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16.01.09 - IDAHO RADIATION CONTROL RULES

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000. LEGAL AUTHORITY.

The Idaho Legislature in Title 39, Chapters 1 and 30, Idaho Code, has granted to the Board of Health and Welfare the authority to adopt rules governing the control of radiation and nuclear material to protect the environment of the state and the health of the citizens of the state. The Idaho Legislature in Title 39, Chapters 1 and 30, Idaho Code, has granted the Director of the Department of Health and Welfare the authority to enforce rules and regulations adopted by the Idaho State Board of Health and Welfare. State regulation of source material, by product material, and special nuclear material in quantities not sufficient to form a critical mass is subject to the provisions of the agreement between the state of Idaho and the U.S. Atomic Energy Commission, effected October 1, 1968, and to the regulations of the Commission as contained in 10 CFR 150. (12-31-91)

001. TITLE AND SCOPE.

These regulations shall be cited, in full, as Idaho Department of Health and Welfare Rules, IDAPA 16, Title 01, Chapter 09, "Idaho Radiation Control Rules." Except as otherwise specifically provided, these rules apply to all persons who receive, possess, use, transfer, own or acquire any source of ionizing radiation, provided, however, that nothing in these rules will apply to any person to the extent such person is subject to regulation by the U.S. Nuclear Regulatory Commission. (12-1-87)

002. DEFINITIONS.

As used in these rules, the following terms have the definitions set forth below: (5-5-81)

01. A/A Values. "A " means the maximum activity of special form radioactive material permitted in a Type A package. "A " means the maximum activity of radioactive material, other than special form radioactive material, permitted in a Type A package. These values are either listed in 10 CFR 71, Appendix A, Table A-1, or may be derived in accordance with the procedure prescribed in Appendix A of 10 CFR 71. (12-1-87)

02. Accelerator Produced Material. Any material made radioactive by exposing it in a particle accelerator. (5-5-81)

03. Accessible Surface. The external surface of the enclosure or housing provided by the manufacturer. (5-5-81)

04. Act. The "Radiation and Nuclear Material Act," Sections 39-3001 through 39-3024, Idaho Code. (5-5-81)

05. Added Filtration. Any filtration added to the inherent filtration. (12-1-87)

06. Agreement State. Any state with which the U.S. Nuclear Regulatory Commission or the U.S. AEC has entered into an effective agreement under Section 274 b of the Atomic Energy Act of 1954, 42 USC 2011--2099, 2111--2190, 2201--2282, 31 USC 1302, as amended. (12-1-87)

07. Airborne Radioactive Material. Any radioactive material dispersed in the air in the form of dusts, fumes, mists, vapors, or gases. (5-9-68)

08. Airborne Radioactivity Area. Any room, enclosure or operating area in which airborne radioactive material exists in concentrations in excess of the amounts specified in Table I, Column I, Subsection 110.03.a.ii., or any room, enclosure or operating area in which airborne radioactive material exists in concentrations which, averaged over the number of hours in any week during which individuals are in the area, exceed twenty-five percent (25%) of the amounts specified in, Table I, Column I, Subsection 110.03.a.ii. (12-31-91)

09. Aluminum Equivalent. The thickness of aluminum (Type 1100) affording the same attenuation, under specified conditions, as the material in question. (5-5-81)

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10. Analytical X-ray Equipment. Equipment used for x-ray diffraction or fluorescence analysis. (12-1-87)

11. Analytical X-ray System. A group of components utilizing x-rays or gamma rays to determine the elemental composition or to examine the microstructure of material. (12-1-87)

12. Assembler. Any person engaged in the business of assembling, replacing, or installing one (1) or more components into an x-ray system or subsystem. The term includes the owner of an x-ray system or his employee or agent who assembles components into an x-ray system that is subsequently used to provide professional or commercial services. (12-1-87)

13. Attenuation Block. A block or stack, having dimensions twenty (20) centimeters by twenty (20) centimeters by three and eight-tenths (3.8) centimeters, of type 1100 aluminum alloy or other materials having equivalent attenuation. (12-1-87)

14. Automatic Exposure Control. A device which automatically controls one (1) or more technique factors in order to obtain at a preselected location(s) a required quantity of radiation (see also "Phototimer"). (12-1-87)

15. Barrier. See Protective Barrier, Subsection 002.93. (12-31-91)

16. Beam Limiting Device. A device which provides a means to restrict the dimensions of the x-ray field, such as but not limited to collimator, diaphragm, or cone. (5-5-81)

17. By-product Material. 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 the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content. (12-1-87)

18. Cabinet Radiography. Industrial radiography using radiation machines, which is conducted in an enclosed, interlocked cabinet, such that the radiation machine will not operate unless all openings are securely closed, and the cabinet is so shielded that every location on the exterior meets conditions for an unrestricted area as specified in Subsection 110.05. (12-31-91)

19. Cabinet X-Ray System. An x-ray system with the x-ray tube installed in an enclosure (hereinafter termed cabinet) which, independently of existing architectural structures except the floor on which it may be placed, is intended to contain at least that portion of a material being irradiated, provide radiation attenuation and exclude personnel from its interior during generation of x-radiation. Included are all x-ray systems designed primarily for the inspection of carry-on baggage at airline, railroad and bus terminals and in similar facilities. An x-ray tube used within a shielded part of a building, or x-ray equipment which may temporarily or occasionally incorporate portable shielding is not considered a cabinet x-ray system. (12-1-87)

20. Certified Cabinet X-Ray System. A cabinet x-ray system which has been certified in accordance with 21 CFR 1010.2 as having been manufactured, assembled and maintained pursuant to the provisions of 21 CFR 1020.40. (12-1-87)

21. Calendar Quarter. Not less than twelve (12) consecutive weeks nor more than fourteen (14) consecutive weeks. The first calendar quarter of each year will begin in January and subsequent calendar quarters will be arranged so that no day is included in more than one (1) calendar quarter and no day in any one (1) year is omitted from inclusion within a calendar quarter. (12-1-87)

22. Calibration. The determination of: (12-1-87)

a. The response or reading of an instrument relative to a series of known radiation values over the range of the instrument; or (12-1-87)

b. The strength of a source of radiation relative to a standard. (12-1-87)

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23. Carrier. 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. (12-1-87)

24. Certified Components. Components of x-ray systems which are subject to regulations promulgated under P.L. 90-602 which is available at all county law libraries. (5-5-81)

25. Certified System. Any x-ray system which has one (1) or more certified components. (5-5-81)

26. CFR. Code of Federal Regulations. (12-1-87)

27. Collimator. A device or mechanism by which the x-ray beam is restricted in size. (5-9-68)

28. Control Panel. That part of the x-ray control upon which are mounted the switches, knobs, pushbuttons, and other hardware necessary for manually setting the technique factors. (5-5-81)

29. Curie. A unit of measurement of radioactivity; one (1) curie (Ci) is that quantity of radioactive material which decays at the rate of 3.7 x 10 transformations per second (tps). One (1) millicurie (mCi) equals one one-thousandth (.001) Curie (3.7×10^{7} + tps) and one (1) microcurie (uCi) equals.000001 Curie (3.7×10^{7} + tps). (12-1-87)

30. Dead-man Switch. A switch so constructed that a circuit-closing contact can be maintained only by continuous pressure on the switch by the operator. (5-9-68)

31. Depleted Uranium. The source material uranium in which the isotope uranium-235 is less than seven hundred and eleven hundredths (0.711) weight percent of the total uranium present. Depleted uranium does not include special nuclear material. (12-1-87)

32. Diagnostic Source Assembly. The tube housing assembly with a beam-limiting device attached. (5-5-81)

33. Diagnostic X-ray System. An x-ray system designed for irradiation of any part of the human body for the purpose of diagnosis or visualization. (5-5-81)

34. Dose. Absorbed dose or dose equivalent as appropriate. (12-1-87)

a. Absorbed dose is the energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. The special unit of absorbed dose is the rad (see "Rad"). (12-1-87)

b. Dose equivalent is a quantity that expresses on a common scale for all radiation a measure of the postulated effect on a given organ. It is defined as the absorbed dose in rads times certain modifying factors. The unit of dose equivalent is the rem (see "Rem"). (12-1-87)

35. Dose Commitment. The total radiation dose to a part of the body that will result from retention in the body of radioactive material. For purposes of estimating the dose commitment, it is assumed that from the time of intake the period of exposure to retained material will not exceed fifty (50) years. (12-1-87)

36. Entrance Exposure Rate. The exposure per unit time at the point where the center of the useful beam enters the patient. (12-1-87)

37. Exclusive Use. 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. Also referred to in other regulations as "sole use" or "full load." (12-1-87)

38. Exposure. The quotient of dQ by dm where "dQ" is the absolute value of the total charge of the ions of one (1) 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 special unit of exposure is the roentgen (R)). (12-1-87)

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39. Exposure Rate. The exposure per unit of time, such as roentgen per minute and milliroentgen per hour. (12-1-87)

40. Facility. The location at which one (1) or more devices or sources are installed and/or located within one (1) building, vehicle, or under one (1) roof and are under the same administrative control. (12-1-87)

41. Fail-Safe Characteristics. A design feature which causes beam port shutters to close, or otherwise prevents emergence of the primary beam, upon the failure of a safety or warning device. (5-5-81)

42. Filter. Material placed in the useful beam to absorb preferentially the less penetrating radiations. (5-5-81)

43. Fissile Material. Any special nuclear material consisting of or containing one or more fissile radionuclides. Fissile radionuclides are plutonium-238, plutonium-239, plutonium-241, uranium-233 and uranium-235. Neither natural nor depleted uranium is fissile material. NOTE: Agency jurisdiction extends only to special nuclear material if quantities are not sufficient to form a critical mass as defined in Subsection 002.128. (12-31-91)

a. Fissile Class I: A package which may be transported in unlimited numbers and in any arrangement, and which requires no nuclear criticality safety controls during transportation. A transport index is not assigned for purposes of nuclear criticality safety but may be required because of external radiation levels. (12-1-87)

b. Fissile Class II: A package which may be transported together with other packages in any arrangement but, for criticality control, in numbers which do not exceed an aggregate transport index of fifty (50). These shipments require no other nuclear criticality safety control during transportation. Individual packages may have a transport index not less than one-tenth (0.1) and not more than ten (10). (12-31-91)

44. Fluoroscopic Imaging Assembly. A component which comprises a reception system in which x-ray photons produce a fluoroscopic image, including equipment housings, electrical interlocks if any, the primary protective barrier, and structural material providing linkage between the image receptor and the diagnostic source assembly. (5-5-81)

44. Former U.S. Atomic Energy Commission (AEC) or U.S. Nuclear Regulatory Commission Licensed Facilities. Nuclear reactors, or nuclear fuel reprocessing plants; or uranium enrichment plants, or critical mass experimental facilities where AEC or Nuclear Regulatory Commission licenses have been terminated. (5-5-81)

46. General License. A license, effective under these regulations without the filing of an application, to acquire, own, possess, use or transfer, radioactive material or a device that contains radioactive material. (5-5-81)

47. General Purpose Radiographic X-ray System. Any radiographic x-ray system which, by design, is not limited to radiographic examination of specific anatomical regions. (5-5-81)

48. Gonadal Shield. A protective barrier for the testes or ovaries. (5-5-81)

49. Half-Value Layer (HVL). The thickness of a specified substance which, when introduced into the path of a given beam of radiation, reduces the exposure rate by one-half (1/2). (5-9-68)

50. Healing Arts. Medicine, dentistry, chiropractic, podiatry, osteopathy, and veterinary medicine. (5-5-81)

51. Healing Arts Screening. The testing of human beings using x-ray machines for the detection or evaluation of health indications when such tests are not specifically and individually ordered by a licensed practitioner of the healing arts legally authorized to prescribe such x-ray tests for the purpose of diagnosis or treatment. (12-1-87)

52. High Radiation Area. Any area, accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive in any one (1) hour a dose in excess of one hundred (100)

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millirems. (5-5-81)

53. Human Use. The internal or external administration of radiation or radioactive materials to human beings. (5-9-68)

54. Image Intensifier. A device, including housing, which instantaneously converts an x-ray pattern into a corresponding light image of higher energy density. (5-5-81)

55. Image Receptor. Any device, such as a fluorescent screen 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 transformations. (5-5-81)

56. Individual. Any human being. (5-5-81)

57. Industrial Radiography. The examination of the macroscopic structure of materials by nondestructive methods utilizing sources of radiation. (5-8-68)

58. Inherent Filtration. The filtration permanently in the useful beam, including the window of the x-ray tube and any permanent tube or source enclosure. (5-9-68)

59. Inspection. 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 Radiation Control Agency. (5-5-81)

60. Interlock. 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. (12-1-87)

61. Kilovolts Peak (kVp). See "Peak Tube Potential." (12-1-87)

62. Lead Equivalent. The thickness of lead affording the same attenuation, under specified conditions, as the material in question. (5-9-68)

63. Leakage Radiation. Radiation emanating from the diagnostic or therapeutic source assembly except for: (12-1-87)

a. The useful beam; and (12-1-87)

b. Radiation produced when the exposure switch or timer is not activated. (12-1-87)

64. Leakage Technique Factors. The technique factors associated with the diagnostic or therapeutic source assembly which are used in measuring leakage radiation. They are defined as follows: (12-1-87)

a. 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 ten (10) millicoulombs, i.e., ten (10) milliampere seconds, or the minimum obtainable from the unit, whichever is larger. (12-1-87)

b. 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. (12-1-87)

65. License. Except where otherwise specified, a license issued pursuant to Section 050. (12-31-91)

66. Licensee. Any person who is licensed by the Radiation Control Agency in accordance with these regulations and the Act. (5-5-81)

67. Licensing State. Any state with regulations equivalent to the Suggested State Regulations for

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Control of Radiation relating to, and an effective program for, the regulatory control naturally occurring and accelerator produced radioactive materials. An agreement state is considered to be a licensing state. (12-1-87)

68. Light Field. That area of the intersection of the light beam from the beam-limiting device and one (1) 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 illumination is one-fourth (1/4) of the maximum in the intersection. (5-5-81)

69. Local Components. Part of an analytical x-ray system including areas that are struck by x-rays such as radiation source housings, port and shutter assemblies, collimators, sample holders, cameras, goniometers, detectors, and shielding, but not including power supplies, transformers, amplifiers, readout devices, and control panels. (12-1-87)

70. Low Specific Activity Material. Low specific activity material means any of the following: (12-1-87)

a. Uranium or thorium ores and physical or chemical concentrates of those ores; (12-1-87)

b. Unirradiated natural or depleted uranium or unirradiated natural thorium; (12-1-87)

c. Tritium oxide in aqueous solutions provided the concentration does not exceed five (5.0) millicuries per milliliter; (12-1-87)

d. Material in which the radioactivity is essentially uniformly distributed and in which the estimated average concentration per gram of contents does not exceed: (12-1-87)

i. 0.0001 millicurie of radionuclides for which the A quantity as defined in Subsection 002.01 is not more than 0.05 curie; (12-31-91)

ii. 0.005 millicurie of radionuclides for which the A quantity as defined in Subsection 002.01 is more than 0.05 curie, but not more than one (1) curie; or (12-31-91)

iii. 0.3 millicurie of radionuclides for which the A quantity as defined in Subsection 002.01. is more than one (1) curie. (12-31-91)

e. Objects of nonradioactive material externally contaminated with radioactive material, provided that the radioactive material is not readily dispersible and the surface contamination, when averaged over an area of one (1) square meter, does not exceed 0.0001 millicurie (22,000) transformations per minute) per square centimeter of radionuclides for which the A quantity as defined in Subsection 002.01. is not more than 0.05 curie or 0.001 millicurie (2,200,000 transformations per minute) per square centimeter for other radionuclides. (12-31-91)

71. Major Processor. A user processing, handling, or manufacturing radioactive material exceeding Type A quantities as unsealed sources of material, or exceeding four (4) times Type B quantities as sealed sources, but does not include nuclear medicine programs, universities, industrial radiographers, or small industrial programs. Type A and B quantities are defined in Section 71.4 of 10 CFR Part 71. (12-1-87)

72. Misadministration. The administration of: (12-1-87)

a. A radiopharmaceutical or radiation from a sealed source other than the one intended; (12-1-87)

b. A radiopharmaceutical or radiation to the wrong patient; (12-1-87)

c. A radiopharmaceutical or radiation by a route of administration other than that intended by the prescribing physician; (12-1-87)

d. A diagnostic dosage of a radiopharmaceutical differing from the prescribed dosage by more than fifty percent (50%); (12-1-87)

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e. A therapeutic dosage of a radiopharmaceutical differing from the prescribed dosage by more than ten percent (10%); or (12-1-87)

f. A therapeutic radiation dose from a sealed source such that errors in the source calibration, time of exposure, and treatment geometry result in a calculated total treatment dose differing from the final prescribed total treatment dose by more than ten percent (10%). (12-1-87)

73. NARM. Any naturally occurring or accelerator produced radioactive material. It does not include byproduct, source, or special nuclear material. (12-1-87)

74. Natural Radioactivity. Radioactivity of naturally occurring nuclides. (12-1-87)

75. Normal Form Radioactive Material. Radioactive material which has not been demonstrated to qualify as "special form radioactive material." (12-1-87)

76. Normal Operating Procedures. Step-by-step instruction necessary to accomplish the analysis. These procedures must include sample insertion and manipulation, equipment alignment, routine maintenance by the registrant or licensee, and data recording procedures, which are related to radiation safety. (12-1-87)

77. Occupational Dose. Exposure of an individual to radiation in a restricted area or exposure in the course of employment in which the individual's duties involve exposure to radiation, provided, that occupational dose will not be deemed to include any exposure of an individual to radiation for the purpose of diagnosis or therapy of such individual. (5-5-81)

78. Open Beam Configuration. An analytical x-ray system in which an individual could accidently place some part of his body in the primary beam path during normal operation. (12-1-87)

79. Ore Refineries. All processors of a radioactive material ore. (5-5-81)

80. Package. The packaging together with its radioactive contents as presented for transport. (12-1-87)

81. Packaging. The assembly of components necessary to comply with the following packaging requirements of Sections 500 and 501. 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. (12-31-91)

82. Particle Accelerator. The term "particle accelerator is very broad and covers many types of devices. It is generally defined as a device used to impart kinetic energy to electrically charged particles such as electrons, protons, deuterons, and helium ions, and is referred to herein to designate devices that accelerate particles to energies greater than approximately one (1) MeV, or to neutron generators which operate with a potential of about one hundred fifty (150) kv. Such accelerators as cyclotrons, betatrons, linear accelerators, Van de Graaff accelerators, Cockcroft-Walton type neutron generators, and resonant transformers are included. (5-5-81)

83. Peak Tube Potential. The maximum value of the potential difference across the x-ray tube during an exposure. (12-1-87)

84. Permanent Radiographic Installation. An installation or structure designed or intended for radiography and in which radiography is regularly performed. (12-1-87)

85. Person. Any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, political subdivision of this state, any other state, or political subdivision or agency thereof, any legal successor, representative, agent or agency of the foregoing. (5-9-68)

86. Personal Supervision. Supervision in which the authorized operator of an x-ray unit or radioisotopic device is physically present at the site where sources of radiation and associated equipment are being used, watching the performance of the assistant or trainee and in such proximity that immediate assistance can be given if required. (12-1-87)

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87. Personnel Monitoring. The determination of exposure to a person. (5-9-68)

88. Personnel Monitoring Equipment. Devices designed to be worn or carried by an individual for the purpose of estimating the dose received, such as film or thermoluminescent dosimetry badges, pocket chambers, pocket dosimeters, or film and thermoluminecsent dosimetry rings. (12-1-87)

89. Pharmacist. An individual licensed by the Idaho Board of Pharmacy to compound and dispense drugs, prescriptions, and poisons. (5-9-68)

90. Phototimer. A method for controlling radiation exposures to image receptors by the amount of radiation which reaches a radiation monitoring device. The radiation monitoring device is part of an electronic circuit which controls the duration of time the tube is activated. (5-5-81)

91. Physician. An individual licensed by the Idaho State Board of Medicine to practice medicine. (5-9-68)

92. Position Indicating Device (PID). A device on dental x-ray equipment used to indicate the beam position and to establish a definite source-surface (skin) distance. It may or may not incorporate or serve as a beam-limiting device. (12-1-87)

93. Primary Beam. Radiation which passes through an aperture of the source housing by a direct path from the x-ray tube or a radioactive source located in the radiation source housing. (12-1-87)

94. Protective Apron. Apron made of radiation absorbing materials, used to reduce radiation exposure. (5-9-68)

95. Protective Barrier. A barrier of radiation attenuating materials used to reduce radiation exposure. (5-9-68)

a. Primary Protective Barrier. A barrier sufficient to attenuate the useful beam to the required degree to assure compliance with Subsections 110.01, 110.04, and 110.05. (12-31-91)

b. Secondary Protective Barrier. A barrier sufficient to attenuate stray radiation to the required degree to assure compliance with Subsections 110.01, 110.04, and 110.05. (12-31-91)

96. Protective Glove. Glove made of radiation absorbing materials used to reduce radiation exposure. (5-5-81)

97. Qualified Expert. An individual who has demonstrated to the satisfaction of the Radiation Control Agency that such individual possesses the knowledge and training to measure ionizing radiation, to evaluate safety techniques, and to advise regarding radiation protection needs. (12-1-87)

98. Rad. The special unit of absorbed dose. One (1) rad equals one one-hundredth (.01) of a joule per kilogram of material. For example, if tissue is the material of interest, then one (1) rad equals one hundred (100) ergs per gram of tissue. (12-1-87)

99. Radiation. Ionizing radiation, that is, gamma rays and x-rays, alpha and beta particles, high speed electrons, neutrons, protons, and other atomic particles. (12-1-87)

100. Radiation Area. Any area, accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive in any one (1) hour a dose in excess of five (5) millirem, or in any five (5) consecutive days a dose in excess of one hundred (100) millirem. (5-5-81)

101. Radiation Control Agency. The Idaho Department of Health and Welfare. (5-5-81)

102. Radiation Machine. Any device capable of producing radiation except devices which produce

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radiation only from radioactive material. (5-9-68)

103. Radiation Safety Officer. An individual who has the knowledge and responsibility to apply appropriate radiation protection principles and regulations. (5-5-81)

104. Radioactive Material. Any material, solid, liquid, or gas, which spontaneously emits radiation. (5-9-68)

105. Radioactivity. The transformation of unstable atomic nuclei by the emission of radiation. (12-1-87)

106. Radiograph. An image receptor on which the image is created directly or indirectly by an x-ray pattern and results in a permanent record. (5-5-81)

107. Radiographer. Any individual who performs or who, in attendance at the site where sources of radiation are being used, personally supervises industrial radiographic operations and who is responsible to the licensee or registrant for assuring compliance with the requirements of these regulations and all conditions of licensure. (5-9-68)

108. Radiographer's Assistant. Any individual who, under the personal supervision of a radiographer, uses sources of radiation, related handling tools, or survey instruments in industrial radiography. (5-9-68)

109. Radiographic Exposure Device. Any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof could be moved, or otherwise changed, from a shielded to unshielded position for purposes of making a radiographic exposure. (5-9-68)

110. Radiographic Imaging System. Any system whereby a permanent or semi-permanent image is recorded on an image receptor by the action of ionizing radiation. (5-5-81)

111. Radiological Physicist. An individual who: (12-1-87)

a. Is certified by the American Board of Radiology in therapeutic radiological physics, radiological physics, or x- and gamma-ray physics; or (12-1-87)

b. Has a bachelor's degree in one of the physical sciences or engineering and three (3) years full-time experience working in therapeutic radiological physics under the direction of a physicist certified by the American Board of Radiology. The work duties must include duties involving the calibration and spot-checks of a medical accelerator or a sealed source teletherapy unit; or (12-1-87)

c. Has a Master's or a Doctor's degree in physics, biophysics, radiological physics, health physics, or engineering; has had one (1) year's full-time training in therapeutic radiological physics; and has had one (1) year's full-time work experience in a radiotherapy facility where the individual's duties involve calibration and spot-checks of a medical accelerator or a sealed source teletherapy unit. (12-1-87)

112. Rating. The operating limits as specified by the component manufacturer. (5-5-81)

113. Registrant. Any person who owns or possesses any device capable of emitting radiation which is registered with the Radiation Control Agency. (5-5-81)

114. Registration. The filing with the Radiation Control Agency of all devices capable of emitting radiation in accordance with these regulations. (5-5-81)

115. Regulations of the U.S. Department of Transportation. The regulations in 49 CFR Parts 100-189. (12-1-87)

116. Rem. A measure of dose equivalent. One (1) millirem (mrem) equals one one-thousandth (.001) rem. For the purpose of these regulations, any of the following is considered to be equivalent to a dose of one (1) rem: (12-1-87)

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a. An exposure of one (1) R of X-, or gamma radiation; or (5-9-68)

b. An absorbed dose of one (1) rad due to X-, gamma, or beta radiation; or (12-1-87)

c. An absorbed dose of one-tenth (0.1) rad due to neutrons or high energy protons. (12-1-87)

d. If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, one (1) rem of neutron radiation can, for purposes of these regulations, be assumed to be equivalent to fourteen million (14,000,000) neutrons per square centimeter incident upon the body; or, if there exists sufficient information to estimate with reasonable accuracy the approximate distribution in energy of the neutrons, the incident number of neutrons per square centimeter equivalent to one (1) rem can be estimated from the following table.

NEUTRON FLUX DOSE EQUIVALENTS TABLE

Neutron Energy (MeV)	Number of Neutrons per Square Centimeter Equivalent to a Dose of One (1) Rem (Neutron/cm^2)	Average Flux to Deliver One hundred (100) Millirem in Forty (40) Hours (Neutrons/cm^2 per Second)
Thermal	970×10^6	670
0.0001	720×10^6	500
0.005	820×10^6	570
0.02	400×10^6	280
0.1	120×10^6	80
0.5	43×10^6	30
1.0	26×10^6	18
2.5	29×10^6	20
5.0	26×10^6	18
7.5	24×10^6	17
10.0	24×10^6	17
10 to 30	14×10^6	10

(12-1-87)

e. An absorbed dose of five one-hundredths (0.05) rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye. (12-1-87)

117. Research and Development. Either theoretical analysis, exploration, or experimentation; or 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. (5-5-81)

118. Restricted Area. Any area access to which is controlled by the licensee or registrant for purposes of protection of individuals from exposure to radiation and/or radioactive material. Restricted area does not include any areas used for residential quarters, although a separate room or rooms in a residential building can be set apart as a restricted area. (5-5-81)

119. Roentgen. A measure of the exposure of X- or gamma radiation in terms in the electric charge

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produced in air. One (1) Roentgen (R) is defined as the amount of X- or gamma radiation required to produce by ionization 2.58 x 10^4 coulomb of ions per kilogram of dry air. (12-1-87)

120. Scattered Radiation. Radiation that, during passage through matter, has been deviated or deflected in direction. (5-9-68)

121. Sealed Source. 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. (5-9-68)

122. Shielded Position. The location within the radiographic exposure device or storage container which, by manufacturer's design, is the proper location for storage of the sealed source. (12-1-87)

123. Shielded Room Radiography. Industrial radiography conducted in an enclosed room so shielded that every location on the exterior meets the conditions as specified in Subsection 110.05. (12-31-91)

124. Shutter. 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. (12-1-87)

125. Source Changer. A device designed and used for replacement of sealed sources in radiographic exposure devices, including those source changers also used for transporting and storage of sealed sources. (12-1-87)

126. Source-Image Receptor Distance (SID). The distance from the source to the center of the input surface of the image receptor. (12-1-87)

127. Source Material. Either uranium or thorium, or any combination thereof, in any physical or chemical form, or ores which contain by weight one-twentieth of one percent (.05%) or more of uranium, thorium, or any combination thereof, not including special nuclear material. (12-1-87)

128. Source of Radiation. Any radioactive material, or any device or equipment emitting or capable of producing radiation. (5-5-81)

129. Special Form Radioactive Material. Radioactive material which satisfies the following conditions: (12-1-87)

a. It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule; (12-1-87)

b. The piece or capsule has at least one (1) dimension not less than five (5) millimeters (0.197 inch); and (12-1-87)

c. It satisfies the test requirements specified by the U.S. Nuclear Regulatory Commission. A special form encapsulation designed in accordance with the Nuclear Regulatory Commission requirements in effect on June 30, 1983, and constructed prior to July 1, 1985, may continue to be used. A special form encapsulation either designed or constructed after June 30, 1985, must meet requirements of this definition applicable at the time of its design or construction. (12-1-87)

130. Special Nuclear Material in Quantities Not Sufficient to Form a Critical Mass. Uranium enriched in the isotope U-235 in quantities not exceeding three hundred fifty (350) grams of contained U-235; uranium 233 in quantities not exceeding two hundred (200) grams; plutonium in quantities not exceeding two hundred (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 the kinds of special nuclear material in combination must not exceed "1", that is, "unity". (5-5-81)

131. Specific Activity. 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

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the material. (12-1-87)

132. Spot Film. A radiograph which is made during a fluoroscopic examination to permanently record conditions which exist during that fluoroscopic procedure. (5-5-81)

133. Spot Film Device. A device intended to transport and/or position a radiographic image receptor between the x-ray source and fluoroscopic image receptor, including clip-on cassette holders. (5-5-81)

134. SSD (Source Skin Distance). The distance between the source of radiation and the skin of the patient. (12-1-87)

135. Storage Container. A device in which sealed sources are transported or stored. (5-9-68)

136. Stray Radiation. The sum of leakage and scattered radiation. (5-9-68)

137. Survey. An evaluation of the production, use, release, disposal, and/or presence of sources of radiation under a specific set of conditions to determine actual or potential radiation hazards. When appropriate, such evaluation includes, but is not limited to tests, physical examination, and measurements of levels of radiation or concentration of radioactive material present. (5-5-81)

138. Technique Factors. The conditions of operation are specified as follows: (12-1-87)

a. For capacitor energy storage equipment, peak tube potential in kV and quantity of charge in mAs; and (5-5-81)

b. For field emission equipment rated for pulsed operation, peak tube potential in kV and number of x-ray pulses; and (5-5-81)

c. 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. (5-5-81)

139. Temporary Job Site. Any location where industrial radiography is performed other than the location(s) listed in a specific license or certificate of registration. (12-1-87)

140. Termination of Irradiation. The stopping of irradiation in a fashion which will not permit continuance of irradiation without the resetting of operating conditions at the control panel. (12-1-87)

141. Test. The process of certifying compliance with an applicable regulation. (12-1-87)

142. These Regulations. Idaho Department of Health and Welfare Rules, Title 1, Chapter 9, Sections 000 through 999, "Idaho Radiation Control Rules." (12-31-91)

143. Traceable to a National Standard. When a quantity or a measurement has been compared to a national standard directly or indirectly through one (1) or more intermediate steps and when all comparisons have been documented. (12-1-87)

144. Transport Index. The dimensionless number (rounded up to the first decimal place) 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 expressing the maximum radiation level in millirem per hour at one (1) meter from the external surface of the package. (12-1-87)

145. Tube. An x-ray tube, unless otherwise specified. (5-5-81)

146. Tube Housing Assembly. The tube housing with tube installed, including high-voltage and/or filament transformers and other appropriate elements when contained within the tube housing. (12-1-87)

147. Tube Rating Chart. The set of curves which specify the rated limits of operation of the tube in terms

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of the technique factors. (12-1-87)

148. Type A Quantity. A quantity of radioactive material, the aggregate radioactivity of which does not exceed A_1 for special form radioactive material or A_2 for normal form radioactive material, where A_1 and A_2 are as defined in Subsection 002.01. (12-31-91)

149. Type B Package. A Type B packaging together with its radioactive contents. A Type B package design is designated as B(U) or B(M). B(U) refers to the need for unilateral approval of international shipments. B(M) refers to the need for multilateral approval. 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 Department of Transportation regulations in 49 CFR Part 173. A Type B package approved prior to September 6, 1983 was designated only as Type B. Limitations on its use are specified in Section 500. (12-31-91)

150. Type B Packaging. Packaging designed to retain the integrity of containment and shielding required by U.S. Nuclear Regulatory Commission regulations when subjected to the normal conditions of transport and hypothetical accident test conditions set forth in 10 CFR Part 71. (12-1-87)

151. Type B Quantity. A quantity of radioactive material greater than a Type A quantity. (12-1-87)

152. U.S. Department of Energy. 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, 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). (12-1-87)

153. Unrefined and Unprocessed Ore. Ore in its natural form prior to any processing, such as grinding, roasting, beneficiating, or refining. (5-9-68)

154. Unrestricted Area. Any area access to which is not controlled by the licensee or registrant for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters. (5-9-68)

155. Uranium (depleted). The source material uranium in which the isotope uranium-235 is less than seven hundred eleven thousandths (0.711) weight percent of the total uranium present. Depleted uranium does not include special nuclear material. (5-5-81)

156. Useful Beam. 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. (12-1-87)

157. Variable-Aperture Beam-Limiting Device. A beam-limiting device which has capacity for stepless adjustment of the x-ray field size at a given source to image distance (SID). (12-1-87)

158. Visible Area. That portion of the input surface of the image receptor over which incident x-ray photons are producing a visible image. (12-1-87)

159. Waste Handling Licensees. Persons licensed to receive and store radioactive wastes prior to disposal and/or persons licensed to dispose of radioactive wastes. (12-1-87)

160. Worker. An individual engaged in work under a license or registration issued by the Radiation Control Agency and controlled by a licensee or registrant, not including the licensee or registrant. (5-5-81)

161. X-ray Control. A device which controls input power to the x-ray high-voltage generator and/or the x-ray tube, including equipment such as timers, phototimers, automatic brightness stabilizers and similar devices

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which control the technique factors of an x-ray exposure. (5-5-81)

162. X-ray Equipment. An x-ray system, subsystem or component thereof. (5-5-81)

a. Mobile. X-ray equipment mounted on a permanent base with wheels and/or casters for moving while completely assembled. (5-5-81)

b. Portable. X-ray equipment designed to be hand-carried. (5-5-81)

c. Stationary. X-ray equipment installed in a fixed location. (5-5-81)

163. X-ray Field. That area of the intersection of the useful beam and any one (1) 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 (1/4) of the maximum in the intersection. (5-5-81)

164. X-ray High-Voltage Generator. A device which transforms electrical energy from the potential supplied by the x-ray control to the tube operating potential, including but not limited to a 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. (5-5-81)

165. X-ray Source. The focal spot of the x-ray tube. (12-1-87)

166. X-ray System. An assemblage of components for the controlled production of x-rays, including 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. (5-5-81)

167. X-ray Tube. Any electron tube which is designed for the conversion of electrical energy into x-ray energy. (5-5-81)

003. -- 005. (RESERVED).

006. EXEMPTIONS.
The Radiation Control Agency can, upon application therefor or upon its own initiative, grant such exemptions or exceptions from the requirements of these regulations as it determines are authorized by law and will not result in undue hazard to public health and safety and/or property. (5-9-68)

01. Carriers. (7-1-93)

a. Common, contract, and private carriers who are not subject to the rules and regulations of the U.S. Department of Transportation or the U.S. Postal Service are subject to applicable sections of these rules. (5-5-81)

b. Common and contract carriers, freight forwarders, and warehousemen, who are subject to the rules and regulations of the U.S. Postal Service (39 CFR Parts 14 & 15), are exempt from these regulations to the extent that they transport or store sources of radiation in the regular course of their carriage for another or storage incident thereto. (5 -5-81)

02. U.S. Department of Energy Contractors and U.S. Nuclear Regulatory Commission Contractors. Any U.S. Department of Energy (DOE) contractor or subcontractor or any U.S. Nuclear Regulatory Commission contractor or subcontractor of the following categories operating within this State is exempt from these rules to the extent that such contractor or subcontractor under his contract receives, possesses, uses, transfers or acquires sources of radiation: (12-1-87)

a. Prime contractors performing work for the DOE at U.S. Government-owned or controlled sites, including the transportation of sources of radiation to or from such sites and the performance of contract services during temporary interruptions of such transportation; and (5-5-81)

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b. Prime contractors of the DOE performing research in, or development, manufacture, storage, testing or transportation of, atomic weapons or components thereof; and (5-5-81)

c. Prime subcontractors of the DOE using or operating nuclear reactors or other nuclear devices in a U.S. Government-owned vehicle or vessel; and (5-5-81)

d. Any other prime contractor or subcontractor of the DOE or of the Nuclear Regulatory Commission when the State and the Nuclear Regulatory Commission jointly determine: (5-5-81)

i. That the exemption of the prime contractor or subcontractor is authorized by law; and (5-5-81)

ii. That under the terms of the contract or subcontract, there is adequate assurance that the work thereunder can be accomplished without undue risk to its public health and safety. (5-5-81)

007. RECORDS.
Each licensee and registrant must keep records showing the receipt, transfer, and disposal of all sources of radiation. Additional record requirements are specified elsewhere in these regulations. (5-5-81)

008. INSPECTIONS.

01. Prelicensing Inspections. The Agency has the right to conduct prelicensing inspections to verify information contained in applications and secure additional information deemed necessary to make a reasonable determination as to whether to issue a license and whether any special conditions must be attached thereto by visiting the facility or location where sources of radiation would be possessed or used. (12-1-87)

02. Inspections of Facilities. Each licensee and registrant must afford the Agency at all reasonable times opportunity to inspect sources of radiation and the premises and facilities wherein such sources of radiation are used or stored. (12-1-87)

03. Inspections of Records. Each licensee and registrant will make available to the Agency for inspection, upon reasonable notice, records maintained pursuant to these regulations. (12-1-87)

009. TESTS.
Each licensee and registrant must perform or permit the Radiation Control Agency to perform such reasonable tests as the Radiation Control Agency deems appropriate or necessary including, but not limited to, tests of sources of radiation, facilities wherein sources of radiation are used or stored, radiation detection and monitoring instruments, and other equipment and devices used in connection with utilization or storage of licensed or registered sources of radiation. (12-1-87)

010. ADDITIONAL REQUIREMENTS.
The Radiation Control Agency can, by license or registration condition, impose upon any licensee or registrant such requirements in addition to those established in these regulations as it deems appropriate or necessary to minimize danger to public health and safety and/or property. (5-5-81)

011. VIOLATIONS.
An injunction or other court order can be obtained prohibiting any violations of any provision of the Act or any regulation or order issued thereunder. Any person who willfully violates any provision of the Act or any regulation or order issued thereunder could be guilty of a crime and, upon conviction, could be punished by fine or imprisonment or both, as provided by law. (5-9-68)

012. IMPOUNDING.
Sources of radiation are subject to impoundment pursuant to Section 39-3014, Idaho Code. (5-5-81)

013. PROHIBITED RADIATION USES.

01. Radiation Sources Used for Shoe Sizing. It is unlawful to operate any device or machine using fluoroscopic x-ray or radiation principles for fitting or selling footwear. (5-5-81)

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02. Unauthorized Use on Humans. It is unlawful to intentionally apply ionizing radiation to human beings except by or under direct supervision of persons, other than veterinarians, licensed to practice healing arts and authorized to use such radiation or as otherwise provided in these regulations related to exposures. (5-5-81)

03. General Health and Safety. The Radiation Control Agency shall have the authority to prohibit the use of sources of radiation when found to be detrimental to health and safety. (12-1-87)

014. COMMUNICATIONS.
All communications and reports concerning these regulations, and applications filed thereunder, may be addressed to the Radiation Control Section, Idaho Department of Health and Welfare, Statehouse, Boise, Idaho 83720. (12-1-87)

015. -- 049. (RESERVED).

050. LICENSING AND REGISTRATION.
Sections 050 -- 099 provide for the licensing and registration of sources of ionizing radiation. (12-31-91)

051. SCOPE.
No person shall receive, possess, use, transfer, own or acquire radioactive material except as authorized in a specific or general license. All other sources of radiation, unless exempt under Sections 053.01, 053.02, 053.03, 006.01, 006.02.a. and 501.01, must be registered with the Radiation Control Agency in accordance with the requirements of Section 090. (12-31-91)

052. (RESERVED).

053. EXEMPTIONS FOR LICENSING AND REGISTRATION PURPOSES.

01. Source Material. (7-1-93)

a. Any person is exempt from the requirements of Section 051 to the extent that such person receives, possesses, owns, uses, or transfers source material in any chemical mixture, compound, solution, or alloy in which the source material is by weight less than one-twentieth of one percent (0.05%) of the mixture, compound, solution, or alloy. (12-31-91)

b. Any person is exempt from the requirements of Section 051 to the extent that such person receives, possesses, owns, uses, or transfers unrefined and unprocessed ore containing source material. Except as authorized in a specific license, such person will not refine or process such ore. (12-31-91)

c. Any person is exempt from the requirements of Section 051 to the extent that such person receives, possesses, owns, uses, or transfers: (12-31-91)

i. Any quantities of thorium contained in the following products: (5-5-81)

(a) Incandescent gas mantles; or (5-9-68)

(b) Vacuum tubes; or (5-9-68)

(c) Welding rods; or (5-9-68)

(d) Electric lamps for illumination purposes provided that each lamp does not contain more than fifty (50) milligrams of thorium; or (5-9-68)

(e) Germicidal lamps, sunlamps, and lamps for outdoor or industrial lighting provided that each lamp does not contain more than two (2) grams of thorium; or (5-9-68)

(f) Rare earth metals and compounds, mixtures, and products containing not more than one-fourth of one percent (0.25%) by weight thorium, uranium, or any combination of these; or (12-1-87)

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(g) Personnel neutron dosimeters, provided that each dosimeter does not contain more than fifty (50) milligrams of thorium; or (12-1-87)

ii. Source material contained in the following products: (5-9-68)

(a) Glazed ceramic tableware, provided that the glaze contains not more than twenty percent (20%) by weight source material; or (5-9-68)

(b) Glassware, glass enamel and glass enamel frit containing not more than ten percent (10%) by weight source material; but not including commercially manufactured glass brick, pane glass, ceramic tile or other glass, glass enamel or ceramic used in construction; or (5-9-68)

(c) Piezoelectric ceramic containing not more than two percent (2%) by weight source material; or (5-9-68)

(d) Glass enamel or glass enamel frit containing not more than ten percent (10%) by weight source material imported or ordered for importation into the United States, or initially distributed by manufacturers in the United States, before the effective date of these regulations; or (12-1-87)

iii. Photographic film, negatives, and prints containing uranium or thorium; or (5-9-68)

iv. Any finished product or part fabricated of, or containing, tungsten-thorium or magnesium-thorium alloys; provided that the thorium content of the alloy does not exceed four percent (4%) by weight and that this exemption must not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of any such product or part; or (5-9-68)

v. Uranium contained in counterweights installed in aircraft, rockets, projectiles, and missiles, or stored or handled in connection with installation or removal of such counterweights; provided: (5-9-68)

(a) The counterweights are manufactured in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, or the Atomic Energy Commission authorizing distribution by the licensee pursuant to 10 CFR Part 40; and (12-1-87)

(b) Each counterweight has been impressed with the following legend clearly legible through any plating or other covering: "DEPLETED URANIUM". However, the requirements specified in Subsections 053.01.c.v.(b) and 053.01.c.v.(c) need not be met by counterweights manufactured prior to December 31, 1969; provided, that such counterweights are impressed with the legend, "CAUTION - RADIOACTIVE MATERIAL - URANIUM", as previously required by the regulations; and (12-31-91)

(c) Each counterweight is durably and legibly labeled or marked with the identification of the manufacturer and the statement: "UNAUTHORIZED ALTERATIONS PROHIBITED"; and (5-9-68)

(d) This exemption shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of any such counterweights other than repair or restoration of any plating or other covering; or (12-1-87)

vi. Uranium used as shielding constituting part of any shipping container which is conspicuously and legibly impressed with the legend "CAUTION - RADIOACTIVE SHIELDING - URANIUM" and the uranium metal is encased in mild steel or equally fire resistant metal of minimum wall thickness of one-eighth (1/8) inch (3.2 millimeters); or (12-1-87)

vii. Thorium contained in finished optical lenses, provided that each lens does not contain more than thirty percent (30%) by weight of natural thorium containing thorium 232 and thorium 238 in equilibrium or 26 nCi for mixtures not in equilibrium; and that the exemption contained in Subsection 053.01.c.vii. must not be deemed to authorize either: (12-31-91)

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(a) The shaping, grinding, or polishing or such lens or manufacturing processes other than the assembly of such lens into optical systems and devices without any alteration of the lens; or (5-9-68)

(b) The receipt, possession, use, or transfer of thorium contained in contact lenses, or in spectacles, or in eye-pieces in binoculars or other optical instruments; or (5-9-68)

viii. Uranium contained in detector heads for use in fire detection units, provided that each detector head contains not more than five one-thousandths (0.005) microcurie of uranium; or (5-9-68)

ix. Thorium contained in any finished aircraft engine part containing nickel-thoria alloy, provided: (5-9-68)

(a) The thorium is dispersed in the nickel-thoria alloy in the form of finely divided thoria, that is, thorium dioxide; and (5-9-68)

(b) The thorium content in the nickel-thoria alloy does not exceed four percent (4%) by weight of natural thorium containing thorium 232 and thorium 238 in equilibrium or 26 nCi for mixtures not in equilibrium. (5-5-81)

d. The exemptions in Subsection 053.01.c. do not authorize the manufacture of any of the products described. (12-31-91)

02. Radioactive Materials Other Than Source Materials. (12-31-91)

a. Exempt Concentrations. (12-31-91)

i. Except as provided in Subsection 053.02.a.iii. any person is exempt to the extent that such person receives, possesses, uses, transfers, owns or acquires products or materials introduced in concentrations not in excess of those listed in Subsection 053.02.a.ii. (12-31-91)

ii. Exempted Concentrations. (12-31-91)

Element (atomic number)	Isotope	Column I Gas concentration uCi/ml*	Column II Liquid and solid concentration uCi/ml**
Antimony (51)	Sb 122		$3X10^{-4}$
	Sb 124		$2X10^{-4}$
	Sb 125		$1X10^{-3}$
Argon (18)	Ar 37	$1X10^{-3}$	
	Ar 41	$4X10^{-7}$	
Arsenic (33)	As 73		$5X10^{-3}$
	As 74		$5X10^{-4}$
	As 76		$2X10^{-4}$
	As 77		$8X10^{-4}$
Barium (56)	Ba 131		$2X10^{-3}$
	Ba 140		$3X10^{-4}$
Beryllium (4)	Be 7		$2X10^{-2}$
Bismuth (83)	Bi 206		$4X10^{-4}$

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Element (atomic number)	Isotope	Column I Gas concentration uCi/ml*	Column II Liquid and solid concentration uCi/ml**
Bromine (35)	Br 82	$4X10^{-7}$	$3X10^{-3}$
Cadmium (48)	Cd 109		$2X10^{-3}$
	Cd 115m		$3X10^{-4}$
	Cd 115		$3X10^{-4}$
Calcium (20)	Ca 45		$9X10^{-5}$
	Ca 47		$5X10^{-4}$
Carbon (6)	C 14	$1X10^{-6}$	$8X10^{-3}$
Cerium (58)	Ce 141		$9X10^{-4}$
	Ce 143		$4X10^{-4}$
	Ce 144		$1X10^{-4}$
Cesium (55)	Cs 131		$2X10^{-2}$
	Cs 134m		$6X10^{-2}$
	Cs 134		$9X10^{-5}$
Chlorine (17)	Cl 38	$9X10^{-7}$	$4X10^{-3}$
Chromium (24)	Cr 51		$2X10^{-2}$
Cobalt (27)	Co 57		$5X10^{-3}$
	Co 58		$1X10^{-3}$
	Co 60		$5X10^{-4}$
Copper (29)	Cu 64		$3X10^{-3}$
Dysprosium (66)	Dy 165		$4X10^{-3}$
	Dy 166		$4X10^{-4}$
Erbium (68)	Er 169		$9X10^{-4}$
	Er 171		$1X10^{-3}$
Europium (63)	Eu 152		$6X10^{-4}$
	(T 1/2=9.2 Hrs)		
	Eu 155		$2X10^{-3}$
Fluorine (9)	F 18	$2X10^{-6}$	$8X10^{-3}$
Gadolinium (64)	Gd 153		$2X10^{-3}$
	Gd 159		$8X10^{-4}$
Gallium (31)	Ga 72		$4X10^{-4}$
Germanium (32)	Ge 71		$2X10^{-2}$
Gold (79)	Au 196		$2X10^{-3}$
	Au 198		$5X10^{-4}$
	Au 199		$2X10^{-3}$

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Element (atomic number)	Isotope	Column I Gas concentration uCi/ml*	Column II Liquid and solid concentration uCi/ml**
Hafnium (72)	Hf 181		$7X10^{-4}$
Hydrogen (1)	H 3	$5X10^{-6}$	$3X10^{-2}$
Indium (49)	In 113m		$1X10^{-2}$
	In 114m		$2X10^{-4}$
Iodine (53)	I 126	$3X10^{-9}$	$2X10^{-5}$
	I 131	$3X10^{-9}$	$2X10^{-5}$
	I 132	$8X10^{-8}$	$6X10^{-4}$
	I 133	$1X10^{-8}$	$7X10^{-5}$
	I 134	$2X10^{-7}$	$1X10^{-3}$
Iridium (77)	Ir 190		$2X10^{-3}$
	Ir 192		$4X10^{-4}$
	Ir 194		$3X10^{-4}$
			or $3X10^{-4}$
Iron (26)	Fe 55		$8X10^{-3}$
	Fe 59		$6X10^{-4}$
Krypton (36)	Kr 85m	$1X10^{-6}$	
	Kr 85	$3X10^{-6}$	
Lanthanum (57)	La 140		$2X10^{-4}$
Lead (82)	Pb 203		$4X10^{-4}$
Lutetium (71)	Lu 177		$1X10^{-3}$
Manganese (25)	Mn 52		$3X10^{-4}$
	Mn 54		$1X10^{-3}$
	Mn 56		$1X10^{-3}$
Mercury (80)	Hg 197m		$2X10^{-3}$
	Hg 197		$3X10^{-3}$
	Hg 203		$2X10^{-4}$
Molybdenum (42)	Mo 99		$2X10^{-3}$
Neodymium (60)	Nd 147		$6X10^{-4}$
	Nd 149		$3X10^{-3}$
Nickel (28)	Ni 65		$1X10^{-3}$
Niobium (Columbium) (41)	Nb 95		$1X10^{-3}$
	Nb 97		$9X10^{-3}$
Osmium (76)	Os 185		$7X10^{-4}$
	Os 191m		$3X10^{-2}$

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Element (atomic number)	Isotope	Column I Gas concentration uCi/ml*	Column II Liquid and solid concentration uCi/ml**
	Os 191		$2X10^{-3}$
	Os 193		$6X10^{-4}$
Palladium (46)	Pd 103		$3X10^{-3}$
	Pd 109		$9X10^{-4}$
Phosphorus (15)	P 32		$2X10^{-4}$
Platinum (78)	Pt 191		$1X10^{-3}$
	Pt 193m		$1X10^{-2}$
	Pt 197m		$1X10^{-2}$
	Pt 197		$1X10^{-3}$
Polonium (84)	Po 210		$7X10^{-6}$
Potassium (19)	K 42		$3X10^{-3}$
Praseodymium (59)	Pr 142		$3X10^{-4}$
	Pr 143		$5X10^{-4}$
Promethium (61)	Pm 147		$2X10^{-3}$
	Pm 149		$4X10^{-4}$
Radium (88)	Ra 226		$1X10^{-7}$
	Ra 228		$3X10^{-7}$
Rhenium (75)	Re 183		$6X10^{-3}$
	Re 186		$9X10^{-4}$
	Re 188		$6X10^{-4}$
Rhodium (45)	Rh 103m		$1X10^{-1}$
	Rh 105		$1X10^{-3}$
Rubidium (37)	Rb 86		$7X10^{-4}$
Ruthenium (44)	Ru 97		$4X10^{-3}$
	Ru 103		$8X10^{-4}$
	Ru 105		$1X10^{-3}$
	Ru 106		$1X10^{-4}$
Samarium (62)	Sm 153		$8X10^{-4}$
Scandium (21)	Sc 46		$4X10^{-4}$
	Sc 47		$9X10^{-4}$
	Sc 48		$3X10^{-3}$
Selenium (34)	Se 75		$3X10^{-3}$
Silicon (14)	Si 31		$9X10^{-3}$
Silver (47)	Ag 105		$1X10^{-4}$

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Element (atomic number)	Isotope	Column I Gas concentration uCi/ml*	Column II Liquid and solid concentration uCi/ml**
	Ag 110m		$3X10^{-4}$
	Ag 111		$4X10^{-4}$
Sodium (11)	Na 24		$2X10^{-3}$
Strontium (38)	Sr 85		$1X10^{-3}$
	Sr 89		$1X10^{-4}$
	Sr 91		$7X10^{-4}$
	Sr 92		$7X10^{-4}$
Sulfur (16)	S 35	$9X10^{-8}$	$6X10^{-4}$
Tantalum (73)	Ta 182		$4X10^{-4}$
Technetium (43)	Tc 96m		$1X10^{-1}$
	Tc 96		$1X10^{-3}$
Tellurium (52)	Te 125m		$2X10^{-3}$
	Te 127m		$6X10^{-4}$
	Te 127		$3X10^{-3}$
	Te 129m		$3X10^{-4}$
	Te 131m		$6X10^{-4}$
	Te 132		$3X10^{-4}$
Terbium (65)	Tb 160		$4X10^{-4}$
Thallium (81)	Tl 200		$4X10^{-3}$
	Tl 201		$3X10^{-3}$
	Tl 202		$1X10^{-3}$
	Tl 204		$1X10^{-3}$
Thulium (69)	Tm 170		$5X10^{-4}$
	Tm 171		$5X10^{-3}$
Tin (50)	Sn 113		$9X10^{-4}$
	Sn 125		$2X10^{-4}$
Tungsten (Wolfram) (74)	W 181		$4X10^{-3}$
	W 187		$7X10^{-4}$
Vanadium (23)	V 48		$3X10^{-4}$
Xenon (54)	Xe 131m	$4X10^{-6}$	
	Xe 133	$3X10^{-6}$	
	Xe 135	$1X10^{-6}$	
Ytterbium (70)	Yb 175		$1X10^{-3}$
Yttrium (39)	Y 90		$2X10^{-4}$

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Element (atomic number)	Isotope	Column I Gas concentration uCi/ml*	Column II Liquid and solid concentration uCi/ml**
	Y 91m		$3X10^{-2}$
	Y 91		$3X10^{-4}$
	Y 92		$6X10^{-4}$
	Y 93		$3X10^{-4}$
Zinc (30)	Zn 65		$1X10^{-3}$
	Zn 69m		$7X10^{-4}$
	Zn 69		$2X10^{-2}$
Zirconium (40)	Zr 95		$6X10^{-4}$
	Zr 97		$2X10^{-4}$
Beta and/or gamma emitting radioactive material not listed above with half-life less than 3 years.		$1X10^{-10}$	$1X10^{-6}$

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

** uc/gm for solids.

NOTE 1: Many radioisotopes disintegrate into isotopes which are also radioactive. In expressing the concentrations in the above table the activity stated is that of the parent isotope and takes into account the daughters.

NOTE 2: For purposes of Subsection 053.02 where there is involved a combination of isotopes, the limit for the combination should be derived as follows: Determine for each isotope in the product the ratio between the concentration present in the product and the exempt concentration established in Table I for the specific isotope when not in combination. The sum of such ratios cannot exceed one (1), that is, "unity". (12-31-91)

iii. No person may introduce radioactive material into a product or material knowing or having reason to believe that it will be transferred to persons exempt under Subsection 053.02.a.i. or exempt under equivalent regulations of the U.S. Nuclear Regulatory Commission or any Agreement State, except in accordance with a specific license issued pursuant to Subsection 081.11 or the general license provided in Subsection 082.01. (12-31-91)

b. Exempt Quantities. (12-31-91)

i. Except as provided in Subsections 053.02.b.iii. and 053.02.b.iv., a person shall be exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns or acquires radioactive material in individual quantities each of which does not exceed the applicable quantity set forth in Subsection 053.02.b.ii. (12-31-91)

ii. Exempt Quantities. (12-31-91)

Radioactive Material	Microcuries
Antimony-122 (Sb 122)	100
Antimony-124 (Sb 124)	10

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Radioactive Material	Microcuries
Antimony-125 (Sb 125)	10
Arsenic-73 (As 73)	100
Arsenic-74 (As 74)	10
Arsenic-76 (As 76)	10
Arsenic-77 (As 77)	100
Barium-131 (Ba 131)	10
Barium-133 (Ba 133)	10
Barium-140 (Ba 140)	10
Bismuth-210 (Bi 210)	1
Bromine-82 (Br 82)	10
Cadmium-109 (Cd 109)	10
Cadmium-115m (Cd 115m)	10
Cadmium-115 (Cd 115)	100
Calcium-45 (Ca 45)	10
Calcium-47 (Ca 47)	10
Carbon-14 (C 14)	100
Cerium-141 (Ce (141)	100
Cerium-143 (Ce 143)	100
Cerium-144 (Ce 144)	1
Cesium-129 (Cs 129)	100
Cesium-131 (Cs 131)	1,000
Cesium-134m (Cs 134m)	100
Cesium-134 (Cs 134)	1
Cesium-135 (Cs 135)	10
Cesium-136 (Cs 136)	10
Cesium-137 (Cs 137)	10
Chlorine-36 (Cl 36)	10
Chlorine-38 (Cl 38)	10
Chromium-51 (Cr 51)	1,000
Cobalt-57 (Co 57)	100
Cobalt-58m (Co 58m)	10
Cobalt-58 (Co 58)	10
Cobalt-60 (Co 60)	1
Copper-64 (Cu 64)	100

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Radioactive Material	Microcuries
Dysprosium-165 (Dy 165)	10
Dysprosium-166 (Dy 166)	100
Erbium-169 (Er 169)	100
Erbium-171 (Er 171)	100
Europium-152 (Eu 152) 9.2 h	100
Europium-152 (Eu 152) 13 yr	1
Europium-154 (Eu 154)	1
Europium-155 (Eu 155)	10
Fluorine-18 (F 18)	1,000
Gadolinium-153 (Gd 153)	10
Gadolinium-159 (Gd 159)	100
Gallium-67 (Ga 67)	100
Gallium-72 (Ga 72)	10
Germanium-68 (Ge-68)	10
Germanium-71 (Ge 71)	100
Gold-195 (Au-195)	10
Gold-198 (Au 198)	100
Gold-199 (Au 199)	100
Hafnium-181 (Hf 181)	10
Holmium-166 (Ho 166)	100
Hydrogen-3 (H 3)	1,000
Indium-111 (In 111)	100
Indium-113m (In 113m)	100
Indium-114m (In 114m)	10
Indium-115m (In 115m)	100
Indium-115 (In 115)	10
Iodine-123 (I 123)	100
Iodine-125 (I 125)	1
Iodine-126 (I 126)	1
Iodine-129 (I 129)	0.1
Iodine-131 (I 131)	1
Iodine-132 (I 132)	10
Iodine-133 (I 133)	1
Iodine-134 (I 134)	10

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Radioactive Material	Microcuries
Iodine-135 (I 135)	10
Iridium-192 (Ir 192)	10
Iridium-194 (Ir 194)	100
Iron-52 (Fe 52)	10
Iron-55 (Fe 55)	100
Iron-59 (Fe 59)	10
Krypton-85 (Kr 85)	100
Krypton-87 (Kr 87)	10
Lanthanum-140 (La 140)	10
Lutetium-177 (Lu 177)	100
Manganese-52 (Mn 52)	10
Manganese-54 (Mn 54)	10
Manganese-56 (Mn 56)	10
Mercury-197m (Hg 197m)	100
Mercury-197 (Hg 197)	100
Mercury-203 (Hg 203)	10
Molybdenum-99 (Mo 99)	100
Neodymium-147 (Nd 147)	100
Neodymium-149 (Nd 149)	100
Nickel-59 (Ni 59)	100
Nickel-63 (Ni 63)	10
Nickel-65 (Ni 65)	100
Niobium-93m (Nb 93m)	10
Niobium-95 (Nb 95)	10
Niobium-97 (Nb 97)	10
Osmium-185 (Os 185)	10
Osmium-191m (Os 191m)	100
Osmium-191 (Os 191)	100
Osmium-193 (Os 193)	100
Palladium-103 (Pd 103)	100
Palladium-109 (Pd 109)	100
Phosphorus-32 (P 32)	10
Platinum-191 (Pt 191)	100
Platinum-193m (Pt 193m)	100

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Radioactive Material	Microcuries
Platinum-193 (Pt 193)	100
Platinum-197m (Pt 197m)	100
Platinum-197 (Pt 197)	100
Polonium-210 (Po 210)	0.1
Potassium-42 (K 42)	10
Potassium-43 (K 43)	10
Praseodymium-142 (Pr 142)	100
Praseodymium-143 (Pr 143)	100
Promethium-147 (Pm 147)	10
Promethium-149 (Pm 149)	10
Radium-226 (Ra 226)	.01
Rhenium-186 (Re 186)	100
Rhenium-188 (Re 188)	100
Rhodium-103m (Rh 103m)	100
Rhodium-105 (Rh 105)	100
Rubidium-81 (Rb 81)	10
Rubidium-86 (Rb 86)	10
Rubidium-87 (Rb 87)	10
Ruthenium-97 (Ru 97)	100
Ruthenium-103 (Ru 103)	10
Ruthenium-105 (Ru 105)	10
Ruthenium-106 (Ru 106)	1
Samarium-151 (Sm 151)	10
Samarium-153 (Sm 153)	100
Scandium-46 (Sc 46)	10
Scandium-47 (Sc 47)	100
Scandium-48 (Sc 48)	10
Selenium-75 (Se 75)	10
Silicon-31 (Si 31)	100
Silver-105 (Ag 105)	10
Silver-110m (Ag 110m)	1
Silver-111 (Ag 111)	100
Sodium-22 (Na 22)	10
Sodium-24 (Na 24)	10

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Radioactive Material	Microcuries
Strontium-85 (Sr 85)	10
Strontium-89 (Sr 89)	1
Strontium-90 (Sr 90)	0.1
Strontium-91 (Sr 91)	10
Strontium-92 (Sr 92)	10
Sulphur-35 (S 35)	100
Tantalum-182 (Ta 182)	10
Technetium-96 (Tc 96)	10
Technetium-97m (Tc 97m)	100
Technetium-97 (Tc 97)	100
Technetium-99m (Tc 99m)	100
Technetium-99 (Tc 99)	10
Tellurium-125m (Te 125m)	10
Tellurium-127m (Te 127m)	10
Tellurium-127 (Te 127)	100
Tellurium-129m (Te 129m)	10
Tellurium-129 (Te 129)	100
Tellurium-131m (Te 131m)	10
Tellurium-132 (Te 132)	10
Terbium-160 (Tb 160)	10
Thallium-200 (Tl 200)	100
Thallium-201 (Tl 201)	100
Thallium-202 (Tl 202)	100
Thallium-204 (Tl 204)	10
Thulium-170 (Tm 170)	10
Thulium-171 (Tm 171)	10
Tin-113 (Sn 113)	10
Tin-125 (Sn 125)	10
Tungsten-181 (W 181)	10
Tungsten-185 (W 185)	10
Tungsten-187 (W 187)	100
Vanadium-48 (V 48)	10
Xenon-131m (Xe 131m)	1,000
Xenon-133 (Xe 133)	100

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Radioactive Material	Microcuries
Xenon-135 (Xe 135)	100
Ytterbium-175 (Yb 175)	100
Yttrium-87 (Y 87)	10
Yttrium-88 (Y 88)	10
Yttrium-90 (Y 90)	10
Yttrium-91 (Y 91)	10
Yttrium-92 (Y 92)	100
Yttrium-93 (Y 93)	100
Zinc-65 (Zn 65)	10
Zinc-69m (Zn 69m)	100
Zinc-69 (Zn 69)	1,000
Zirconium-93 (Zr 93)	10
Zirconium-95 (Zr 95)	10
Zirconium-97 (Zr 97)	10
Any radioactive material not listed above other than alpha-emitting radioactive material	0.1

(12-1-87)

iii. Subsection 053.02.b. 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. (12-31-91)

iv. No person can, for purposes of commercial distribution, transfer radioactive material in the individual quantities set forth in Subsection 053.02.b.ii. with knowledge or reason to believe that such quantities of radioactive material will be transferred to persons exempt under Subsection 053.02.b. or equivalent regulations of the U.S Nuclear Regulatory Commission or any Agreement State or Licensing State, except in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.18. which license states that the radioactive material can be transferred by the licensee to persons exempt or the equivalent regulations of the U.S. Nuclear Regulatory Commission or any Agreement State or Licensing State. (12-31-91)

v. Any person who possesses radioactive material received or acquired under a generally licensed quantity formerly provided in these regulations is exempt from the requirements for a license set forth in Subsection 053.02.b. to the extent that such person possesses, uses, transfers or owns such radioactive material. Such exemption does not apply for radium-226. (12-31-91)

c. Authority to transfer possession or control by the manufacturer, processor, or producer of any equipment, device, commodity, or other product containing source material or byproduct material whose subsequent possession, use, transfer, and disposal by all other persons are exempted from regulatory requirements can be obtained only from the U.S. Nuclear Regulatory Commission, Washington, D.C. 20545. (12-1-87)

d. Except for persons who administer radioactive material, or persons who incorporate radioactive material into the following products, any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns or acquires the following products: (12-1-87)

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i. Timepieces or timepiece hands or dials containing not more than the following specified quantities of radioactive material and not exceeding the following: (5-5-81)

(a) Twenty-five (25) millicuries of tritium per timepiece; or (5-9-68)

(b) Five (5) millicuries of tritium per hand; or (5-9-68)

(c) Fifteen (15) millicuries of tritium per dial; bezels, when used, will be considered as part of the dial; or (5-9-68)

(d) One hundred (100) microcuries of promethium-147 per watch or two hundred (200) microcuries of promethium-147 per any other timepiece; or (5-9-68)

(e) Twenty (20) microcuries of promethium-147 per watch hand or forty (40) microcuries of promethium-147 per other timepiece hand; or (5-9-68)

(f) Sixty (60) microcuries of promethium-147 per watch dial or one hundred twenty (120) microcuries of promethium-147 per other timepiece dial; bezels, when used, will be considered as part of the dial; or (5-9-68)

(g) The levels of radiation from hands and dials containing promethium-147 will not exceed, when measured through fifty (50) milligrams per square centimeter of absorber, for wrist watches, one-tenth (0.1) millirad per hour at ten (10) centimeters from any surface; for pocket watches, one-tenth (0.1) millirad per hour at one (l) centimeter from any surface; and for any other timepiece, two-tenths (0.2) millirad per hour at ten (10) centimeters from any surface; or (5-9-68)

(h) One (1) microcurie of radium-226 per timepiece in timepieces acquired prior to the effective date of these regulations; and (5-5-81)

ii. Lock illuminators containing not more than fifteen (15) millicuries of tritium or not more than two (2) millicuries of promethium-147 installed in automobile locks. The levels of radiation from each lock illuminator containing promethium-147 will not exceed one (1) millirad per hour at one (1) centimeter from any surface when measured through fifty (5) milligrams per square centimeter of absorber; and (5-9-68)

iii. Precision balances containing not more than one (1) millicurie of tritium per balance or not more than five-tenths (0.5) millicurie of tritium per balance part; and (12-1-87)

iv. Automobile shift quadrants containing not more than twenty-five (25) millicuries of tritium; and (5-9-68)

v. Marine compasses containing not more than seven hundred fifty (750) millicuries of tritium gas and other marine navigational instruments containing not more than two hundred fifty (250) millicuries of tritium gas; and (5-9-68)

vi. Thermostat dials and pointers containing not more than twenty-five (25) millicuries of tritium per thermostat; and (5-9-68)

vii. Electronic tubes which include spark gap tubes, power tubes, gas tubes including glow lamps, receiving tubes, microwave tubes, indicator tubes, pick-up tubes, radiation detection tubes, and any other completely sealed tube that is designed to conduct or control electrical currents, provided that the level of radiation due to radioactive material contained in each electronic tube does not exceed one (1) millirad per hour at one (1) centimeter from any surface when measured through seven (7) milligrams per square centimeter of absorber. Each tube will not contain more than one (1) of the following specified quantities of radioactive material: (12-1-87)

(a) One hundred fifty (150) millicuries of tritium per microwave receiver protector tube or ten (10) millicuries of tritium per any other electronic tube; or (5-9-68)

(b) One (1) microcurie of cobalt-60; or (5-9-68)

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(c) Five (5) microcuries of nickel-63; or (5-9-68)

(d) Thirty (30) microcuries of krypton-85; or (5-9-68)

(e) Five (5) microcuries of cesium-137; or (5-9-68)

(f) Thirty (30) microcuries of promethium-147; and (5-9-68)

viii. Ionizing radiation measuring instruments containing, for purposes of internal calibration or standardization one (1) or more sources of radioactive material provided that: (12-1-87)

(a) Each source contains no more than one (1) exempt quantity set forth in Subsection 053. 02.b.ii.; and (12-31-91)

(b) Each instrument contains no more than ten (10) exempt quantities. For purposes of this requirement, an instrument's source(s) may contain either one or different types of radionuclides and an individual exempt quantity may be composed of fractional parts of one or more of the exempt quantities in Subsection 053.02.b.ii., provided that the sum of such fractions shall not exceed unity. (12-31-91)

(c) For purposes of Subsection 053.02.d.viii., five one-hundredths (0.05) microcurie of Americium-241 is considered an exempt quantity under Subsection 053.02.b.ii. (12-31-91)

ix. Spark gap irradiators containing not more than one (1) microcurie of cobalt-60 per spark gap irradiator for use in electrically ignited fuel oil burners having a firing rate of at least three (3) gallons (11.4 liters) per hour. (12-1-87)

e. Except for persons who manufacture, process, or produce self-luminous products containing tritium, krypton-85, or promethium-147, any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns or acquires tritium, krypton-85, or promethium-147 in self-luminous products manufactured, processed, produced, imported, or transferred in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.22, which license authorized the transfer of the product to persons who are exempt from regulatory requirements. The exemption in Subsection 053.02.d. does not apply to tritium, krypton-85, or promethium-147 used in products for frivolous purposes, in toys, or adornments. (12-31-91)

f. Any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, or owns articles containing less than one-tenth (0.1) microcurie of radium-226 which were acquired prior to the effective date of this section. (12-1-87)

g. Except for persons who manufacture, process, or produce gas and aerosol detectors containing radioactive material, any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns, or acquires radioactive material in gas and aerosol detectors designed to protect life or property from fires and airborne hazards, provided that detectors containing radioactive material shall be manufactured in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, and imported or transferred in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, pursuant to 10 CFR 32.26 or provided that detectors containing radioactive material other than byproduct material must have been manufactured, imported or transferred in accordance with a specific license issued by an Agreement State, either of which license authorized the transfer of the detector to persons who are exempt from regulatory requirements. Gas and aerosol detectors previously manufactured and distributed to general licenses in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission or an Agreement State will be considered exempt under Subsection 053.02.e., provided that the device is labeled in accordance with the specific license authorizing distribution of the generally licensed device, and provided further that they meet the requirements of Subsection 081.12. (12-31-91)

h. Gas and aerosol detectors containing NARM previously manufactured and distributed in accordance with a specific license issued by a Licensing State shall be considered exempt under Subsection 053.02.g., provided that the device is labeled in accordance with the specific license authorizing distribution, and

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provided further that they meet the requirements of Subsection 081.12. (12-31-91)

i. Any person is exempt from these regulations to the extent that such person receives, possesses, uses, transfers, owns or acquires synthetic plastic resins containing scandium-46 which are designed for sand consolidation in oil wells. Such resins must have been manufactured or imported in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, or must have been manufactured in accordance with the specifications contained in a specific license issued by the Radiation Control Agency or any Agreement State to the manufacturer of such resins pursuant to licensing requirements equivalent to those in 10 CFR 32.16 and 32.17 of the regulations of the U.S. Nuclear Regulatory Commission. This exemption does not authorize the manufacture of any resins containing scandium-46. (5-5-81)

03. Exemptions for Radiation Machines. The following radiation machines are exempt from the registration requirements: (12-1-87)

a. Domestic television receivers; and (12-1-87)

b. Other electrical equipment that produces radiation incidental to its operation for other purposes, providing the dose equivalent rate averaged over an area of ten (10) square centimeters does not exceed five-tenths (0.5) millirem per hour at five (5) centimeters from any accessible surface of such equipment. The production testing or factory servicing of such equipment is not exempt; and (12-1-87)

c. Radiation machines while in transit or storage incident thereto. (5-5-81)

054. -- 069. (RESERVED).

070. TYPES OF LICENSES.
Licenses for radioactive materials are of two (2) types: general and specific. General licenses provided in this section are effective without the filing of applications with the Radiation Control Agency or the issuance of licensing documents to the particular persons, although the filing of a certificate with the Agency may be required by the particular general license. The general licensee is subject to all other applicable portions of these regulations and any limitations of the general license. Specific licenses require the submission of an application to the Agency and the issuance of a licensing document by the Agency. The licensee is subject to all applicable portions of these regulations as well as any limitations specified in the licensing document. (12-1-87)

071. GENERAL LICENSES.
A general license is hereby issued authorizing the receipt of title to source material without regard to quantity. This general license does not authorize any person to receive, possess, use, or transfer source material. (12-1-87)

01. Source Material. A general license is hereby issued authorizing commercial and industrial firms, research, educational and medical institutions, and state and local governments to use and transfer not more than fifteen (15) pounds (6.82 kg) of source material at any one (1) time for research, development, educational, commercial, or operational purposes. A person authorized to use or transfer source material, pursuant to this general license, may not receive more than a total of one hundred fifty (150) pounds (68.2 kg) of source material in any one (1) calendar year. (12-1-87)

02. Exemptions from Regulations. Persons who receive, possess, use, or transfer source material, pursuant to the general license in accordance with Subsection 071.01., are exempt from the provisions of Section 100, to the extent that such receipt, possession, use, or transfer is within the terms of the general license; however, this exemption does not apply to any person who is also in possession of source material under a specific license issued pursuant to this section. (12-31-91)

03. Depleted Uranium in Industrial Products and Devices. A general license is hereby granted authorizing individuals to receive, acquire, possess, use, or transfer, in accordance with the provisions of Subsections 071.03 through 071.03.d., depleted uranium contained in industrial products or devices for the purpose of providing a concentrated mass in a small volume of the product or device. (12-31-91)

a. The general license outlined in Subsection 071.03 applies only to industrial products or devices

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which have been manufactured either in accordance with a specific license issued to the manufacturer of the products or devices pursuant to Subsection 081.21 or in accordance with a specific license issued to the manufacturer by the U.S. Nuclear Regulatory Commission or an Agreement State which authorizes manufacture of the products or devices for distribution to persons generally licensed by the U.S. Nuclear Regulatory Commission or an Agreement State. (12-31-91)

b. Registration Certificate - Use of Depleted Uranium Under General License. (12-31-91)

i. Persons who receive, acquire, possess, or use depleted uranium pursuant to the general license established by Subsection 071.03 must file a "Registration Certificate - Use of Depleted Uranium Under General License", with the Agency. The form must be submitted within thirty (30) days after the first receipt or acquisition of the depleted uranium. The registrant must furnish the following information and such other information required by that form: (12-31-91)

(a) Name and address of the registrant; and (5-5-81)

(b) A statement that the registrant has developed and will maintain procedures designed to establish physical control over the depleted uranium described in Subsection 071.03 and designed to prevent transfer of such depleted uranium in any form, including metal scrap, to persons not authorized to receive the depleted uranium; and (12-31-91)

(c) Name and/or title, address, and telephone number of the individual duly authorized to act on behalf of the registrant in supervising the procedures identified in Subsection 071.03.b. (12-31-91)

ii. The registrant possessing or using depleted uranium under the general license established by Subsection 071.03 must report in writing to the Agency any changes in information furnished by him in the "Registration Certificate for Use of Depleted Uranium". The report must be submitted within thirty (30) days after the effective date of the change. (12-31-91)

iii. "Registration Certificate - Use of Depleted Uranium Under General License" forms can be obtained from the Radiation Control Section, Department of Health and Welfare. (5-5-81)

c. A person who receives, acquires, possesses, or uses depleted uranium pursuant to the general license established by Subsection 071.03. (12-31-91)

i. Must not introduce such depleted uranium, in any form, into a chemical, physical, or metallurgical treatment or process, except a treatment or process for repair or restoration of any plating or other covering of the depleted uranium; and (5-5-81)

ii. Must not abandon such depleted uranium; and (5-5-81)

iii. Must transfer or dispose of such depleted uranium only by transfer in accordance with the provisions of Subsection 081.29. Where the transferee receives the depleted uranium pursuant to the general license established by Subsection 071.03, the transferor must furnish the transferee a copy of this regulation and a copy of Registration Certificate described in Subsection 071.03. Where the transferee receives the depleted uranium pursuant to a general license contained in the U.S. Nuclear Regulatory Commission or Agreement State's regulation equivalent to Subsection 071.03, the transferor must furnish the transferee a copy of this regulation and a copy of their registration certificate accompanied by a note explaining that use of the product or device is regulated by the U.S. Nuclear Regulatory Commission or Agreement State under requirements substantially the same as those in this regulation; and (12-31-91)

iv. Must report in writing to the Agency within thirty (30) days of any transfer, the name and address of the person receiving the depleted uranium pursuant to the transfer; and (5-5-81)

v. Must not export the depleted uranium except in accordance with a license issued by the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 110. (5-5-81)

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d. Any person receiving, acquiring, possessing, using, or transferring depleted uranium pursuant to the general license established by Subsection 071.03 is exempt from the requirements of Sections 100 and 450 with respect to the depleted uranium covered by that general license. (12-31-91)

072. GENERAL LICENSES FOR RADIOACTIVE MATERIAL OTHER THAN SOURCE MATERIAL. A general license is granted to authorize the ownership of radioactive material without regard to quantity. Notwithstanding any other provisions of this Section, this general license does not authorize the manufacture, production, transfer, receipt, possession or use of radioactive material. (5-5-81)

01. Certain Devices and Equipment. A general license is hereby issued authorizing the transfer, receipt, acquisition, ownership, possession, and use of radioactive material incorporated in the following devices or equipment which have been manufactured, tested and labeled by the manufacturer in accordance with a specific license issued to the manufacturer by the U.S. Nuclear Regulatory Commission, and authorizing distribution under the general license of 10 CFR 31.3. The general license will be subject to provisions of Sections and Subsections 007, 008, 009, 010, 011, 012. 053.02.a.iii., 081.24, 081.29. 081.30, 500, 100 and 450. (12-31-91)

a. Static Elimination Device. Devices designed for use as static eliminators which contain, as a sealed source or sources, radioactive material consisting of a total of not more than five hundred (500) microcuries of polonium-210 per device. (5-9-68)

b. Ion Generating Tube. Devices designed for ionization of air which contain, as a sealed source or sources, radioactive material consisting of a total of not more than five hundred (500) microcuries of polonium-210 per device or a total of not more than fifty (50) millicuries of hydrogen-3 (tritium) per device. (5-9-68)

02. Certain Measuring, Gauging or Controlling Devices. (5-9-68)

a. A general license is hereby issued to commercial and industrial firms, research, educational and medical institutions, individuals in the conduct of their business, and the state or local government agencies to own, receive, acquire, possess, and use or transfer in accordance with this section, radioactive material, excluding special nuclear material, contained in devices designed and manufactured for the purpose of detecting, measuring, gauging, or controlling thickness, density, level, interface location, radiation, leakage, or qualitative or quantitative chemical composition, or for producing light or an ionized atmosphere. (12-1-87)

i. The general license in Subsection 072.02.a. applies only to radioactive material contained in devices which have been manufactured and labeled in accordance with the specifications contained in a specific license issued by the Radiation Control Agency pursuant to Subsection 081.09 or in accordance with the specifications contained in a specific license issued by the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State, which authorizes distribution of devices to persons generally licensed by the U. S. Nuclear Regulatory Commission, an Agreement State or a Licensing State. Regulations under the Federal Food, Drug and Cosmetic Act authorizing the use of radioactive materials for inspection of food and for food processing require certain additional labeling thereon which is found in 21CFR 179.21. (12-31-91)

ii. Such devices must bear a label containing the following or a substantially similar statement: "The receipt, possession, use, and transfer of this device, Model, Serial, are subject to a general license or the equivalent and the regulations of the U.S. Nuclear Regulatory Commission or of a state with which Nuclear Regulatory Commission has entered into an agreement, for the exercise of regulatory authority. Removal of this label is prohibited.

CAUTION - RADIOACTIVE MATERIAL
(Name of Supplier)"

The model, serial number, and name of supplier can be omitted from this label provided they are specified elsewhere on a label affixed to the device. (5-5-81)

b. Any person who owns, receives, acquires, possesses, uses or transfers radioactive material in a device pursuant to the general license in Subsection 072.02.a. shall: (12-31-91)

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i. Assure that all labels are affixed to the device at the time of receipt and bear a statement that removal of the label is prohibited. (12-1-87)

ii. Assure that such labels are maintained thereon. (12-1-87)

iii. Assure that the device is tested for leakage of radioactive material and proper operation of the "on-off" mechanism and indicator, if any, at no longer than six (6) month intervals or at such other intervals as specified in the label, however; (12-1-87)

(a) Devices containing only krypton need not be tested for leakage of radioactive material, and (12-1-87)

(b) Devices containing only tritium or not more than one hundred (100) microcuries of other beta or gamma emitting material or ten (10) microcuries of alpha-emitting material and devices held in storage in the original shipping container prior to installation need not be tested for any purpose. (12-1-87)

iv. Assure that tests required in Section 072.02.b.iii. of this section and other testing, installation, servicing precautions and removal from installation involving the radioactive material, its shielding and containment, are performed: (12-31-91)

(a) In accordance with the instructions provided by the labels; or (12-1-87)

(b) By a person holding an applicable specific license issued from the Agency, the U.S. Nuclear Regulatory Commission or a Licensing State to perform such activities; (12-1-87)

v. Maintain records showing compliance with the requirements of Subsections 072.02.b.iii. and 072.02.b.iv. The records must show the results of tests, the dates of performance of, and the names of persons performing, testing, installation, servicing, and removal from installation concerning the radioactive material, its shielding or containment. Records of tests for leakage of radioactive material required by Subsection 072.02.b.iii. must be maintained for one (1) year after the next required leak test is performed or until the sealed source is transferred or disposed of. Records of tests of the "on-off" mechanism and indicator required by Subsection 072.02.b.iii. shall be maintained for one (1) year after the next required test of the "on-off" mechanism and indicator is performed or until the sealed source is transferred or disposed of. Records which are required by Subsection 072.02.b. shall be maintained for a period of two (2) years from the date of the recorded event or until the device is transferred or disposed of. (12-31-91)

vi. Upon the occurrence of a failure of or damage to, or any indication of a possible failure of or damage to, the shielding of the radioactive material or the "on-off" mechanism or indicator, or upon the detection of 0.005 microcurie or more removable radioactive material one must: (12-1-87)

(a) Immediately suspend operation of the device until it has been repaired by the manufacturer or other person holding an applicable specific license from the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State to repair such devices; or (12-1-87)

(b) Disposed of by transfer to a person authorized by an applicable specific license to receive the radioactive material contained in the device; and (12-1-87)

(c) Within thirty (30) days, furnish to the Agency a report containing a brief description of the event and the remedial action taken. (12-1-87)

vii. Must not abandon the device containing radioactive material. (12-1-87)

viii. Except as provided in Subsection 072.02.b.ix., transfer or dispose of the device containing radioactive material only by transfer to a specific licensee of the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State whose specific license authorizes the licensee to receive the device and within thirty (30) days after transfer of a device to a specific licensee, furnish to the Agency a report containing identification of the device by manufacturer's name and model number and the name and address of the person

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receiving the device. No report is required if the device is transferred to the specific licensee in order to obtain a replacement device. (12-31-91)

ix. Transfer the device to another general licensee only: (12-1-87)

(a) Where the device remains in use at a particular location. In such case the transferor shall give the transferee a copy of this regulation and any safety documents identified in the label on the device and within thirty (30) days of the transfer, report to the Agency the manufacturer's name and model number of device transferred, the name and address of the transferee, and the name and/or position of an individual who may constitute a point of contact between the Agency and the transferee; or (12-1-87)

(b) Where the device is held in storage in the original shipping container at its intended location of use prior to initial use by a general licensee. (12-1-87)

x. Comply with the provisions of Subsections 140.02 and 140.03 for reporting radiation incidents, theft, or loss of licensed material, but will be exempt from the other requirements of these regulations. (12-31-91)

c. The general license in Subsection 072.02.a. does not authorize the manufacture of devices containing radioactive material. (12-31-91)

d. The general license provided in Subsection 072.02.a. is subject to the provisions of Section 007. through 012. and Subsection 081.23, 081.29, 081.30 and Section 501. (12-31-91)

03. Luminous Safety Devices for Aircraft. (12-31-91)

a. A general license is issued to own, receive, acquire, possess, and use tritium or promethium-147 contained in luminous safety devices for use in aircraft, provided: (5-9-68)

i. Each device contains not more than ten (10) curies of tritium or three hundred (300) millicuries of promethium-147; and (5-9-68)

ii. Each device has been manufactured, assembled, or imported in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission or each device has been manufactured or assembled in accordance with the specifications contained in a specific license issued by the Radiation Control Agency or any Agreement State to the manufacturer or assembler of such device pursuant to licensing requirements equivalent to those in 10 CFR 32.53. (5-5-81)

b. Persons who own, receive, acquire, possess, or use luminous safety devices pursuant to the general license in Subsection 072.03.a. are exempt from the requirements of Section 100.; however, they must comply with the provisions of Subsections 140.02 and 140.03. (12-31-91)

c. This general license does not authorize the manufacture, assembly, or repair of luminous safety devices containing tritium or promethium-147. (5-5-81)

d. This general license does not authorize the ownership, receipt, acquisition, possession or use of promethium-147 contained in instrument dials. (5-5-81)

e. The general license provided in Subsection 072.03.a. is subject to the provisions of Sections 007, 008, 009, 010, 011, 012, 081.23, 081.29, 081.30 and 501. (12-31-91)

04. Calibration and Reference Sources. (12-31-91)

a. A general license is hereby granted to those persons listed below authorizing them to own, receive, acquire, possess, use and transfer americium-241 in the form of calibration or reference sources in accordance with the provisions of Subsections 072.04.d. and 072.04.e. (12-31-91)

i. Any person who holds a specific license issued by the Radiation Control Agency which authorizes

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that person to receive, possess, use, and transfer radioactive material; and (12-1-87)

ii. Any person who holds a specific license issued by the U.S. Nuclear Regulatory Commission which authorizes that person to receive, possess, use, and transfer special nuclear material. (12-1-87)

b. A general license is hereby granted authorizing the ownership, receipt, possession, use, and transfer of plutonium in the form of calibration or reference sources in accordance with the provisions of Subsections 072.04.d. and 072.04.e. to any person who holds a specific license issued by the Radiation Control Agency which authorizes that person to receive, possess, use and transfer radioactive material. (12-31-91)

c. A general license is hereby issued to own, receive, possess, use, and transfer radium-226 in the form of calibration or reference sources in accordance with the provisions of Subsections 072.04.d. and 072.04.e. to any person who holds a specific license issued by the Agency which authorizes that person to receive, possess, use, and transfer radioactive material. (12-31-91)

d. The general licenses in Subsections 072.04.a. and 072.04.b. apply only to calibration or reference sources which have been manufactured, or initially transferred in accordance with the specifications contained in a specific license issued to the manufacturer or importer of the sources by the U.S. Nuclear Regulatory Commission, pursuant to 10 CFR 32.57 or 10 CFR 70.39, or which have been manufactured in accordance with the specifications contained in a specific license issued to the manufacturer by the Radiation Control Agency or any Agreement State pursuant to licensing requirements equivalent to those contained in 10 CFR 32.57 or 10 CFR 70.39. (12-31-91)

e. The general licenses provided in Subsections 072.04.a., 072.04.b. and 072.04.c. are subject to the provisions of Sections 007, 008, 009, 010, 011, 012, 081.23, 081.29, 081.30, 501, and 100. In addition, persons who own, receive, acquire, possess, use, or transfer one (1) or more calibration or reference sources pursuant to these general licenses: (12-31-91)

i. Shall not possess at any one (1) time, at any one (1) location of storage or use, more than five (5) microcuries of americium-241, five (5) microcuries of plutonium or five (5) microcuries of radium-226 in such sources; and (12-1-87)

ii. Shall not receive, possess, use, or transfer such source unless the source, or the storage container, bears a label which includes the following statement or a substantially similar statement which contains the information called for in the following statement:

"The receipt, possession, use and transfer of such source Model, Serial No., are subject to a general license and the regulations of the U.S. Nuclear Regulatory Commission or of a state with which the Commission has entered into an agreement for the exercise of regulatory authority. Do not remove this label.

CAUTION - RADIOACTIVE MATERIAL
THIS SOURCE CONTAINS (NAME OF THE ELEMENT(S))
DO NOT TOUCH RADIATION PORTION OF THIS SOURCE

(Name of Manufacturer or Importer)"; and (5-5-81)

iii. Shall not transfer, abandon, or dispose of such source except by transfer to a person authorized by a license from the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or an Agreement State to receive the source; and (12-1-87)

iv. Shall store such source, except when the source is being used, in a closed container adequately designed and constructed to contain americium-241, radium-226 or plutonium which might otherwise escape during storage; and (12-1-87)

v. Shall not use such source for any purpose other than calibration of radiation detectors or the standardization of other sources. (12-1-87)

f. These general licenses do not authorize the manufacture of calibration or reference sources

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containing americium-241, radium-226 or plutonium. (12-1-87)

05. Medical Diagnostic Uses. (12-1-87)

a. A general license is hereby granted to any physician or veterinarian to receive, possess, transfer, or use radioactive material set forth below for the stated diagnostic uses, provided that the use is in accordance with the provisions of Subsections 072.05.b. through 072.05.d., and the radioactive material is in the form of capsules, disposable syringes, or other prepackaged individual doses; and the radioactive material has been manufactured in accordance with a specific license issued by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, any Agreement State, or any Licensing State authorizing distribution under the general license granted in Subsection 072.05.a. or its equivalent and requires manufacturers of radiopharmaceuticals which are under the general license in Subsection 072.05.a. to affix a certain identifying label to the container or in the leaflet or brochure which accompanies the radiopharmaceutical. Such radioactive material and diagnostic uses include: (12-31-91)

i. Iodine-131 as sodium iodide (NaI 131) for measurement of thyroid uptake; and (5-5-81)

ii. Iodine-131 as iodinated human serum albumin (IHSA) for determinations of blood and blood plasma volume; and (5-5-81)

iii. Iodine-125 as iodinated human serum albumin (IHSA) for determinations of blood and blood plasma volume; and (5-5-81)

iv. Cobalt-57 for the measurement of intestinal absorption of cyanocobalamin; and (5-5-81)

v. Cobalt-58 for the measurement of intestinal absorption of cyanocobalamin; and (5-5-81)

vi. Cobalt-60 for the measurement of intestinal absorption of cyanocobalamin; and (5-5-81)

vii. Chromium-51 as sodium radiochromate for determinations of red blood cell volumes and studies of red blood cell survival time. (5-5-81)

b. No physician will receive, possess, use, or transfer radioactive material pursuant to the general license established by Subsection 072.05 until such person has filed "Certificate - Medical Use of Radioactive Material Under General License" with the Radiation Control Agency and received from the Radiation Control Agency a validated copy with certification number assigned. (Certificate forms described in Subsection 072.05.b. can be obtained from the Radiation Control Office, Idaho Department of Health and Welfare, Boise, Idaho, 83720.) The generally licensed physician will furnish the following information and such other information as required by that form: (12-31-91)

i. Name and address of the generally licensed physician; and (5-5-81)

ii. A statement that the generally licensed physician is a duly licensed physician authorized to dispense drugs in the practice of medicine in this State; and (5-5-81)

iii. A statement that the generally licensed physician has appropriate radiation measuring instruments to carry out the diagnostic procedures for which he proposes to use radioactive material under the general license of Subsection 072.05 and he is competent in the use of such instruments. (12-31-91)

c. A physician who receives, possesses, or uses a pharmaceutical containing radioactive material pursuant to the general license established by Subsection 072.05.a. shall: (12-31-91)

i. Not possess at any one (1) time, pursuant to the general license in Subsection 072.05.a., more than: (12-31-91)

(a) Two hundred (200) microcuries of iodine-131; or (5-5-81)

(b) Two hundred (200) microcuries of iodine-125; or (5-5-81)

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(c) Five (5) microcuries of cobalt-57; or (5-5-81)

(d) Five (5) microcuries of cobalt-58; or (5-5-81)

(e) Five (5) microcuries of cobalt-60; or (5-5-81)

(f) Two hundred (200) microcuries of chromium-51; and (5-5-81)

ii. Store the pharmaceutical until administered in the original shipping container, or a container providing equivalent radiation protection; and (12-1-87)

iii. Use the pharmaceutical only for the uses authorized by Subsection 072.05.a.; and (12-31-91)

iv. Not administer the pharmaceutical to a woman with confirmed pregnancy or to a person under eighteen (18) years of age; and (12-1-87)

v. Not transfer the radioactive material to a person who is not authorized to receive it pursuant to a license issued by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or any Licensing State, or in any manner other than in the unopened, labeled shipping container as received from the supplier, except by administering it to a patient. (12-1-87)

d. The generally licensed physician possessing or using radioactive material under the general license of Subsection 072.05.a. must report to the Radiation Control Agency, any changes in the information furnished by such physician in the "Certificate - Medical Use of Radioactive Material Under General License." The report must be submitted within thirty (30) days after the effective date of the change. (12-31-91)

e. Any person using radioactive material pursuant to the general license of Subsection 072.05 is exempt from the requirements of Section 100. with respect to the radioactive material covered by the general license. (12-31-91)

06. Use of Radioactive Material for Certain In Vitro Clinical or Laboratory Testing. (12-31-91)

a. A general license is hereby granted to any physician, veterinarian, clinical laboratory or hospital to receive, acquire, possess, transfer or use, for any of the following stated tests, in accordance with Subsections 072.06.b. through 072.06.f., the following radioactive materials in prepackaged units for use in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals: (12-31-91)

i. Iodine-125, in units not exceeding ten (10) microcuries each; and (12-1-87)

ii. Iodine-131, in units not exceeding ten (10) microcuries each; and (12-1-87)

iii. Carbon-14, in units not exceeding ten (10) microcuries each; and (12-1-87)

iv. Hydrogen-3 (tritium), in units not exceeding fifty (50) microcuries each; and (12-1-87)

v. Iron-59, in units not exceeding twenty (20) microcuries each; and (12-1-87)

vi. Cobalt-57, in units not exceeding ten (10) microcuries each; and (12-1-87)

vii. Selenium-75, in units not to exceed ten (10) microcuries each; and (12-1-87)

viii. Mock iodine-125 reference or calibration sources, in units not exceeding five-hundredths (0.05) microcurie of iodine-129 and five-thousandths (0.005) microcurie of americium-241 each. (12-1-87)

b. No person will receive, acquire, possess, or use or transfer radioactive material pursuant to the

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general license established by Subsection 072.06.a. until he has filed a "Certificate - In Vitro Testing with Radioactive Material Under General License", with the Radiation Control Agency and received from the Radiation Control Agency a validated copy with certification number assigned. (The certificate forms described in Subsection 072.06.b. can be obtained from the Radiation Control Section, Idaho Department of Health and Welfare, Statehouse, Boise, Idaho, 83720.) The physician, clinical laboratory or hospital shall furnish the following information and such other information as required by that form: (12-31-91)

i. Name and address of the physician, veterinarian, clinical laboratory or hospital; and (12-1-87)

ii. The location of use; and (5-5-81)

iii. A statement that the physician, veterinarian, clinical laboratory or hospital has appropriate radiation measuring instruments to carry out in vitro clinical or laboratory tests with radioactive material as authorized under the general license in Subsection 072.06 and that such tests will be performed only by personnel competent in the use of such instruments and in the handling of the radioactive material. (12-31-91)

c. A person who receives, acquires, possesses or uses radioactive material pursuant to the general license established by Subsection 072.06.a. shall comply with the following: (12-31-91)

i. The general licensee shall not possess at any one (1) time, pursuant to the general license in Subsection 072.06.a., at any one (1) location of storage or use a total amount of iodine-125, iodine-131, selenium-75, cobalt-57, and/or iron-59 in excess of two hundred (200) microcuries; and (12-31-91)

ii. The general licensee shall store the radioactive material, until used, in the original shipping container or in a container providing equivalent radiation protection; and (12-1-87)

iii. The general licensee shall use the radioactive material only for the uses authorized by Subsection 072.06.a.; and (12-31-91)

iv. The general licensee shall not transfer the radioactive material to a person who is not authorized to receive it pursuant to a license issued by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or any Agreement State, nor transfer the radioactive material in any manner other than in the unopened, labeled shipping container as received from the supplier; and (12-1-87)

v. The general licensee shall dispose of the mock iodine-125 reference or calibration sources described in Subsection 072.06.a.viii. as required by Section 130. (12-31-91)

d. The general licensee must not receive, acquire, possess, or use radioactive material pursuant to Subsection 072.06.a., except: (12-31-91)

i. As prepackaged units which are labeled in accordance with the provisions of a specific license issued by the U.S. Nuclear Regulatory Commission, any Agreement State, or Licensing State which authorizes the manufacture and distribution of iodine-125, selenium-75, mock iodine-125, iodine 131, cobalt-57, carbon-14, hydrogen-3 (tritium), or iron-59 for distribution to persons generally licensed under Subsection 072.06 or its equivalent; and (12-31-91)

ii. When the following statement, or one (1) substantially similar, appears on a label affixed to each prepackaged unit or appears in a leaflet or brochure which accompanies the package:

"This radioactive material can be received, acquired, possessed, and used only by physicians, veterinarians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use, and transfer are subject to the regulations and a general license of the United Stated Nuclear Regulatory Commission or of a State with which the Commission has entered into an agreement for the exercise of regulatory authority. Name of Manufacturer" (12-1-87)

e. The physician, clinical laboratory, veterinarians or hospital possessing or using radioactive material

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under the general license of Subsection 072.06.a. must report in writing to the Radiation Control Agency, any changes in the information furnished by him in the "Certificate - In Vitro Testing with Radioactive Material Under General License". The report shall be furnished within thirty (30) days after the effective date of the change. (12-31-91)

f. Any person using radioactive material pursuant to the general license of Subsection 072.06.a. is exempt from the requirements of Section 100 with respect to radioactive material covered by that general license, except that such persons using the mock iodine-125 described in Subsection 072.06.a.viii. shall comply with the provisions of Section 130 and Subsections 140.02 and 140.03. (12-31-91)

07. Ice Detection Devices. (12-31-91)

a. A general license is issued authorizing the ownership, receipt, acquisition, possession, use, and transfer of strontium-90 contained in ice detection devices, provided each device contains not more than fifty (50) microcuries of strontium-90 and each device has been manufactured or imported in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission or each device has been manufactured in accordance with the specifications contained in a specific license issued by the Radiation Control Agency or any Agreement State to the manufacturer of such device pursuant to licensing requirements equivalent to those in 10 CFR 32.61. (5-5-81)

b. Persons who own, receive, acquire, possess, use or transfer strontium-90 contained in ice detection devices pursuant to the general license in Subsection 072,07.a. (12-31-91)

i. Upon occurrence of visually observable damage, such as a bend, crack or discoloration from overheating to the device, must discontinue use of the device until it has been inspected, tested for leakage and repaired by a person holding a specific license from the U.S. Nuclear Regulatory Commission or an Agreement State to manufacture or service such devices; or must dispose of the device pursuant to the provisions of Subsection 130.01, and (12-31-91)

ii. Must assure that all labels affixed to the device at the time of receipt, and which bear a statement which prohibits removal of the labels, are maintained thereon; and (5-5-81)

iii. Are exempt from the requirements of 100 except that such persons must comply with the provisions of Section 130 and Subsection 140.02 and 140.03. (12-31-91)

c. This general license does not authorize the manufacture, assembly, disassembly, or repair of strontium-90 in ice detection devices. (5-9-68)

d. The general license provided in Subsection 072.07.a. is subject to the provisions of Sections 007, 008. 009, 010, 011, 012, and Subsections 081.23, 081.29, 081.30 and Sections 501. (12-31-91)

073. -- 079. (RESERVED).

080. SPECIFIC LICENSES.

01. Filing Application for Specific Licenses. (7-1-93)

a. Applications for specific licenses must be filed on a form prescribed by the Radiation Control Agency. (5-5-81)

b. The Radiation Control Agency can, at any time after the filing of the original application and before the expiration of the license, require further statements in order to enable the Radiation Control Agency to determine whether the application should be granted, denied, modified, or revoked. (5-9-68)

c. Each application must be signed by the applicant or licensee or a person duly authorized to act on his behalf. (5-5-81)

d. An application for a license can include a request authorizing one (1) or more activities. (5-9-68)

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e. In the application, the applicant can incorporate by reference information contained in previous applications, statements, or reports filed with the Radiation Control Agency provided such references are clear and specific. (5-9-68)

f. Any disclosure of information from such applications and appurtenant documents must conform to the requirements of Title 05, Chapter 01, "Rules Governing the Protection and Disclosure of Department Records", Rules and Regulations of the Idaho Department of Health and Welfare. (5-5-81)

02. General Requirements for the Issuance of Specific Licenses. A license application will be approved if the Radiation Control Agency determines that: (5-5-81)

a. The applicant is qualified by reason of training and experience to use the material in question for the purpose requested in accordance with these regulations in such a manner as to minimize danger to public health and safety and/or property; and (5-9-68)

b. The applicant's proposed equipment, facilities, and procedures are adequate to minimize danger to public health and safety and/or property; and (5-9-68)

c. The issuance of the license will not be harmful or adverse to the health and safety of the public; and (5-9-68)

d. The applicant satisfies any applicable special requirements in Section 081. (12-31-91)

081. SPECIAL REQUIREMENTS FOR ISSUANCE OF CERTAIN SPECIFIC LICENSES FOR RADIOACTIVE MATERIALS.

01. Institutional Licenses for Human Use of Radioactive Materials. In addition to the requirements set forth in Subsection 080.01, a specific license for human use of radioactive material in institutions will be issued only if: (12-31-91)

a. The applicant has appointed a radiation safety committee of at least three (3) members to evaluate all proposals for research, diagnostic, and therapeutic use of radioisotopes within that institution and to approve of all users of radioactive materials within that institution. Membership of the committee should include physicians expert in internal medicine, hematology, radiation therapy, and protection against radiation and a person experienced in assay of radioactive material; and (12-1-87)

b. The applicant possesses adequate facilities for the clinical care of patients, and is experienced in assay of radioisotopes and protection against ionizing radiation; and (5-5-81)

c. Each physician designated on the application as an individual user, who will supervise other users of radioactive material, has substantial experience in the handling and administration of radioisotopes and, where applicable, the clinical management of radioactive patients; and (5-9-68)

d. In the event the application is for a broad license to use unspecified quantities or multiple types of radioactive material, the applicant's staff has substantial experience in the use of a variety of radioactive materials for a variety of human uses. (12-1-87)

02. Private Licenses for Human Use of Radioactive Materials. In addition to the requirements set forth in Subsection 080.01, a specific license for the human use of radioactive materials will be issued to an individual physician or group of physicians only if: (12-31-91)

a. The applicant has access to a hospital possessing adequate facilities to hospitalize and monitor the applicant's radioactive patients, when advisable; and (5-5-81)

b. The applicant has extensive experience in the handling and administration of radioisotopes, and where applicable, the clinical management of radioactive patients. (5-9-68)

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c. The application is for use in the applicant's practice in an office outside a medical institution. However, the Radiation Control Agency will not approve an application by an individual physician or group of physicians for a specific license to receive, possess, or use radioactive material on the premises of a medical institution unless: (12-1-87)

i. The use of radioactive material is limited to: (12-1-87)

(a) The administration of radiopharmaceuticals for diagnostic or therapeutic purposes; (12-1-87)

(b) The performance of diagnostic studies on patients to whom a radiopharmaceutical has been administered; (12-1-87)

(c) The performance of in vitro diagnostic studies; or (12-1-87)

(d) The calibration and quality control checks of radioactive assay instrumentation, radiation safety instrumentation and diagnostic instrumentation; (12-1-87)

ii. The licensee brings and removes the radioactive material. The institution cannot receive, possess, or store radioactive material other than the amount of material remaining in the patient; and (12-1-87)

iii. The medical institution does not hold a radioactive material license under Subsection 081.01. (12-31-91)

03. Groups of Diagnostic Uses. (12-31-91)

a. Group I - Uses of diagnostic radiopharmaceuticals for uptake, dilution, excretion, and function studies, not including imaging or tumor localizations, will include: (12-1-87)

i. Chromium-51 as chromate, chloride or labeled human serum albumin. (12-1-87)

ii. Cobalt-57, -58, or -60 as labeled cyanocobalamin. (12-1-87)

iii. Iodine-131, 123, or -125 as Iodinated Human Serum Albumin, rose bengal, iodine, labeled iodopyracet, sodium iodophippurate, sodium diatrizoate, diatrizoate methyglucamine, sodium diprotrizoate, sodium acetrizoate, or sodium iothalamate, labeled fats or fatty acids. (12-1-87)

iv. Iron-59 as citrate. (12-1-87)

v. Potassium-42 as chloride. (12-1-87)

vi. Sodium-24 as chloride. (12-1-87)

vii. Technetium-99m as pertechnetate. (12-1-87)

viii. Any radioactive material in a radiopharmaceutical and for a diagnostic use involving measurements of uptake, dilution, or excretion for which a "Notice of Claimed Investigational Exemption for a New Drug" (IND) or New Drug Application (NDA) has been accepted by the Food and Drug Administration (FDA). (12-1-87)

b. Group II - Scans and tumor localizations will include: (5-5-81)

i. Chromium-51 as human serum albumin. (12-1-87)

ii. Fluorine-18 in solution. (12-1-87)

iii. Gallium-67 as citrate. (12-1-87)

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iv. Gold-198 in colloidal form. (12-1-87)

v. Indium-113m as chloride. (12-1-87)

vi. Iodine-123 as sodium iodide. (12-1-87)

vii. Iodine-125 as sodium iodide or fibrinogen. (12-1-87)

viii. Iodine-131 as sodium iodide, iodinated human serum albumin, macroaggregated iodinated human serum albumin, colloidal (microaggregated) iodinated human serum albumin, rose bengal, or sodium iodohippurate. (12-1-87)

ix. Mercury-197 as chlormerodrin. (12-1-87)

x. Selenium-75 as selenomethionine. (12-1-87)

xi. Strontium-85 as nitrate. (12-1-87)

xii. Strontium-87m as chloride. (12-1-87)

xiii. Technetium-99m as pertechnetate sulfur colloid, or macroaggregated human serum albumin. (12-1-87)

xiv. Thallium-201 as chloride. (12-1-87)

xv. Ytterbium-169 as pentatate sodium. (12-1-87)

xvi. Any radioactive material in a radiopharmaceutical prepared from a reagent kit listed in Subsection 081.03. c. (12-31-91)

xvii. Any radioactive material in a radiopharmaceutical and for a diagnostic use involving imaging or localizing except those in gaseous forms for which a "Notice of Claimed Investigational Exemption for a New Drug" (IND) or a "New Drug Application" (NDA) has been accepted by the Food and Drug Administration (FDA). (12-1-87)

c. Group III - Use of generators and reagent kits for the preparation and use of radiopharmaceuticals containing radioactive material for certain diagnostic uses include: (12-1-87)

i. Molybdenum-99/technetium/99m generators for the elution of technetium-99m as pertechnetate. (12-1-87)

ii. Technetium-99m as pertechnetate for use with reagent kits for preparation and use of radiopharmaceuticals containing technetium-99m as provided in Subsections 081.03.c.iii and 081.03.c.vi. (12-31-91)

iii. Reagent kits for preparation of technetium-99m labeled: (12-1-87)

(a) sulfur colloid; (12-1-87)

(b) pentatate sodium; (12-1-87)

(c) human serum albumin microspheres; (12-1-87)

(d) polyphosphates; (12-1-87)

(e) macroaggregated human serum albumin; (12-1-87)

(f) etidronate sodium; (12-1-87)

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(g) stanous pyrophosphate; (12-1-87)

(h) human serum albumin; (12-1-87)

(i) medronate sodium; (12-1-87)

(j) gluceptate sodium; (12-1-87)

(k) oxidronate sodium; (12-1-87)

(l) disofenin; and (12-1-87)

(m) succimer. (12-1-87)

iv. Tin-113/indium-113m generators for the elution of indium-113m as chloride. (12-1-87)

v. Yttrium-87/strontium-87m generators for the elution of strontium-87m. (12-1-87)

vi. Any generator or reagent kit for preparation and diagnostic use of radiopharmaceutical containing radioactive material for which generator or reagent kit a "Notice of Claimed Investigational Exemption for a New Drug" (IND) has been accepted by the Food and Drug Administration (FDA). (12-1-87)

04. Groups of Therapeutic Uses and Certain Medical Uses. Therapy uses of radioactive material in humans will be grouped as outlined below. (5-5-81)

a. Group IV. Uses of prepared radiopharmaceuticals for certain therapeutic uses that do not normally require hospitalization for purposes of radiation safety will include: (5-5-81)

i. Iodine-131 as iodide for treatment of hyperthyroidism and cardiac dysfunction. (5-5-81)

ii. Phosphorus-32 as soluble phosphate for treatment of polycythemia vera, leukemia and bone metastases. (5-5-81)

iii. Phosphorus-32 as colloidal chromic phosphate for intracavitary treatment of malignant effusions. (5-5-81)

iv. Any radioactive material in a radiopharmaceutical and a therapeutic use not normally requiring hospitalization for purposes of radiation safety for which the Food and Drug Administration (FDA) has accepted a "Notice of Claimed Investigational Exemption for a New Drug" (IND) or New Drug Application (NDA). (12-1-87)

b. Group V. Uses of prepared radiopharmaceuticals for certain therapeutic uses that normally require hospitalization for purposes of radiation safety will include: (5-5-81)

i. Gold-198 as colloid for intracavitary treatment of malignant effusions. (5-5-81)

ii. Iodine-131 as iodide for treatment of thyroid carcinoma. (5-5-81)

iii. Any radioactive material in a radiopharmaceutical and for a therapeutic use normally requiring hospitalization for radiation safety reasons for which the Food and Drug Administration (FDA) has accepted a "Notice of Claimed Investigational Exemptions for a New Drug" (IND) or New Drug Application (NDA). (12-1-87)

c. Group VI. Uses of sources and devices containing radioactive material for certain medical uses will include: (5-5-81)

i. Americium-241 as a sealed source in a device for bone mineral analysis. (5-5-81)

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ii. Cesium-137 encased in needles and applicator cells for topical, interstitial, and intracavitary treatment for cancer. (5-5-81)

iii. Cobalt-60 encased in needles and applicator cells for topical, interstitial, and intracavitary treatment of cancer. (5-5-81)

iv. Gold-198 as seeds for interstitial treatment of cancer. (5-5-81)

v. Iodine-125 as a sealed source in a device for bone mineral analysis. (5-5-81)

vi. Iridium-192 as seeds encased in nylon ribbon or other approved carriers for interstitial treatment of cancer. (5-5-81)

vii. Iodine-125 as seeds for interstitial treatment of cancer. (5-5-81)

viii. Radon-222 as seeds for topical, interstitial, and intracavitary treatment of cancer. (12-1-87)

ix. Radium-226 as a sealed source for topical, interstitial, and intracavitary treatment of cancer. (12-1-87)

x. Strontium-90 sealed in an applicator for treatment of superficial eye conditions. (12-1-87)

xi. Iodine-125 as a sealed source in a portable device for bone imaging and foreign body detection. (12-1-87)

05. Specific Licenses for Certain Groups of Medical Uses of Radioactive Material. (12-31-91)

a. Subject to the provisions of Subsections 081.05.b., 081.05.c. and 081.05.d., an application for a specific license pursuant to Subsection 081.01 for any medical use or uses of radioactive material specified in one (1) or more of Groups I, II, III, IV, V, and VI inclusive, of Section 081. will be approved for all of the uses within the group or groups which include the use or uses specified in the application, provided: (12-31-91)

i. The applicant or registrant satisfies the requirements of Subsections 081.01, 081.02 and 081.06; and (12-31-91)

ii. The applicant or registrant, or the physician designated in the application as the individual user, has adequate clinical experience in the types of uses, included in the group or groups; and (12-1-87)

iii. The applicant or the physicians and all other personnel who will be involved in the preparation and use of the radioactive material have adequate training and experience in the handling of radioactive material appropriate to their participation in the uses included in the group or groups; and (5-5-81)

iv. The applicant's radiation detection and measuring instrumentation is adequate for conducting the procedures involved in the uses included in the group or groups; and (5-5-81)

v. The applicant's radiation safety operating procedures are adequate for handling and disposal of the radioactive material involved in the uses included in the group or groups. (5-5-81)

b. Any licensee who is authorized to use one (1) or more groups of radioactive material pursuant to Subsection 081.05.a. is subject to the following conditions: (12-31-91)

i. For Groups I, II, IV, and V, no licensee will receive, possess, or use radioactive material except as a radiopharmaceutical manufactured in the form to be administered to the patient, labeled, packaged, and distributed in accordance with a specific license issued by the Radiation Control Agency or by another Agreement State or the U.S. Nuclear Regulatory Commission; and (5-5-81)

ii. For Group III, no licensee will receive, possess, or use generators or reagent kits to prepare

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radiopharmaceuticals containing radioactive material, except: (12-1-87)

(a) Reagent kits not containing radioactive material that are approved by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission or an Agreement State or Licensing State for use by persons licensed by Subsection 081.01. or equivalent regulations; and (12-31-91)

(b) Generators or reagent kits containing radioactive material that are manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the Radiation Control Agency, U.S. Nuclear Regulatory Commission or an Agreement State; and (5-5-81)

iii. For Group VI, no licensee or registrant shall receive, possess, or use radioactive material except as contained in a source or device that has been manufactured, labeled, packaged, and distributed in a specific license issued by the Agency pursuant to Subsection 082.21., a specific license issued by the U.S. Nuclear Regulatory Commission pursuant to Section 32.74 of 10 CFR Part 32, or a specific license issued to the manufacturer by an Agreement State or a Licensing State pursuant to equivalent regulations. (12-31-91)

iv. For Group III, any licensee or registrant using generators or reagent kits must: (12-1-87)

(a) Elute the generator, or process radioactive material with the reagent kit, in accordance with instructions approved by the U.S. Nuclear Regulatory Commission, an Agreement State, or Licensing State and furnished by the manufacturer on the label attached to or in the leaflet or brochure that accompanies the generator or reagent kit; (12-1-87)

(b) Before administration to patients, cause each elution or extraction of technetium-99m from a molybdenum 99/technetium 99m generator to be tested to determine either the total molybdenum-99 activity or the concentration of molybdenum-99. This testing shall be conducted according to written procedures and by personnel who have been specifically trained to perform the test; (12-1-87)

(c) Prohibit the administration to patients of technetium-99m containing more than one (1) microcurie of molybdenum-99 per millicurie of technetium-99m, or more than five (5) microcuries of molybdenum-99 per administered dose, at the time of administration; and (12-1-87)

(d) Maintain for three (3) years for Agency inspection records of the molybdenum-99 test conducted on each elution from the generator. (12-1-87)

v. For Groups I, II, and III, any licensee using radioactive material for clinical procedures other than those specified in the product labeling (package insert) shall comply with the product labeling regarding: (12-1-87)

(a) Chemical and physical form; (12-1-87)

(b) Route of administration; and (12-1-87)

(c) Dosage range. (12-1-87)

vi. Technetium-99m pentate, as an aerosol when used for the listed clinical 081.05.b.iv. (12-31-91)

c. Any licensee who is licensed pursuant to Subsection 081.05.a. for one (1) or more of the medical use groups in Subsection 081.03 is also authorized to use radioactive material under the general license in Subsection 072.06.a. for the specified in vitro uses without filing a notification with the Agency as required by Subsection 072.06.b. provided, that the licensee is subject to the other provisions of Subsection 072.06. (12-31-91)

d. Any licensee who is licensed pursuant to Subsection 081.05.a. for one (1) or more of the medical use groups in Subsections 081.03 and 081.04 also is authorized, subject to the provisions of Subsections 081.05.d.e. and 081.05.d.f. and 081.05.e. and 081.05.f., to receive, possess and use for calibration and reference standards: (12-31-91)

i. Any radioactive material listed in Group 1, Group II or Group III of Subsection 081.03 with a half-

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life not longer than one hundred (100) days, in amounts not to exceed fifteen (15) millicuries total; (12-31-91)

ii. Any radioactive material listed in Group I, Group II, or Group III of Subsection 081.03 with half-life greater than one hundred (100) days in amounts not to exceed two hundred (200) microcuries total; (12-31-91)

iii. Technetium-99m in amounts not to exceed thirty (30) millicuries; and (12-1-87)

iv. Any radioactive material, in amounts not to exceed three (3) millicuries per source, contained in calibration or reference sources that have been manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the Agency pursuant to Subsection 081.20, a specific license issued by the U.S. Nuclear Regulatory Commission pursuant to Section 32.74 of 10 CFR Part 32, or a specific license issued to the manufacturer by an Agreement State or a Licensing State pursuant to equivalent regulations. (12-31-91)

e. Any licensee or registrant who possesses sealed sources as calibration or reference sources pursuant to Subsection 081.05.d. shall cause each sealed source containing radioactive material, other than hydrogen-3, with a half-life greater than thirty (30) days in any form other than gas to be tested for leakage and/or contamination at intervals not to exceed six (6) months. In the absence of a certificate from a transferor indicating that a test has been made within six (6) months prior to the transfer, the sealed sources shall not be used until tested, provided, however, that no leak tests are required when: (12-31-91)

i. The source contains one hundred (100) microcuries or less of beta- and/or gamma-emitting material or ten (10) microcuries or less of alpha-emitting material; or (12-1-87)

ii. The sealed source is stored and is not being used. Such sources shall, however, be tested for leakage prior to any use or transfer unless they have been leak tested within six (6) months prior to the date of use or transfer. (12-1-87)

iii. The leak test shall be capable of detecting the presence of five thousandths (0.005) microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is mounted or stored on which contamination might be expected to accumulate. Records of leak test results must be kept in units of microcuries and maintained for inspection by the Agency. (12-1-87)

iv. If the leak test reveals the presence of five thousandths (0.005) microcurie or more of removable contamination, the licensee or registrant shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Sections 050 through 100. A report must be filed within five (5) days of the test with the Agency describing the equipment involved, the test results, and the corrective action taken. (12-31-91)

f. Any licensee or registrant who possesses and uses calibration and reference sources pursuant to Subsection 081.05.d. shall: (12-31-91)

i. Follow the radiation safety and handling instructions approved by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State and furnished by the manufacturer on the label attached to the source, or permanent container thereof, or in the leaflet or brochure that accompanies the source, and maintain such instruction in a legible and conveniently available form; and (12-1-87)

ii. Conduct a quarterly physical inventory to account for all sources received and possessed. Records of the inventories shall be maintained for inspection by the Radiation Control Agency and shall include the quantities and kinds of radioactive material, location of sources, and the date of the inventory. (12-1-87)

06. Human Use of Sealed Sources. (12-31-91)

a. In addition to the requirements set forth in Subsection 081.02, a specific license for human use of sealed sources listed under Group VI will be issued only if the application is made by an institution, and the individual user: (12-31-91)

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i. Has specialized training in the therapeutic use of the sealed source considered (teletherapy unit, beta applicator, etc.), or has experience equivalent to such training; and (5-9-68)

ii. Is a physician. (5-9-68)

b. For Group VI any licensee who possesses and uses sources or devices containing radioactive material must: (5-5-81)

i. Assure that needles or standard medical applicator cells containing cobalt-60 as wire are not opened while in the licensee's possession unless specifically authorized by a license issued to him by the Radiation Control Agency; and (5-5-81)

ii. Assure that patients containing cobalt-60, cesium-137 and/or iridium-192 implants remain hospitalized until the implants are removed; and (5-5-81)

iii. Follow the radiation safety and handling instructions approved by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or an Agreement State and furnished by the manufacturer on the label attached to the source, device or permanent container thereof, or in the leaflet or brochure which accompanies the source or device, and maintain such instruction in a legible and conveniently available form. (5-5-81)

07. Use of Sealed Sources in Industrial Radiography. In addition to the requirements set forth in Subsection 080.01 or Section 090 a specific license for use of sealed sources or registration for x-ray machine use in industrial radiography will be issued only if: (12-31-91)

a. The applicant will have an adequate program for training radiographers and radiographers' assistants and submits to the Radiation Control Agency a schedule or description of such program which specifies the: (5-9-68)

i. Initial training; and (5-9-68)

ii. Periodic training; and (5-9-68)

iii. On-the-job training; and (5-9-68)

iv. Means to be used by the licensee to determine the radiographer's knowledge and understanding of and ability to comply with Radiation Control Agency regulations and licensing requirements, and the operating and emergency procedures of the applicant; and (5-9-68)

v. Means to be used by the licensee to determine the knowledge and understanding of the radiographer's assistant and his ability to comply with the operating and emergency procedures of the applicant; and (5-9-68)

b. The applicant has established and submits to the Radiation Control Agency satisfactory written operating and emergency procedures as described in Subsection 154.02; and (12-31-91)

c. The applicant will have an adequate internal inspection system, or other management control, to assure that license provisions, regulations, and the applicant's operating and emergency procedures are followed by radiographers and radiographers' assistant. The inspection system must include the performance of internal inspections at intervals not to exceed three (3) months and the retention of records of such inspections for two (2) years; and (12-1-87)

d. The applicant submits to the Radiation Control Agency a description of his overall organization structure pertaining to the industrial radiography program, including specified delegations of authority and responsibility for operation of the program; and (12-1-87)

e. The applicant who desires to conduct his own leak tests has established adequate procedures to be followed in leak testing sealed sources for possible leakage and contamination and submits to the Radiation Control

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Agency a description of such procedures to be used, including: (5-5-81)

i. Instrumentation to be used; and (5-9-68)

ii. Method of performing tests, such as points on equipment to be smeared and method of taking smear; and (5-9-68)

iii. Pertinent experience of the person who will perform the test; and (5-9-68)

f. The licensee will conduct a program for inspection and maintenance of radiographic exposure devices and storage containers to assume proper functioning of components important to safety. (5-5-81)

08. Institutional Licenses for Use in Research and Development. In addition to the requirements set forth in Subsection 080.02, a specific license for multiple quantities or types of radioactive material for use in research and development in institutions will be issued only if: (12-31-91)

a. The applicant's staff has substantial experience in the use of a variety of radioisotopes for a variety of research and development uses; and (5-9-68)

b. The applicant has established an isotope committee, composed of such persons as a Radiation Safety Officer, a representative of the business office and one (1) or more persons trained or experienced in the safe use of radioactive materials, which will review and give advance approval of purchase of radioisotopes, of all users, and of all proposed uses of radioactive materials; and (5-9-68)

c. The applicant has appointed a Radiation Safety Officer who will advise and assist on radiation safety problems. (5-9-68)

09. Licensing the Manufacture and Distribution of Devices to Persons Generally Licensed Under Subsection 072.02. (12-31-91)

a. An application for a specific license to manufacture or distribute devices containing radioactive material, excluding special nuclear material, to persons generally licensed under Subsection 072.02 or equivalent regulations of the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State will be approved if: (12-31-91)

i. The applicant satisfies the general requirements of Subsection 080.02; and (12-31-91)

ii. The applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control, labels, proposed uses, installation, servicing, leak testing, operating and safety instructions, and potential hazards of the device to provide reasonable assurance that: (5-5-81)

(a) The device can be safely operated by persons not having training in radiological protection; and (5-5-81)

(b) Under ordinary conditions of handling, storage, and use of the device, the radioactive material contained in the device will not be released or inadvertently removed from the device, and it is unlikely that any person will receive in any period of one (1) calendar quarter a dose in excess of ten percent (10%) of the limits specified in the Table in Subsection 110.01; and (12-31-91)

(c) Under accident conditions such as fire and explosions associated with handling, storage, and use of the device, it is unlikely that any person would receive an external radiation dose or dose commitment in excess of fifteen (15) rems for the whole body, head and trunk, active blood-forming organs, gonads, or lens of the eye; the excess of two hundred (200) rems for the hands and forearms, feet and ankles, localized areas of skin averaged over areas no larger than one (1) square centimeter; and in excess of fifty (50) rems for other organs; and (5-5-81)

iii. Each device bears a durable, legible, clearly visible label or labels approved by the Radiation Control Agency, which contain in a clearly identified and separate statement: (5-5-81)

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(a) Instructions and precautions necessary to assure safe installation, operation, and servicing of the device; however, documents such as operating and service manuals can be identified in the label and used to provide this information; and (5-5-81)

(b) The requirement, or lack of requirement, for leak testing, or for testing any on-off mechanism and indicator, including the maximum time interval for such testing, and the identification of radioactive material by isotope, quantity of radioactivity, and date of determination of the quantity; and (5-5-81)

(c) The information called for in one (1) of the following statements, as appropriate, in the same or substantially similar form:

"The receipt, possession, use and transfer of this device Model, Serial No., are subject to a general license or the equivalent and the regulations of the U.S. Nuclear Regulatory Commission, a State with which the Nuclear Regulatory Commission has entered into an agreement for the exercise of regulatory authority, or any Licensing State. This label must be maintained on the device in a legible condition. Removal of this label is prohibited.

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(name of manufacturer or distributor)" and (5-5-81)

(d) Notwithstanding the above, the model, serial number, and name of manufacturer or distributor can be omitted from label provided the information is elsewhere specified on labeling affixed to the device. (5-5-81)

b. In the event the applicant desires that the device be required to be tested at intervals longer than six (6) months, either for proper operation of the on-off mechanism and indicator, if any, or for leakage of radioactive material or for both, he must include in his application sufficient information to demonstrate that the longer interval is justified by performance characteristics of the device or similar devices and by design features which have a significant bearing on the probability or consequences of leakage of radioactive material from the device or failure of the on-off mechanism and indicator. In determining the acceptable interval for the test for leakage of radioactive material, the Radiation Control Agency will consider information which includes, but is not limited to: (5-5-81)

i. Primary containment of source capsule; and (12-1-87)

ii. Protection of primary containment; and (5-9-68)

iii. Method of sealing containment; and (5-9-68)

iv. Containment construction materials; and (5-9-68)

v. Form of contained radioactive material; and (5-9-68)

vi. Maximum temperature withstood during prototype test; and (5-9-68)

vii. Maximum pressure withstood during prototype tests; and (5-9-68)

viii. Maximum quantity of contained radioactive material; and (5-9-68)

ix. Radiotoxicity of contained radioactive material; and (5-9-68)

x. Operating experience with identical devices or similarly designed and constructed devices. (5-9-68)

c. In the event the applicant desires that the general licensee under Subsection 072.02, or under equivalent regulations of the Nuclear Regulatory Commission, an Agreement State or a Licensing State be authorized to install the device, collect the sample to be analyzed by a specific licensee for leakage of radioactive material, service the device, test the on-off mechanism and indicator, or remove the device from installation, he must include in

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his application written instructions to be followed by the general licensee, estimated calendar quarter doses associated with such activity or activities, and bases for such estimates. The submitted information must demonstrate that performance of such activity or activities by an individual untrained in radiological protection, in addition to other handling, storage, and use of devices under the general license, is unlikely to cause that individual to receive a calendar quarter dose in excess of ten percent (10%) of the limits specified in the Table in Subsection 110.01. (12-31-91)

d. Each person licensed under Subsection 081.09 to distribute devices to generally licensed persons must: (12-31-91)

i. Furnish a copy of the general license contained in Section 072 to each person to whom he directly or through an intermediate person transfers radioactive material in a device for use pursuant to the general license contained in Subsection 072.01; and (12-31-91)

ii. Furnish a copy of the general license contained in the U.S. Nuclear Regulatory Commission's, Agreement State's or Licensing State's regulation equivalent to Subsection 072.02, or alternatively furnish a copy of the general license contained in Subsection 072.02 to each person to whom he directly or through an intermediate person transfers radioactive material in a device for use pursuant to the general license of the U.S. Nuclear Regulatory Commission, the Agreement State or the Licensing State. If a copy of the general license in Subsection 072.02 is furnished to such a person, it must be accompanied by a note explaining that the use of the device is regulated by the U.S. Nuclear Regulatory Commission, Agreement State or Licensing State under requirements substantially the same as those in Subsection 072.02; and (12-31-91)

iii. Report to the Radiation Control Agency all transfers of such devices to persons for use under the general license in Subsection 072.02. Such report must identify each general licensee by name and address, an individual by name and/or position who can constitute a point of contact between the Radiation Control Agency and the general licensee, the type and model number of device transferred, and the quantity and type of radioactive material contained in the device. If one (1) or more intermediate persons will temporarily possess the device at the intended place of use prior to its possession by the user, the report must include identification of each intermediate person by name, address, contact, and relationship to the intended user. If no transfers have been made to the persons generally licensed under Subsection 072.02 during the reporting period, the report must so indicate. The report will cover each calendar quarter and must be filed within thirty (30) days thereafter; and (12-31-91)

iv. Must comply with the following report requirements: (5-5-81)

(a) Report to the U.S. Nuclear Regulatory Commission all transfers of such devices to persons for use under the Nuclear Regulatory Commission general license in 10 CFR 31.5; and (5-5-81)

(b) Report to the responsible State agency all transfers of devices manufactured and distributed pursuant to Subsection 081.09 for use under a general license in that state's regulations which are equivalent to Subsection 072.02; and (12-31-91)

(c) Such reports must identify each general licensee by name and address, each individual by name and/or position who constitutes a point of contact between the agency and the general licensee, the type and model of the device transferred, and the quantity and type of radioactive material contained in the device. If one (1) or more intermediate persons will temporarily possess the device at the intended place of use prior to its possession by the user, the report must include identification of each intermediate person by name, address, contact, and relationship to the intended user. The report must be submitted within thirty (30) days after the end of each calendar quarter in which such a device is transferred to the generally licensed person; and (5-5-81)

(d) If no transfers have been made to U.S. Nuclear Regulatory Commission licensees during the reporting period, this information must be reported to the Nuclear Regulatory Commission; and (5-5-81)

(e) If no transfers have been made to general licensees within a particular state during the reporting period, this information will be reported to the responsible state agency upon request of the agency. (5-5-81)

e. Additionally, such licensees must keep records showing the name, address, and the point of contact

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for each general licensee to whom he directly or through an intermediate person transfers radioactive material in devices for use pursuant to the general license provided for in Subsection 072.02, or pursuant to equivalent regulations of the Nuclear Regulatory Commission, and Agreement State or a Licensing State. The records must show the date of each transfer, the radionuclide and the quantity of radioactivity in each device transferred, the identity of any intermediate person, and compliance with the report requirements of this section. (12-31-91)

10. Special Requirements for the Manufacture, Assembly, or Repair of Luminous Safety Devices for Use in Aircraft. An application for a specific license to manufacture, assemble, or repair luminous safety devices containing tritium or promethium-147 for use in aircraft and for subsequent distribution to persons generally licensed under Subsection 072.03 will be approved subject to the following conditions: (12-31-91)

a. The applicant satisfies the general requirements specified in Subsection 080.02; and (12-31-91)

b. The applicant satisfies the requirements of 10 CFR 32.53, 32.54, 32.55, 32.56, 32.101 or their equivalent. (5-5-81)

11. Licensing the Introduction of Radioactive Material Into Products in Exempt Concentrations. (5-5-81)

a. In addition to the requirements set forth in Subsection 080.02, a specific license authorizing the introduction of radioactive material into a product or material owned by or in the possession of the licensee or another to be transferred to persons exempt under Subsection 053.02.a. will be issued only if: (12-31-91)

i. The applicant submits a description of the product or material into which the radioactive material will be introduced, intended use of the radioactive material and the product or material into which it is introduced, method of introduction, initial concentration of the radioactive material in the product or material, control methods to assure that no more than the specified concentration is introduced into the product or material, estimated time interval between introduction and transfer of the product or material, and estimated concentration of the radioactive material in the product or material at the time of transfer; and (5-9-68)

ii. The applicant provides reasonable assurance that the concentration of radioactive material at the time of transfer will not exceed the concentrations of Subsection 053.02.a.ii., that reconcentration of the radioactive material in concentrations exceeding those in Subsection 053.02.a.ii. is not likely, that use of lower concentrations is not feasible, and that the product or material is not likely to be incorporated in any food, beverage, cosmetic, drug or other commodity or product designed for ingestion or inhalation by, or application to, a human being. (12-31-91)

b. Each person licensed under Subsection 081.11 must file an annual report with the Radiation Control Agency which will identify the type and quantity of each product or material into which radioactive material has been introduced during the reporting period; the name and address of the person who owned or possessed, at the time of introduction, the product or material into which radioactive material has been introduced; the type and quantity of radionuclide introduced into each such product or material; and the initial concentrations of the radionuclide in the product or material at the time of transfer of the radioactive material by the licensee. If no transfers of radioactive material have been made pursuant to Subsection 081.11 during the reporting period, the report must so indicate. The report must cover the year ending June 30, and must be filed within thirty (30) days thereafter. (12-31-91)

c. Authority to transfer possession or control by the manufacturer, processor, or producer of any equipment, device, commodity, or other product containing source material or byproduct material or special nuclear material whose subsequent possession, use, transfer, and disposal by all other persons are exempted from regulatory requirements can be obtained only from the U.S. Nuclear Regulatory Commission, Washington, D.C. 20545. (5-5-81)

12. Licensing the Distribution of Radioactive Material in Exempt Quantities. (12-31-91)

a. An application for a specific license to distribute natural occurring radioactive materials to persons exempted from these regulations pursuant to Subsection 053.02.b. will be approved if: (12-31-91)

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i. The radioactive material is not contained in any food, beverage, cosmetic, drug, or other commodity designed for ingestion or inhalation by, or application to, a human being; and (5-5-81)

ii. The radioactive material is in the form of processed chemical elements, compounds, or mixtures, tissue samples, bioassay samples, counting standards, plated or encapsulated sources, or similar substances, which are identified as being radioactive and which are to be used for their radioactive properties, but which are not incorporated into any manufactured or assembled commodity, product, or device intended for commercial distribution; and (5-5-81)

iii. The applicant submits copies of prototype labels and brochures and the Radiation Control Agency approves such labels and brochures. (5-5-81)

b. The license issued under Subsection 081.12. is subject to the following conditions: (12-31-91)

i. No more than ten (10) exempt quantities can be sold or transferred in any single transaction. However, an exempt quantity can be composed of fractional parts of one (1) or more of the exempt quantity provided the sum of the fractions must not exceed "unity". (5-5-81)

ii. Each exempt quantity must be separately and individually packaged. No more than ten (10) such packaged exempt quantities will be contained in any outer package for transfer to persons exempt pursuant to Subsection 053.02.b. The outer package must be such that the dose rate at the external surface of the package does not exceed five-tenths (0.5) millirem per hour. (12-31-91)

iii. The immediate container of each quantity or separately packaged fractional quantity of radioactive material must bear a durable, legible label which identifies the radionuclide and the quantity of radioactivity, and bears the words "Radioactive Material". (5-5-81)

iv. In addition to the labeling information required by Subsection 081.12.b.iii., the label affixed to the immediate container or an accompanying brochure, must (12-31-91)

(a) State that the contents are exempt from the U.S. Nuclear Regulatory Commission or Agreement State requirements; and (5-5-81)

(b) Bear the words "Radioactive Material - Not for Human Use - Introduction into Foods, Beverages, Cosmetics, Drugs, or Medicinals, or into Products Manufactured for Commercial Distribution is Prohibited by Law - Exempt Quantities Must Not be Combined"; and (5-5-81)

(c) Set forth appropriate additional radiation safety precautions and instructions relating to the handling, use, storage, and disposal of the radioactive material. (5-5-81)

c. Each person licensed under Subsection 081.12 must maintain records identifying, by name and address, each person to whom radioactive material is transferred for use under Subsection 053.02.b. or the equivalent regulations of an Agreement State or Nuclear Regulatory Commission, and stating the kinds and quantities of radioactive material transferred. An annual summary report stating the total quantity of each radionuclide transferred under the specific license must be filed with the Radiation Control Agency. Each report must cover the year ending June 30, and must be filed within thirty (30) days thereafter. If no transfers of radioactive material have been made pursuant to Subsection 081.12 during the reporting period, the report will so indicate. (12-31-91)

13. Licensing the Incorporation of Natural Occurring and Accelerator Produced Radioactive Material Into Gas and Aerosol Detectors. An application for a specific license authorizing the incorporation of natural occurring and accelerator produced radioactive material into gas and aerosol detectors to be distributed to persons exempt under Subsection 053.02.g and 053.02.h. will be approved if the application satisfies requirements equivalent to those contained in 10 CFR 32.26. The maximum quantity of radium-226 in each device shall not exceed one tenth (0.1) microcuries. (12-31-91)

14. Manufacture and Distribution of Radioactive Material for Medical Use Under General License. In addition to requirements set forth in Subsection 080.02, a specific license authorizing the distribution of radioactive

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material for use by physicians under the general license in Subsection 072.05 will be issued if: (12-31-91)

a. The applicant submits evidence that the radioactive material is to be manufactured, labeled, and packaged in accordance with a new drug application which the Commissioner of Food and Drugs, Food and Drug Administration, has approved, or in accordance with a license for a biologic product issued by the Secretary, Department of Health and Human Services; and (12-1-87)

b. The following statement, or a substantially similar statement which contains the information called for below, appears on the label affixed to the container or appears in the leaflet or brochure which accompanies the package: (12-31-91)

"This radioactive drug may be received, possessed, and used only by physicians licensed to dispense drugs in the practice of medicine. Its receipt, possession, use and transfer are subject to the regulations and a general license or its equivalent of the U.S. Nuclear Regulatory Commission or of a Licensing State.

Name of Manufacturer" (12-1-87)

15. Manufacture and Distribution of Radioactive Material for Certain In Vitro Clinical or Laboratory Testing Under General License. An application for a specific license to manufacture or distribute radioactive material for use under the general license of Subsection 072.06 will be approved if: (12-31-91)

a. The applicant satisfies the general requirements specified in Subsection 080.02; and (12-31-91)

b. The radioactive material is to be prepared for distribution in prepackaged units of: (5-5-81)

i. Iodine-125 in units not exceeding ten (10) microcuries each; and (5-5-81)

ii. Iodine-131 in units not exceeding ten (10) microcuries each; and (5-5-81)

iii. Carbon-14 in units not exceeding ten (10) microcuries each; and (5-5-81)

iv. Hydrogen-3 (tritium) in units not exceeding fifty (50) microcuries each; and (5-5-81)

v. Iron-59 in units not exceeding twenty (20) microcuries each; and (5-5-81)

vi. Cobalt-57 in units not exceeding ten (10) microcuries each; and (5-5-81)

vii. Mock iodine-125 in units not exceeding five one-hundredths (0.05) microcurie of iodine-129 and five one-thousandths (0.005) microcurie of americium-241 each. (12-1-87)

viii. Selenium-75 in units not exceeding ten (10) microcuries each. (12-1-87)

c. Each prepackaged unit bears a durable, clearly visible label which: (5-5-81)

i. Identifies the radioactive contents as to chemical form and radionuclide, and indicates that the amount of radioactivity does not exceed ten (10) microcuries of iodine-125, iodine-131, or carbon-14; fifty (50) microcuries of hydrogen-3 (tritium); twenty (20) microcuries of iron-59; or ten (10) microcuries of cobalt-57, selenium-75 or mock iodine-125 in units of not exceeding five one-hundredths (0.05) microcurie of iodine-129 and five one-thousandths (0.005) microcurie of americium-241 each; and (12-1-87)

ii. Displays the radiation caution symbol described in Subsection 120.03.a.i. and the words, "CAUTION RADIOACTIVE MATERIAL", and "Not for Internal or External Use in Humans or Animals"; and (12-31-91)

d. The following statement, or a substantially similar statement which contains the information called for in the following statement, appears on a label affixed to each prepackaged unit or appears in a leaflet or brochure which accompanies the package: (2-31-91)

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"This radioactive material can be received, acquired, possessed, and used only by physicians, veterinarians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use, and transfer are subject to the regulations and a general license of the U.S. Nuclear Regulatory Commission or of a Licensing State.

Name of Manufacturer"; and (12-1-87)

e. The label affixed to the unit, or the leaflet or brochure which accompanies the package, contains adequate information as to the precautions to be observed in handling and storing such radioactive material. In the case of the mock iodine-125 reference or calibration source, the information accompanying the source must also contain directions to the licensee regarding the waste disposal requirements set out in Section 930. (12-1-87)

16. Special Requirements for License to Manufacture Calibration Sources Containing Americium-241, Plutonium or Radium-226 for Distribution to Persons Generally Licensed Under Subsection 072.04. An application for a specific license to manufacture calibration and reference sources containing americium-241, plutonium or radium-226 to persons generally licensed under Subsection 072.04 will be approved subject to the following conditions: (12-31-91)

a. The applicant satisfies the general requirement of Subsection 080.02; and (12-31-91)

b. The applicant satisfies the requirements of 10 CFR 32.57, 32.58, 32.59, 32.102 and 70.39 or their equivalent. (12-1-87)

17. Licensing the Manufacture and Distribution of Ice Detection Devices. An application for a specific license to manufacture ice detection devices and to distribute them to persons generally licensed under Subsection 072.07 will be approved subject to the following conditions: (2-31-91)

a. An applicant satisfies the general requirements of Subsection 080.02; and (2-31-91)

b. The criteria of 10 CFR 32.61, 32.62, and 32.103 are met. (12-1-87)

18. Manufacture and Distribution of Radiopharmaceuticals Containing Radioactive Material for Medical Use Under Group Licenses (5-5-81)

a. An application for a specific license to manufacture and distribute radiopharmaceuticals containing radioactive material for use by persons licensed pursuant to Subsection 081.05 for the uses listed in Group I, II, IV or V of Subsection 081.03 will be approved if: (12-31-91)

i. The applicant satisfies the general requirements specified in Subsection 080.02; and (12-31-91)

ii. The applicant submits evidence that: (5-5-81)

(a) The radiopharmaceutical containing radioactive material will be manufactured, labeled, and packaged in accordance with the Federal Food, Drug and Cosmetic Act, U.S. Code Title 21, or the Public Health Service Act, U.S. Code Title 42, as a new drug application (NDA) approved by the Food and Drug Administration (FDA), or a "Notice of Claimed Investigational Exemption for a New Drug" (IND) that has been accepted by the FDA; or (12-1-87)

(b) The manufacture and distribution of the radiopharmaceutical containing radioactive material is not subject to the Federal Food, Drug and Cosmetic Act and the Public Health Service Act; and (5-5-81)

iii. The applicant submits information on the radionuclide, chemical and physical form, packaging including maximum activity per package, and shielding provided by the packaging of the radioactive material which is appropriate for safe handling and storage of radiopharmaceuticals by group licensees; and: (5-5-81)

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(a) The label affixed to each package of the radiopharmaceutical contains information on the radionuclide, quantity, and date of assay and the label affixed to each package, or the leaflet or brochure which accompanies each package, contains a statement that the radiopharmaceutical is licensed by the Agency for distribution to persons licensed pursuant to Subsections 081.05 and 081.03, as appropriate, or under equivalent licenses of the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State or that an application for such license has been filed with the Radiation Control Agency on or before the effective date of these regulations; and (12-31-91)

(b) The labels, leaflets or brochures required by Subsection 081.19.a.iii.(a) are in addition to the labeling required by the Food and Drug Administration (FDA) and they can be separate from or, with the approval of FDA, can be combined with the labeling required by FDA. (12-31-91)

19. Manufacture and Distribution of Generators or Reagent Kits for Preparation of Radiopharmaceuticals Containing Radioactive Material. (12-31-91)

a. An application for a specific license to manufacture and distribute generators or reagent kits containing radioactive material for preparation of radiopharmaceuticals by persons licensed pursuant to Subsection 081.05 for the uses listed in Group III Subsection 081.03 will be approved if: (12-31-91)

i. The applicant satisfies the general requirements specified in Subsection 080.02; and (12-31-91)

ii. The applicant submits evidence that: (5-5-81)

(a) The generator or reagent kit is to be manufactured, labeled and packaged in accordance with the Federal Food, Drug and Cosmetic Act, U.S. Code Title 21, or the Public Health Act, U.S. Code Title 42, such as a new drug application (NDA) approved by the Food and Drug Administration (FDA), or a "Notice of Claimed Investigational Exemption for a New Drug" (IND) that has been accepted by the FDA; or (12-1-87)

(b) The manufacture and distribution of the generator or reagent kit are not subject to the Federal Food, Drug and Cosmetic Act, U.S. Code Title 21, and the Public Health Service Act, U.S. Code Title 42; and (5-5-81)

iii. The applicant submits information on the radionuclide, chemical and physical form, packaging including maximum activity per package, and shielding provided by the packaging of the radioactive material contained in the generator or reagent kit; and (5-5-81)

iv. The label affixed to the generator or reagent kit contains information on the radionuclide, quality, and date of assay; and (5-5-81)

v. The label affixed to the generator or reagent kit, or the leaflet or brochure which accompanies the generator or reagent kit, contains: (5-5-81)

(a) Adequate information, from a radiation safety standpoint, on the procedures to be followed and the equipment and shielding to be used in eluting the generator or processing radioactive material with the reagent kit; and (5-5-81)

(b) A statement that the generator or reagent kit, as appropriate, is approved for use by persons licensed by the Radiation Control Agency pursuant to Subsections 081.05 and 081.03. Group III or under equivalent licenses of the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State. The labels, leaflets or brochures required by Subsection 081.20.a. are in addition to the labeling required by FDA and they can be separate from or, with the approval of FDA, can be combined with the labeling required by FDA. (12-31-91)

b. Although the Radiation Control Agency does not regulate the manufacture and distribution of reagent kits that do not contain radioactive material, it does regulate the use of such reagent kits for the preparation of radiopharmaceuticals containing radioactive material as part of its licensure and regulation of the users of radioactive material. Any manufacturer of reagent kits that do not contain radioactive material who desires to have his reagent kits approved by the Radiation Control Agency for use by persons licensed pursuant to Subsection 081.05 and Group III of Subsection 081.03 can submit the pertinent information specified in Subsection 081.19. (12-31-91)

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20. Manufacture and Distribution of Sources or Devices Containing Radioactive Material for Medical Use. (12-31-91)

a. An application for a specific license to manufacture and distribute sources and devices containing radioactive material to persons licensed pursuant to Subsection 081.05 for use as a calibration or reference source or for the uses listed in Group VI of Subsection 081.04 will be approved if: (12-31-91)

i. The applicant satisfies the general requirements in Subsection 080.02; and (12-31-91)

ii. The applicant submits sufficient information regarding each type of source or device pertinent to an evaluation of its radiation safety, including: (5-5-81)

(a) The radioactive material contained, its chemical and physical form, and amount; and (5-5-81)

(b) Details of design and construction of the source or device; and (5-5-81)

(c) Procedures for, and results of, prototype tests to demonstrate that the source or device will maintain its integrity under stresses likely to be encountered in use and accidents; and (5-5-81)

(d) For devices containing radioactive material, the radiation profile of a prototype device; and (5-5-81)

(e) Details of quality control procedures to assure that production sources and devices meet the standards of the design and prototype tests; and (5-5-81)

(f) Procedures and standards for calibrating sources and devices; and (5-5-81)

(g) Legend and methods for labeling sources and devices as to their radioactive content; and (5-5-81)

(h) Instructions for handling and storing the source or device from the radiation safety standpoint; these instructions are to be included on a durable label attached to the source or device or attached to a permanent storage container for the source or device; provided, that instructions which are too lengthy for such label can be summarized on the label and printed in detail on a brochure which is referenced on the label; and (5-5-81)

iii. The label affixed to the source or device, or to the permanent storage container for the source or device, contains information on the radionuclide, quantity, and date of assay, and a statement that the source or device, which must be specifically named, is licensed by the Radiation Control Agency for distribution to persons licensed pursuant to Subsections 081.05 and 081.04. Group VI or under equivalent licenses of the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State or that a pending application for such license has been filed with the Radiation Control Agency on or before the effective date of these regulations, provided, that such labeling for sources which do not require long term storage, such as gold-198 seeds, can be on a leaflet or brochure which accompanies the source. (12-31-91)

b. In the event the applicant desires that the source or device be required to be tested for leakage of radioactive material at intervals longer than six (6) months, he must include in his application sufficient information to demonstrate that such longer interval is justified by performance characteristics of the source or device or similar sources or devices and by design features that have a significant bearing on the probability or consequences of leakage of radioactive material from the source. (5-5-81)

i. In determining the acceptable interval for test of leakage of radioactive material, the Radiation Control Agency will consider information that includes, but is not limited to: (5-5-81)

(a) Primary containment, source capsule; and (5-5-81)

(b) Protection of primary containment; and (5-5-81)

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(c) Method of sealing containment; and (5-5-81)

(d) Containment construction materials; and (5-5-81)

(e) Form of contained radioactive material; and (5-5-81)

(f) Maximum temperature withstood during prototype tests; and (5-5-81)

(g) Maximum pressure withstood during prototype tests; and (5-5-81)

(h) Maximum quantity of contained radioactive material; and (5-5-81)

(i) Radiotoxicity of contained radioactive material; and (5-5-81)

(j) Operating experience with identical sources or devices or similarly designed and constructed sources or devices. (5-5-81)

21. Requirements for License to Manufacture and Distribute Industrial Products Containing Depleted Uranium for Mass-Volume Applications. (12-31-91)

a. An application for a specific license to manufacture industrial products and devices containing depleted uranium for use pursuant to Subsection 071.03 or equivalent regulations of the U.S. Nuclear Regulatory Commission or an Agreement State will be approved if: (12-31-91)

i. The applicant satisfies the general requirements specified in Subsection 080.02; and (12-31-91)

ii. The applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control procedures, labeling and marking, proposed uses, and potential hazards of the industrial product or device to provide reasonable assurance that possession, use and transfer of the depleted uranium in the product or device is not likely to cause any individual to receive in any period of one (1) calendar quarter a radiation dose in excess of ten percent (10%) of the limits specified in Subsection 110.01; and (12-31-91)

iii. The applicant submits sufficient information regarding the industrial product or device and the presence of depleted uranium for a mass-volume application in the product or device to provide reasonable assurance that unique benefits will accrue to the public because of the usefulness of the product or device. (5-5-81)

b. In the case of an industrial product or device whose unique benefits are questionable, the Radiation Control Agency will approve an application for a specific license under Subsection 081.21 only if the product or device is found to combine a high degree of utility and low probability of uncontrolled disposal and dispersal of significant quantities of depleted uranium into the environment. (12-31-91)

c. The Radiation Control Agency can deny any application for a specific license under Subsection 081.21 if the end use of the industrial product or device cannot be reasonably foreseen. (12-31-91)

d. Each person licensed pursuant to Subsection 081.21.a. must: (12-31-91)

i. Maintain the level of quality control required by the license in the manufacture of the industrial product or device, and in the installation of the depleted uranium into the product or device; and (5-5-81)

ii. Label or mark each unit to: (5-5-81)

(a) Identify the manufacturer of the product or device and the number of the license under which the product or device was manufactured, state the fact that the product or device contains depleted uranium, and list the quantity of depleted uranium in each product or device; and (5-5-81)

(b) State that the receipt, possession, use, and transfer of the product or device are subject to a general license or the equivalent and the regulations of the U.S. Nuclear Regulatory Commission or of an Agreement State;

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and (5-5-81)

iii. Assure that the depleted uranium before being installed in each product or device has been impressed with the following legend clearly legible through any plating or other covering: "Depleted Uranium"; and (5-5-81)

iv. Furnish the following: (5-5-81)

(a) A copy of the general license contained in Subsection 071.03 and a copy of registration certificate described in Subsection 071.03.c. to each person to whom he transfers depleted uranium in a product or device for use pursuant to the general license contained in Subsection 071.03; or (12-31-91)

(b) A copy of the general license contained in the U.S. Nuclear Regulatory Commission or Agreement State's regulation equivalent to Subsection 071.03 and a copy of the U.S. Nuclear Regulatory Commission or Agreement State's certificate; or alternatively, furnish a copy of the general license contained in Subsection 071.03 and a copy of registration certificate described in Subsection 071.03.c. to each person to whom he transfers depleted uranium in a product or device for use pursuant to the general license of the U.S. Nuclear Regulatory Commission or an Agreement State, with a note explaining that use of the product or device is regulated by the U.S. Nuclear Regulatory Commission or an Agreement State under requirements substantially the same as those in Subsection 071.03; and (5-5-81)

v. Report to the Radiation Control Agency all transfers of industrial products or devices to persons for use under the general license in Subsection 071.03. Such report will identify each general licensee by name and address, an individual by name and/or position who could constitute a point of contact between the Radiation Control Agency and the general licensee, the type and model number of device transferred, and the quantity of depleted uranium contained in the product or device. The report must be submitted within thirty (30) days after the end of each calendar quarter in which such a product or device is transferred to the generally licensed person. If no transfers have been made to persons generally licensed under Subsection 071.03 during the reporting period, the report must so indicate; and (12-31-91)

vi. Comply with the following reporting requirements: (5-5-81)

(a) Report to the U.S. Nuclear Regulatory Commission all transfers of industrial products or devices to persons for use under the U.S. Nuclear Regulatory Commission general license in 10 CFR 40.25; and (5-5-81)

(b) Report to the responsible state agency all transfers of devices manufactured and distributed pursuant to Subsection 081.22.a. for use under a general license in that state's regulations equivalent to Subsection 071.03; and (12-31-91)

(c) Such report will identify each general licensee by name and address, an individual by name and/or position who may constitute a point of contact between the agency and the general licensee, the type and model number of the device transferred, and the quantity of depleted uranium contained in the product or device. The report must be submitted within thirty (30) days after the end of each calendar quarter in which such report or device is transferred to the generally licensed person; and (5-5-81)

(d) If no transfers have been made to U.S. Nuclear Regulatory Commission licensees during the reporting period, this information must be reported to the U.S. Nuclear Regulatory Commission; and (5-5-81)

(e) If no transfers have been made to general licensees within a particular Agreement State during the reporting period, this information must be reported to the responsible Agreement State agency; and (5-5-81)

vii. Keep records showing the name, address, and point of contact for each general licensee to whom he transfers depleted uranium in industrial products or devices for use pursuant to the general license provided in Subsection 071.03 or equivalent regulations of the U.S. Nuclear Regulatory Commission or of an Agreement State. The records must be maintained for a period of two (2) years and must show the date of each transfer, the quantity of depleted uranium in each product or device transferred, and compliance with the report requirements of this section. (12-31-91)

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22. Issuance of Specific Licenses. (12-31-91)

a. Upon a determination that an application meets the requirements of the Act and the regulations of the Radiation Control Agency, the Radiation Control Agency will issue a specific license authorizing the proposed activity in such form and containing such conditions and limitations as it deems appropriate or necessary. (5-9-68)

b. The Radiation Control Agency can incorporate in any license at the time of issuance, or thereafter by appropriate rule, regulation, or order, such additional requirements and conditions with respect to the licensee's receipt, possession, use, and transfer of radioactive materials subject to Subsection 081.22.a. as it deems appropriate or necessary in order to: (12-31-91)

i. Minimize danger to public health and safety and/or property; and (5-9-68)

ii. Require such reports and the keeping of such records, and to provide for such inspections of activities under the license as appropriate or necessary; and (5-9-68)

iii. Prevent loss or theft of material subject to Subsection 081.23.a. (12-31-91)

23. Specific Terms and Conditions of Licenses. (12-31-91)

a. Each license issued pursuant to Subsection 081.22.a. will be subject to all the provisions of the Act, now or hereafter in effect, and to all rules, regulations, and orders of the Radiation Control Agency. (12-31-91)

b. No license issued or granted under Subsection 081.22.a. and no right to possess or utilize radioactive materials granted by any license issued pursuant to Subsection 081.22.a. can 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 Radiation Control Agency, after securing full information finds that the transfer is in accordance with the provisions of the Act, and gives its consent in writing. (12-31-91)

c. Each person licensed by the Radiation Control Agency pursuant to Subsection 081.22.a. will confine his use and possession of the material licensed to the locations and purposes authorized in the license. (12-31-91)

d. Each licensee shall notify the Radiation Control Agency in writing when the licensee decides to permanently discontinue all activities involving materials authorized under the license. (12-1-87)

24. Expiration of Licenses. Except as provided in Subsection 081.25, each specific license will expire at the end of the specified day, in the month and year stated therein. (12-31-91)

25. Renewal of Licenses. (12-31-91)

a. Applications for renewal of specific licenses will be filed in accordance with Subsection 080.01. (12-31-91)

b. In any case in which a licensee, not less than thirty (30) days prior to expiration of his existing license, has filed an application in proper form for renewal or for a new license authorizing the same activities, such existing license will not expire until the application has been finally determined by the Radiation Control Agency. (5-9-68)

26. Amendment of Licenses at Request of Licensee. Applications for amendments of a license must be filed in accordance with Section 080, and must specify the respects in which the licensee desires his license to be amended and the grounds for such amendment. (12-31-91)

27. Radiation Control Agency Action on Applications to Renew or Amend. In considering an application by a licensee to renew or amend his license, the Radiation Control Agency will apply the criteria set forth in Subsections 080.02 and 081 as applicable. (12-31-91)

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28. Inalienability of Licenses. No license issued or granted under Subsection 081.22.a. and no right to possess or utilize radioactive material granted by any license issued pursuant to Subsection 081.22 can 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 Radiation Control Agency, after securing full information finds that the transfer is in accordance with the provisions of the Act and gives its consent in writing. (12-31-91)

29. Transfer of Material. (12-31-91)

a. No licensee may transfer radioactive materials except as authorized pursuant to Subsections 081.29.b. and 081.29.c. (12-31-91)

b. Any licensee may transfer radioactive materials: (12-1-87)

i. To the Radiation Control Agency; or (5-9-68)

ii. To the U.S. Nuclear Regulatory Commission, U. S. Department of Energy; or (12-1-87)

iii. To any person exempt from these regulations to the extent permitted under such exemption; or (12-1-87)

iv. To any person authorized to receive such material under terms of a general license or its equivalent, or a specific license or its equivalent, issued by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or any Licensing State, or to any person otherwise authorized to receive such material by the Federal Government or any agency thereof, the Radiation Control Agency, or any Agreement State; or (12-1-87)

v. As otherwise authorized by the Radiation Control Agency in writing. (5-5-81)

c. Before transferring radioactive material to a specific licensee of the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, an Agreement State, or to a general licensee who is required to register with the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or any Licensing State prior to receipt of the radioactive material, the licensee transferring the material must verify that the transferee's license authorizes the receipt of the type, form, and quantity of radioactive material to be transferred. (12-1-87)

d. The following methods for the verification required by Subsection 081.29.c. are acceptable: (12-31-91)

i. The transferor can have in his possession and read, a current copy of the transferee's specific license or registration certificate; or (5-5-81)

ii. The transferor can have in his possession a written certification by the transferee that he is authorized by license or registration certificate to receive the type, form, and quantity of radioactive material to be transferred, specifying the license or registration certificate number, issuing agency, and expiration date; or (5-5-81)

iii. For emergency shipments the transferor can accept oral certification by the transferee that he is authorized by license or registration certificate to receive the type, form, and quantity of radioactive material to be transferred, specifying the license or registration certificate number, issuing agency, and expiration date; provided, that the oral certification is confirmed in writing within ten (10) days; or (5-5-81)

iv. The transferor can obtain other sources of information compiled by a reporting service from official records of the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or a Licensing State as to the identity of licensees and the scope and expiration dates of licenses and registration; or (12-1-87)

v. When none of the methods of verification described in Subsections 081.29.d.i. through 081.29.d.iv. are readily available or when a transferor desires to verify that information received by one (1) of such methods is correct or up-to-date, the transferor can obtain and record confirmation from the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or a Licensing State that the transferee is licensed to receive the radioactive

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material. (12-31-91)

e. Preparation for shipment and transport of radioactive material must be in accordance with the provisions of Section 501. (12-31-91)

082. RECIPROCITY.

01. Reciprocal Recognition of Licenses. (7-1-93)

a. Subject to these regulations, any person who holds a specific license from the U.S. Nuclear Regulatory Commission or any other Licensing State, such license being issued by the agency having jurisdiction where the licensee maintains an office for directing the licensed activity and where the radiation safety records are normally maintained, is hereby granted a general license to conduct within this state the activities authorized in the license for a period not in excess of one hundred eighty (180) days in any one (1) calendar year, provided: (12-1-87)

i. The licensing document does not limit the activity authorized by such document to specified installations or locations; and (5-9-68)

ii. The out-of-state licensee notifies the Radiation Control Agency in writing at least three (3) days prior to engaging in such activity. Such notification will indicate the location, period, and type of proposed possession and use within the State, and will be accompanied by a copy of the pertinent licensing document. If for a specific case, the three (3) day period would impose an undue hardship on the out-of-state licensee, he can, upon application to the Radiation Control Agency, obtain permission to proceed sooner. The Radiation Control Agency can waive the requirement for filing additional written notifications during the remainder of the calendar year following the receipt of the initial notification from a person engaging in activities under the general license provided in this section; and (5-5-81)

iii. The out-of-state licensee complies with all applicable regulations of the Radiation Control Agency and with all the terms and conditions of his licensing document, except any such terms and conditions which may be inconsistent with applicable regulations of the Radiation Control Agency; and (5-9-68)

iv. The out-of-state licensee supplies such other information as the Radiation Control Agency requests; and (5-9-68)

v. The out-of-state licensee will not transfer or dispose of radioactive material possessed or used under the general license provided in this section except by transfer to a person: (5-5-81)

(a) Specifically licensed by the Radiation Control Agency, another Licensing State or by the U.S. Nuclear Regulatory Commission to receive such material; or (12-1-87)

(b) Exempt from the requirements for a license for such material under Subsection 053. 02.a. (12-31-91)

b. Notwithstanding the provisions of Subsection 082.01.a., any person who holds a specific license issued by the U.S. Nuclear Regulatory Commission or another Agreement State authorizing the holder to manufacture, transfer, install, or service a device described in Subsection 072.02.a. within areas subject to the jurisdiction of the licensing body is hereby granted a general license to install, transfer, demonstrate, or service such a device in this State, provided: (12-31-91)

i. Such person files a report with the Radiation Control Agency within thirty (30) days after the end of each calendar quarter in which any device is transferred to or installed in this State. Each such report will identify each general licensee to whom such device is transferred by name and address, and the quantity and type of radioactive material contained in the device; and (5-9-68)

ii. The device has been manufactured, labeled, installed, and serviced in accordance with applicable provisions of the specific license issued to such person by the U.S. Nuclear Regulatory Commission or an Agreement State; and (5-5-81)

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iii. Such person assures that any labels required to be affixed to the device under regulations of the authority which licensed manufacture of the device, bears a statement that "Removal of this label is prohibited by law"; and (5-5-81)

iv. The holder of the specific license furnishes to each general licensee to whom he transfers such device or on whose premises he installs such device a copy of the general license contained in Subsection 072.02. (12-31-91)

02. Denial of Reciprocal Recognition of Licenses. The Radiation Control Agency can withdraw, limit, or qualify its acceptance of any specific license or equivalent licensing document issued by another agency, or any product distributed pursuant to such licensing document, upon determining that such action is necessary in order to prevent undue hazard to public safety or property. (5-5-81)

083. -- 089. (RESERVED).

090. REGISTRATION.

01. Registration of Radiation Machine Facilities. The owner or person having possession of any radiation machine or facility shall apply for registration with the Radiation Control Agency within thirty (30) days of acquisition and prior to operation of such facility. (12-1-87)

a. Application for registration shall be on forms furnished by the Radiation Control Agency and shall contain: (12-1-87)

i. Name of the owner, organization or person having administrative control and responsibility for use; and (5-5-81)

ii. Address and telephone number where the machine is located and used except that a central headquarters can be used for a mobile machine used at various temporary field locations; and (12-1-87)

iii. A designation of the general category of use, such as dental, medical, industrial, veterinary, and research. (5-9-68)

iv. The manufacturer, model number, and type of each radiation machine located within the facility. (12-1-87)

v. If the facility is mobile, the geographic areas within the State where it will be used. (12-1-87)

vi. The signature of the individual designated under Subsection 090.01.b. (12-31-91)

vii. Name of the radiation machine supplier, installer, and service agent. (12-1-87)

viii. The date of application and signature of the individual responsible for the use of the facility. (12-1-87)

b. Designate on the application form an individual to be responsible for radiation protection. (12-1-87)

c. Each registrant shall prohibit any person from furnishing radiation machine servicing or services as described in Subsection 090.02 to his radiation machine facility until such person provides evidence that such person has been registered with the Agency as a provider of services in accordance with Subsection 090.02. (12-31-91)

02. Application for Registration of Servicing and Services. (12-31-91)

a. Each person who is engaged in the business of installing or offering to install radiation machines or is engaged in the business of furnishing or offering to furnish radiation machine servicing or services in this State

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shall apply for registration with the Agency within thirty (30) days prior to furnishing or offering to furnish any such services. (12-1-87)

b. When required by the Radiation Control Agency an application for registration shall be completed on forms furnished by the Agency and contain: (12-1-87)

i. Name, address, and telephone number of the following: (12-1-87)

(a) The individual or the company to be registered. (12-1-87)

(b) The owner(s) of the company. (12-1-87)

ii. The services which are to be provided. (12-1-87)

iii. The area of the State and other states to be covered. (12-1-87)

iv. A list of the individuals or employees qualified to provide these services. (12-1-87)

v. The date of application and signature of the individual responsible for the company, beneath a statement of the items specified in Subsection 090.02. (12-31-91)

c. Each person listed under Subsection 090.02.b.i.(a) shall specify: (12-31-91)

i. That such person has read and understands the requirements of these regulations; (12-1-87)

ii. The services for which such person is applying for registration; (12-1-87)

iii. The training and experience that qualify such person listed under Subsections 090.02.b.i.(a) and 090.02.b.ii. to discharge the services for which the registrant is applying for registration; (12-31-91)

iv. The type of measurement instrument to be used, frequency of calibration, and source of calibration; and (12-1-87)

v. The type of personnel dosimeters supplied, frequency of reading, and replacement or exchange schedule. (12-1-87)

d. For the purpose of Subsection 090.02 services include but may not be limited to: (12-31-91)

i. Installation or servicing of radiation machines and associated radiation machine components, (12-1-87)

ii. Calibration of radiation machines or radiation measurement instruments or devices, (12-1-87)

iii. Radiation protection or health physics consultations or surveys, and (12-1-87)

iv. Personnel dosimetry services. (12-1-87)

e. No individual may perform services which are not specifically stated for that individual on the notice of registration issued by the Radiation Control Agency. (12-1-87)

03. Issuance of Notice of Registration. (12-31-91)

a. Upon a determination that an applicant meets the requirements of the regulations, the Radiation Control Agency may issue a notice of registration. (12-1-87)

b. The Radiation Control Agency may incorporate in the notice of registration at the time of issuance or thereafter by appropriate rule, regulation, or order, such additional requirements and conditions with respect to the

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registrant's receipt, possession, use, and transfer of radiation machines as it deems appropriate or necessary. (12-1-87)

04. Expiration of Notice of Registration. Except as provided by Subsection 090.05, each notice of registration will expire at the end of the day specified in the notice in the month and year stated therein. (12-31-91)

05. Renewal of Notice of Registration. (12-31-91)

a. Application for renewal of registration shall be filed in accordance with Subsection 090.01 or 090.02. (12-31-91)

b. In any case in which a registrant not less than thirty (30) days prior to the expiration of his existing notice of registration has filed an application in proper form for renewal, such existing notice of registration shall not expire until the application status has been finally determined by the Radiation Control Agency. (12-1-87)

06. Report of Changes. The registrant shall notify the Radiation Control Agency in writing before any change which would render the information contained in the application for registration or the notice of registration no longer accurate. (12-1-87)

07. Approval Not Implied. No person, in any advertisement, shall refer to the fact that a facility is registered with the Radiation Control Agency pursuant to the provisions of Section 090 and no person shall state or imply that any activity under such registration has been approved by the Radiation Control Agency. (12-31-91)

08. Seller, Vendor, Assembler or Transfer Obligation. (12-31-91)

a. Any person who sells, leases, transfers, or lends radiation machines in this State shall notify the Radiation Control Agency within fifteen (15) days of: (12-1-87)

i. The names and addresses of persons who have received these machines; and (5-9-68)

ii. The manufacturer and model of each machine transferred, sold, leased, or lent; and (5-9-68)

iii. The date of transfer, sale, lease, or lending of each radiation machine. (5-9-68)

b. No person shall make, sell, lease, transfer, lend or install x-ray equipment or the supplies used in connection with such equipment unless such supplies and equipment, when placed in operation and used, meets the requirements of these regulations. This includes responsibility for the delivery of cones or collimators, filters, adequate timers, and fluoroscopic shutters where applicable. (12-1-87)

09. Out-Of-State Radiation Machines. Whenever any radiation machine is to be brought into the State for use during a period not in excess of one hundred eighty (180) days, the person proposing to bring such machine into the State must give written notice to the Radiation Control Agency at least five (5) working days before such machine enters the State. The notice must include the type of radiation machine, the nature, duration, and scope of use, and the exact location where the radiation machine is to be used. If, for a specific case, the five (5) day period would impose an undue hardship on the person, he can, upon application to the Radiation Control Agency, obtain permission to proceed sooner. In addition, the person with an out-of-state machine must: (5-5-81)

a. Comply with all applicable regulations of the Radiation Control Agency; and (5-9-68)

b. Supply the Radiation Control Agency with other information which the Radiation Control Agency reasonably requests. (5-9-68)

10. Registrant Obligation. The registrant will be subject to all applicable requirements of these regulations. (5-5-81)

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091. ADMINISTRATIVE APPEAL OF FINAL LICENSE -- RECIPROCITY AND REGISTRATION DECISIONS.

Within thirty (30) days after a final license or registration decision has been issued pursuant to Sections 050 through 090 the applicant may petition the Radiation Control Agency to review the decision in accordance with this section. The thirty (30) day period within which an applicant may request review under this section begins with the service of notice of the Radiation Control Agency's decision unless a later date is specified in that notice. Any petition for administrative review shall be in writing and state the reasons supporting review. Within a reasonable time following filing of a petition for review, the Radiation Control Agency shall hold a hearing in accordance with Title 67, Chapter 52, Idaho Code, and issue a final decision. (12-31-91)

092. MODIFIED REVOCATION OF LICENSE.

01. Modification, Revocation, and Termination of Licenses - Reciprocity and Registration. Pursuant to amendments to the Act, departmental rules or regulations, or orders issued by the Radiation Control Agency, the terms and conditions of all licenses, reciprocity and registration are subject to amendment, revision, or modification, and licenses are subject to suspension or revocation. (12-1-87)

a. Any license can be revoked, suspended, modified, or denied, in whole or in part. (5-9-68)

i. For any materially false statement: (5-9-68)

(a) In the application; or (5-9-68)

(b) In any statement of fact required under provisions of the Act or under these regulations; or (5-9-68)

ii. Because of the conditions revealed: (5-9-68)

(a) By the application; or (5-9-68)

(b) By statement of fact; or (5-9-68)

(c) By any report; or (5-9-68)

(d) By any record; or (5-9-68)

(e) By any inspection; or (5-9-68)

(f) By any other means which would warrant the Radiation Control Agency to refuse to grant a license on an original application; or (5-9-68)

iii. For violations of or failure to observe any of the terms and conditions: (5-9-68)

(a) Of the Act; or (5-9-68)

(b) Of the license; or (5-9-68)

(c) Of any rule; or (5-9-68)

(d) Of any regulation; or (5-9-68)

(e) Of an order of the Radiation Control Agency. (5-9-68)

b. Except in cases of willful violation or in which the public health, interest or safety requires otherwise, no license can be modified, suspended, or revoked unless, prior to the institution of proceedings therefor, the facts or conduct which warrant such actions have been called to the attention of the licensee in writing and the licensee must have been accorded an opportunity to demonstrate or achieve compliance with all lawful requirements. (5-5-81)

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c. The Radiation Control Agency can terminate a specific license upon written request submitted by the licensee to the Radiation Control Agency. (5-9-68)

d. Each licensee must notify the Radiation Control Agency in writing and request termination of the license when the licensee decides to terminate all activities involving materials authorized under the license. This notification must be no less than thirty (30) days before the expiration date specified in a specific license and include: (12-1-87)

i. A radiation survey report to confirm the absence of radioactive material or establish the levels of residual radioactive contamination, unless the licensee demonstrates the absence of residual radioactive contamination in some other manner. (12-1-87)

ii. Records of personnel dosimetry. (12-1-87)

iii. Records of leak tests for sources required under Section 009 and Subsection 081.05.e. or conditions set forth in the license. (12-31-91)

iv. Records of transfer showing to whom radioactive material was transferred and license number of the recipient. (12-1-87)

02. Notice of Revocation. Except in cases of emergency, the Director shall issue a written notice of intent to revoke to the permittee prior to final revocation. Revocation shall become final within twenty (20) days of receipt of the notice by the permittee, unless within that time the permittee requests an administrative hearing in writing. (12-1-87)

03. Notice of Hearing. The Director shall notify the permittee in writing of any revocation hearing at least twenty (20) days prior to the date set for such hearing. The hearing shall be conducted in accordance with Title 67, Chapter 52, Idaho Code. (12-1-87)

04. Emergency Action. If the Director finds the public health, safety or welfare requires emergency action, the Director shall incorporate findings in support of such action in a written notice of emergency revocation issued to the permittee. Emergency revocation shall be effective upon receipt by the permittee. Thereafter, if requested by the permittee in writing, the Director shall provide the permittee a revocation hearing and prior notice thereof. Such hearings shall be conducted in accordance with Title 67, Chapter 52, Idaho Code. (12-1-87)

093. -- 099. (RESERVED).

100. STANDARDS FOR PROTECTION AGAINST RADIATION.

Section 100 establishes standards for protection against radiation hazards. Except as otherwise specifically provided, Section 100 applies to all licensees or registrants. Nothing in Section 100 can be interpreted as limiting the intentional exposure of patients to radiation for the purpose of medical diagnosis or therapy. In addition to complying with these requirements, every reasonable effort must be made to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as far below the limits specified in Section 100 as practicable. The phrase "as far below the limits specified in Section 100 as practicable" means as low as is practicably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety and other socioeconomic considerations in relation to the utilization of ionizing radiation in the public interest. (12-31-91)

101. -- 109. (RESERVED).

110. OCCUPATIONAL EXPOSURES.

01. Exposure of Individuals to Radiation in Restricted Areas. Except as provided in Subsection 110.01.b., no licensee or registrant may possess, use, receive, or transfer sources of radiation in such a manner as to cause any individual in a restricted area to receive in any period of one (1) calendar quarter from all sources of radiation in the licensee's or registrant's possession a dose in excess of the limits specified in Subsection 110.01.a.:

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(12-31-91)

a. TABLE

	Rem Per Calendar Quarter
Whole body, head and trunk, active blood-forming organs, lens of eyes, or gonads	1 1/4
Hands and forearms, feet and ankles	18 3/4
Skin of whole body	7 1/2

(5-9-68)

b. A licensee or registrant may permit an individual in a restricted area to receive a dose to the whole body greater than that permitted in the table in Subsection 110.01.a., provided: (12-31-91)

i. During any calendar quarter the dose to the whole body from sources of radiation in the licensee's or registrant's possession does not exceed three (3) rem; and (5-5-81)

ii. The dose to the whole body, when added to the accumulated occupational dose to the whole body, does not exceed five (5) (N-18) rem where "N" equals the individual's age in years at his last birthday; and (5-5-81)

iii. The licensee or registrant has determined the individual's accumulated occupational dose to the whole body on a clear and legible record containing all the information required pursuant to Subsection 140.01.a. and has otherwise complied with the requirements of Subsection 110.02 as used in Subsection 110.01.b. "Dose to the whole body" includes any dose to the whole body, gonads, active blood-forming organs, head and trunk, or lens of the eye. (12-31-91)

c. For determining the doses specified in Section 110 a dose from x-rays or gamma rays up to ten (10) MeV can be assumed to be equivalent to the exposure measured by a properly calibrated appropriate instrument in air at or near the body surface in the region of the highest dose rate. (12-31-91)

d. No licensee or registrant can change the method observed by him of determining calendar quarter for purposes of these regulations except at the beginning of a calendar year from Subsection 002.21. (12-31-91)

02. Determination of Accumulated Dose. (12-31-91)

a. Each licensee or registrant shall require any individual, prior to first entry of the individual into the licensee's or registrant's restricted area during each employment or work assignment under such circumstances that the individual will receive or is likely to receive in any period of one (1) calendar quarter an occupational dose in excess of twenty-five percent (25%) of the applicable standards specified in Subsections 110.01 and 110.04.a., to disclose in a written, signed statement: (12-31-91)

i. That the individual had no prior occupational dose during the current calendar quarter; or (12-31-91)

ii. The nature and amount of any occupational dose which the individual may have received during the specifically identified current calendar quarter, from sources of radiation possessed or controlled by the other persons, and each licensee or registrant shall maintain records of such statements until the Agency authorizes disposition. (12-1-87)

b. Before permitting any individual in a restricted area to receive exposure to radiation in excess of the limits specified in Subsection 110.01, each licensee or registrant must: (12-31-91)

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i. Obtain a signed certificate on a clear and legible record containing all the information required, showing each period of time after the individual attained the age of eighteen (18) in which the individual received an occupational dose of radiation (copies of certificates can be obtained from the Radiation Control Agency); and (5-5-81)

ii. Calculate, on a clear and legible record containing all the information required pursuant to Subsection 140.01.a., the previously accumulated occupational dose received by the individual and the additional dose allowed for that individual under Subsection 110.01.b. (12-31-91)

iii. In the preparation of a clear and visible record containing all the information required, make a reasonable effort to obtain reports of the individual's previously accumulated occupational dose. For each period for which the licensee or registrant obtains such report, he must use the dose shown in the report. In any case where a licensee or registrant is unable to obtain reports of the individual's occupational dose for a previous complete calendar quarter, it must be assumed that the individual has received the occupational dose specified in the following applicable columns:

TABLE

Part of Body	Column 1	Column 2
	Assumed Dose in Rem for Calendar Quarters Prior to January 1, 1961	Assumed Dose in Rem for Calendar Quarters Beginning on or After January 1, 1961
Whole Body, gonads, active blood-forming organs, head and trunk, lens of eye	3 3/4	1 1/4

iv. The licensee or registrant shall retain and preserve all records used until the agency authorizes their disposition. If calculation of the individual's accumulated occupational dose for all periods prior to January 1, 1961, yields a result higher than the applicable accumulated dose value for the individual as of that date, as specified in Subsection 110.01.b., the excess can be disregarded. (12-31-91)

03. Exposure of Individuals to Concentrations of Radioactive Materials in Air in Restricted Areas. (12-31-91)

a. All licensees must comply with the following: (5-5-81)

i. No licensee can possess, use, or transfer radioactive material in such a manner as to permit any individual in a restricted area to inhale a quantity of radioactive material in any period of one (1) calendar quarter greater than the quantity which would result from inhalation for forty (40) hours per week for thirteen (13) weeks at uniform concentrations of radioactive material in air specified in the table in Subsection 110.03.a.ii. If the radioactive material is of such form that intake by absorption through the skin is likely, individual exposures to radioactive material must be controlled so that the uptake of radioactive material by any organ from either inhalation or absorption or both routes of intake, in any calendar quarter does not exceed that which would result from inhaling such radioactive material for forty (40) hours per week for thirteen (13) weeks at uniform concentrations specified in the table in Subsection 110.03.a.ii. (12-31-91)

(a) Since the concentration specified for tritium oxide vapor assumes equal intakes by skin absorption and inhalation, the total intake permitted is twice that which would result from inhalation alone at the concentration specified in the table in Subsection 110.03.a.ii. for forty (40) hours per week for thirteen (13) weeks. (12-31-91)

(b) For Radon 222, the limiting quantity is that inhaled in the period of one (1) calendar year. For radioactive materials designated "Sub" in the "Isotope" column of the table in Subsection 110.03.a.ii., the concentration value specified is based upon exposure to the material as an external radiation source. Individual exposures to these materials can be accounted for as part of the limitation on individual dose in Subsection 110.01.

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These materials will be subject to the precautionary procedures required in Subsection 110.01. (12-31-91)

(c) The quarterly quantity limits can be calculated by multiplying the concentration values specified in Column 1 of the tables of action 110.03.a.ii. by 6.3 x 10 ml. (12-31-91)

(d) Significant intake by ingestion or injection is presumed to occur only as a result of circumstances such as accident, inadvertence, poor procedure, or similar special conditions. Such intakes must be evaluated and accounted for by techniques and procedures as appropriate to the circumstances of the occurrence. Exposures so evaluated must be included in determining whether the limitation on individual exposures in Subsection 110.03.a. has been exceeded. (12-31-91)

ii. Concentrations in Air and Water Above Natural Background. (12-31-91)

		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
Actinium (89)	Ac-227 S*	$2X10^{-12}$	$6X10^{-5}$	$8X10^{-14}$	$2X10^{-6}$
	I*	$3X10^{-11}$	$9X10^{-3}$	$9X10^{-13}$	$3X10^{-4}$
	Ac-228 S	$8X10^{-8}$	$3X10^{-3}$	$3X10^{-9}$	$9X10^{-5}$
	I	$2X10^{-8}$	$3X10^{-3}$	$6X10^{-10}$	$9X10^{-5}$
Americium (95)	Am-241 S	$6X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
	I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Am-242m S	$6X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
	I	$3X10^{-10}$	$3X10^{-3}$	$9X10^{-12}$	$9X10^{-5}$
	Am-242 S	$4X10^{-8}$	$4X10^{-3}$	$1X10^{-9}$	$1X10^{-4}$
	I	$5X10^{-8}$	$4X10^{-3}$	$2X10^{-9}$	$1X10^{-4}$
	Am-243 S	$6X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
	I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Am-244 S	$4X10^{-6}$	$1X10^{-1}$	$1X10^{-7}$	$5X10^{-3}$
	I	$2X10^{-5}$	$1X10^{-2}$	$8X10^{-7}$	$5X10^{-3}$
Antimony (51)	Sb-122 S	$2X10^{-7}$	$8X10^{-4}$	$6X10^{-9}$	$3X10^{-5}$
	I	$1X10^{-7}$	$8X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
	Sb-124 S	$2X10^{-7}$	$7X10^{-4}$	$5X10^{-9}$	$2X10^{-5}$
	I	$2X10^{-8}$	$7X10^{-4}$	$7X10^{-10}$	$2X10^{-5}$
	Sb-125 S	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$3X10^{-8}$	$3X10^{-3}$	$9X10^{-10}$	$1X10^{-4}$
Argon (18)	Ar-37 Sub*	$6X10^{-3}$	----	$1X10^{-4}$	----
	Ar-41 Sub	$2X10^{-6}$	----	$4X10^{-8}$	----
Arsenic (33)	As-73	$2X10^{-6}$	$1X10^{-2}$	$7X10^{-8}$	$5X10^{-4}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
	I	$4X10^{-7}$	$1X10^{-2}$	$1X10^{-8}$	$5X10^{-4}$
	As-74	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$5X10^{-5}$
	I	$1X10^{-7}$	$2X10^{-3}$	$4X10^{-9}$	$5X10^{-5}$
	As-76 S	$1X10^{-7}$	$6X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
	I	$1X10^{-7}$	$6X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
	As-77 S	$5X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$8X10^{-5}$
	I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$8X10^{-5}$
Astatine (85)	At-211 S	$7X10^{-9}$	$5X10^{-5}$	$2X10^{-10}$	$2X10^{-6}$
	I	$3X10^{-8}$	$2X10^{-3}$	$1X10^{-9}$	$7X10^{-5}$
Barium (56)	Ba-131 S	$1X10^{-6}$	$5X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	I	$4X10^{-7}$	$5X10^{-3}$	$1\ X10^{-8}$	$2X10^{-4}$
	Ba-140 S	$1X10^{-7}$	$8X10^{-4}$	$4X10^{-9}$	$3X10^{-5}$
	I	$4X10^{-8}$	$7X10^{-4}$	$1X10^{-9}$	$2X10^{-5}$
Berkelium (97)	Bk-249 S	$9X10^{-10}$	$2X10^{-2}$	$3X10^{-11}$	$6X10^{-4}$
	I	$1X10^{-7}$	$2X10^{-2}$	$4X10^{-9}$	$6X10^{-4}$
	Bk-250 S	$1X10^{-7}$	$6X10^{-3}$	$5X10^{-9}$	$2X10^{-4}$
	I	$1X10^{-6}$	$6X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
Beryllium (4)	Be-7 S	$6X10^{-6}$	$5X10^{-2}$	$2X10^{-7}$	$2X10^{-3}$
	I	$1X10^{-6}$	$5X10^{-2}$	$4X10^{-8}$	$2X10^{-3}$
Bismuth (83)	Bi-206 S	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$4X10^{-5}$
	I	$1X10^{-7}$	$1X10^{-3}$	$5X10^{-9}$	$4X10^{-5}$
	Bi-207 S	$2X10^{-7}$	$2X10^{-3}$	$6X10^{-9}$	$6X10^{-5}$
	I	$1X10^{-8}$	$2X10^{-3}$	$5X10^{-10}$	$6X10^{-5}$
	Bi-210 S	$6X10^{-9}$	$1X10^{-3}$	$2X10^{-10}$	$4X10^{-5}$
	I	$6X10^{-9}$	$1X10^{-3}$	$2X10^{-10}$	$4X10^{-5}$
	Bi-212 S	$1X10^{-7}$	$1X10^{-2}$	$3X10^{-9}$	$4X10^{-4}$
	I	$2X10^{-7}$	$1X10^{-2}$	$7X10^{-9}$	$4X10^{-4}$
Bromine (35)	Br-82 S	$1X10^{-6}$	$8X10^{-3}$	$4X10^{-8}$	$3X10^{-4}$
	I	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$4X10^{-5}$
Cadmium (48)	Cd-109 S	$5X10^{-8}$	$5X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
	I	$7X10^{-8}$	$5X10^{-4}$	$3X10^{-9}$	$2X10^{-4}$
	Cd-115m S	$4X10^{-8}$	$7X10^{-4}$	$1X10^{-9}$	$3X10^{-5}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
	I	$4X10^{-8}$	$7X10^{-4}$	$1X10^{-9}$	$3X10^{-5}$
	Cd-115 S	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$3X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$4X10^{-5}$
Calcium (20)	Ca-45 S	$3X10^{-8}$	$3X10^{-4}$	$1X10^{-9}$	$9X10^{-6}$
	I	$1X10^{-7}$	$5X10^{-3}$	$4X10^{-9}$	$2X10^{-4}$
	Ca-47 S	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$5X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$3X10^{-5}$
Californium (98)	Cf-249 S	$2X10^{-12}$	$1X10^{-4}$	$5X10^{-14}$	$4X10^{-6}$
	I	$1X10^{-10}$	$7X10^{-4}$	$3X10^{-12}$	$2X10^{-5}$
	Cf-250 S	$5X10^{-12}$	$4X10^{-4}$	$2X10^{-13}$	$1X10^{-5}$
	I	$1X10^{-10}$	$7X10^{-4}$	$3X10^{-12}$	$3X10^{-5}$
	Cf-251 S	$2X10^{-12}$	$1X10^{-4}$	$6X10^{-14}$	$4X10^{-6}$
	I	$1X10^{-10}$	$8X10^{-4}$	$3X10^{-12}$	$3X10^{-5}$
	Cf-252 S	$6X10^{-12}$	$2X10^{-4}$	$2X10^{-13}$	$7X10^{-6}$
	I	$3X10^{-11}$	$2X10^{-4}$	$1X10^{-12}$	$7X10^{-6}$
	Cf-253 S	$8X10^{-10}$	$4X10^{-3}$	$3X10^{-11}$	$1X10^{-4}$
	I	$8X10^{-10}$	$4X10^{-3}$	$3X10^{-11}$	$1X10^{-4}$
	Cf-254 S	$5X10^{-12}$	$4X10^{-6}$	$2X10^{-13}$	$1X10^{-7}$
	I	$5X10^{-12}$	$4X10^{-6}$	$2X10^{-13}$	$1X10^{-7}$
Carbon (6)	C-14 S	$4X10^{-6}$	$2X10^{-2}$	$1X10^{-7}$	$8X10^{-4}$
	(CO) Sub	$5X10^{-5}$	----	$1X10^{-6}$	----
Cerium (58)	Ce-141 S	$4X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
	I	$2X10^{-7}$	$3X10^{-3}$	$5X10^{-9}$	$9X10^{-5}$
	Ce-143 S	$3X10^{-7}$	$1X10^{-3}$	$9X10^{-9}$	$4X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$7X10^{-9}$	$4X10^{-5}$
	Ce-144 S	$1X10^{-8}$	$3X10^{-4}$	$3X10^{-10}$	$1X10^{-5}$
	I	$6X10^{-9}$	$3X10^{-4}$	$2X10^{-10}$	$1X10^{-5}$
Cesium (55)	Cs-131 S	$1X10^{-5}$	$7X10^{-2}$	$4X10^{-7}$	$2X10^{-3}$
	I	$3X10^{-6}$	$3X10^{-2}$	$1X10^{-7}$	$9X10^{-4}$
	Cs-134m S	$4X10^{-5}$	$2X10^{-1}$	$1X10^{-6}$	$6X10^{-3}$
	I	$6X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$1X10^{-3}$
	Cs-134 S	$4X10^{-8}$	$3X10^{-4}$	$1X10^{-9}$	$9X10^{-6}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
	I	$1X10^{-8}$	$1X10^{-3}$	$4X10^{-10}$	$4X10^{-5}$
	Cs-135 S	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$9X10^{-8}$	$7X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$
	Cs-136 S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$9X10^{-5}$
	I	$2X10^{-7}$	$2X10^{-3}$	$6X10^{-9}$	$6X10^{-5}$
	Cs-137 S	$6X10^{-8}$	$4X10^{-4}$	$2X10^{-9}$	$2X10^{-5}$
	I	$1X10^{-8}$	$1X10^{-3}$	$5X10^{-10}$	$4X10^{-5}$
Chlorine (17)	Cl-36 S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$8X10^{-5}$
	I	$2X10^{-8}$	$2X10^{-3}$	$8X10^{-10}$	$6X10^{-5}$
	Cl-38 S	$3X10^{-6}$	$1X10^{-2}$	$9X10^{-8}$	$4X10^{-5}$
	I	$2X10^{-6}$	$1X10^{-2}$	$7X10^{-8}$	$4X10^{-5}$
Chromium (24)	Cr-51 S	$1X10^{-5}$	$5X10^{-2}$	$4X10^{-7}$	$2X10^{-3}$
	I	$2X10^{-6}$	$5X10^{-2}$	$8X10^{-8}$	$2X10^{-3}$
Cobalt (27)	Co-57 S	$3X10^{-6}$	$2X10^{-2}$	$1X10^{-7}$	$5X10^{-4}$
	I	$2X10^{-7}$	$1X10^{-2}$	$6X10^{-9}$	$4X10^{-4}$
	Co-58m S	$2X10^{-5}$	$8X10^{-2}$	$6X10^{-7}$	$3X10^{-3}$
	I	$9X10^{-6}$	$6X10^{-2}$	$3X10^{-7}$	$2X10^{-3}$
	Co-58 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$5X10^{-8}$	$3X10^{-3}$	$2X10^{-9}$	$9X10^{-5}$
	Co-60 S	$3X10^{-7}$	$1X10^{-3}$	$1X10^{-8}$	$5X10^{-5}$
	I	$9X10^{-9}$	$1X10^{-3}$	$3X10^{-10}$	$3X10^{-5}$
Copper (29)	Cu-64 S	$2X10^{-6}$	$1X10^{-2}$	$7X10^{-8}$	$3X10^{-4}$
	I	$1X10^{-6}$	$6X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
Curium (96)	Cm-242 s	$1X10^{-10}$	$7X10^{-4}$	$4X10^{-12}$	$2X10^{-5}$
	I	$2X10^{-10}$	$7X10^{-4}$	$6X10^{-12}$	$2X10^{-5}$
	Cm-243 S	$6X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$5X10^{-6}$
	I	$1X10^{-10}$	$7X10^{-4}$	$3X10^{-12}$	$2X10^{-5}$
	Cm-244 S	$9X10^{-12}$	$2X10^{-4}$	$3X10^{-13}$	$7X10^{-6}$
	I	$1X10^{-10}$	$8X10^{-4}$	$3X10^{-12}$	$3X10^{-5}$
	Cm-245 S	$5X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
	I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Cm-246 S	$5X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
	I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Cm-247 S	$5X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
	I	$1X10^{-10}$	$6X10^{-4}$	$4X10^{-12}$	$2X10^{-5}$
	Cm-248 S	$6X10^{-13}$	$1X10^{-5}$	$2X10^{-14}$	$4X10^{-7}$
	I	$1X10^{-11}$	$4X10^{-5}$	$4X10^{-13}$	$1X10^{-6}$
	Cm-249 S	$1X10^{-5}$	$6X10^{-2}$	$4X10^{-7}$	$2X10^{-3}$
	I	$1X10^{-5}$	$6X10^{-2}$	$4X10^{-7}$	$2X10^{-3}$
Dysprosium (66)	Dy-165 S	$3X10^{-6}$	$1X10^{-2}$	$9X10^{-8}$	$4X10^{-4}$
	I	$2X10^{-6}$	$1X10^{-2}$	$7X10^{-8}$	$4X10^{-4}$
	Dy-166 S	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$4X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$7X10^{-9}$	$4X10^{-5}$
Einsteinium (99)	Es-253 S	$8X10^{-10}$	$7X10^{-4}$	$3X10^{-11}$	$2X10^{-5}$
	I	$6X10^{-10}$	$7X10^{-4}$	$2X10^{-11}$	$2X10^{-5}$
	Es-254m S	$5X10^{-9}$	$5X10^{-4}$	$2X10^{-10}$	$2X10^{-5}$
	I	$6X10^{-9}$	$5X10^{-4}$	$2X10^{-20}$	$2X10^{-5}$
	Es-254 S	$2X10^{-11}$	$4X10^{-4}$	$6X10^{-13}$	$1X10^{-5}$
	I	$1X10^{-10}$	$4X10^{-4}$	$4X10^{-12}$	$1X10^{-5}$
	Es-255 S	$5X10^{-10}$	$8X10^{-4}$	$2X10^{-11}$	$3X10^{-5}$
	I	$4X10^{-10}$	$8X10^{-4}$	$1X10^{-8}$	$3X10^{-5}$
Erbium (68)	Er-169 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
	I	$4X10^{-7}$	$3X10^{-3}$	$1X10^{-8}$	$9X10^{-5}$
	Er-171 S	$7X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Europium (63)	Eu-152 S (T =9.2 hrs)	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	Eu-152 S (T =13 yrs)	$1X10^{-8}$	$2X10^{-3}$	$4X10^{-10}$	$8X10^{-5}$
	I	$2X10^{-8}$	$2X10^{-3}$	$6X10^{-10}$	$8X10^{-5}$
	Eu-154 s	$4X10^{-9}$	$6X10^{-4}$	$1X10^{-10}$	$2X10^{-5}$
	I	$7X10^{-9}$	$6X10^{-4}$	$2X10^{-10}$	$2X10^{-5}$
	Eu-155 S	$9X10^{-8}$	$6X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
	I	$7X10^{-8}$	$6X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$
Fermium (100)	Fm-254 S	$6X10^{-8}$	$4X10^{-3}$	$2X10^{-9}$	$1X10^{-4}$
	I	$7X10^{-8}$	$4X10^{-3}$	$2X10^{-9}$	$1X10^{-4}$
	Fm-255 S	$2X10^{-8}$	$1X10^{-3}$	$6X10^{-10}$	$3X10^{-5}$
	I	$1X10^{-8}$	$1X10^{-3}$	$4X10^{-10}$	$3X10^{-5}$
	Fm-256 S	$3X10^{-9}$	$3X10^{-5}$	$1X10^{-10}$	$9X10^{-7}$
	I	$2X10^{-9}$	$3X10^{-5}$	$6X10^{-11}$	$9X10^{-7}$
Fluorine (9)	F-18 S	$5X10^{-6}$	$2X10^{-2}$	$2X10^{-7}$	$8X10^{-4}$
	I	$3X10^{-6}$	$1X10^{-2}$	$9X10^{-8}$	$5X10^{-4}$
Gadolinium (64)	Gd-153 S	$2X10^{-7}$	$6X10^{-3}$	$8X10^{-9}$	$2X10^{-4}$
	I	$9X10^{-8}$	$6X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$
	Gd-159 S	$5X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$8X10^{-5}$
	I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$8X10^{-5}$
Gallium (31)	Ga-72 S	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$4X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$4X10^{-5}$
Germanium (32)	Ge-68 S	$4X10^{-6}$	$2X10^{-2}$	$1X10^{-7}$	$8X10^{-4}$
	I	$1X10^{-8}$	----	$5X10^{-10}$	----
Germanium (32)	Ge-71 S	$1X10^{-5}$	$5X10^{-2}$	$4X10^{-7}$	$2X10^{-3}$
	I	$6X10^{-6}$	$5X10^{-2}$	$2X10^{-7}$	$2X10^{-3}$
Gold (79)	Au-195 S	$8X10^{-6}$	$4X10^{-2}$	$3X10^{-7}$	$1X10^{-4}$
	I	$6X10^{-8}$	$6X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
	Au-196 S	$1X10^{-6}$	$5X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	I	$6X10^{-7}$	$4X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	Au-198 S	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$5X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$5X10^{-5}$
	Au-199 S	$1X10^{-6}$	$5X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	I	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
Hafnium (72)	Hf-181 S	$4X10^{-8}$	$2X10^{-3}$	$1X10^{-9}$	$7X10^{-5}$
	I	$7X10^{-8}$	$2X10^{-3}$	$3X10^{-9}$	$7X10^{-5}$
Holmium (67)	Ho-166 S	$2X10^{-7}$	$9X10^{-4}$	$7X10^{-9}$	$3X10^{-5}$
	I	$2X10^{-7}$	$9X10^{-4}$	$6X10^{-9}$	$3X10^{-5}$
Hydrogen (1)	H-3 S	$5X10^{-6}$	$1X10^{-1}$	$2X10^{-7}$	$3X10^{-3}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
	I	$5X10^{-6}$	$1X10^{-1}$	$2X10^{-7}$	$3X10^{-3}$
	Sub	$2X10^{-3}$	----	$4X10^{-5}$	----
Indium (49)	In-113m S	$8X10^{-6}$	$4X10^{-2}$	$3X10^{-7}$	$1X10^{-3}$
	I	$7X10^{-6}$	$4X10^{-2}$	$2X10^{-7}$	$1X10^{-3}$
	In-114m S	$1X10^{-7}$	$5X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
	I	$2X10^{-8}$	$5X10^{-4}$	$7X10^{-10}$	$2X10^{-5}$
	In-115m S	$2X10^{-6}$	$1X10^{-2}$	$8X10^{-8}$	$4X10^{-4}$
	I	$2X10^{-6}$	$1X10^{-2}$	$6X10^{-8}$	$4X10^{-4}$
	In-115 S	$2X10^{-7}$	$3X10^{-3}$	$9X10^{-9}$	$9X10^{-5}$
	I	$3X10^{-8}$	$3X10^{-3}$	$1X10^{-9}$	$9X10^{-5}$
Iodine (55)	I-125 S	$5X10^{-9}$	$4X10^{-5}$	$8X10^{-11}$	$2X10^{-7}$
	I	$2X10^{-7}$	$6X10^{-3}$	$6X10^{-9}$	$2X10^{-4}$
	I-126 S	$8X10^{-9}$	$5X10^{-5}$	$9X10^{-11}$	$3X10^{-7}$
	I	$3X10^{-7}$	$3X10^{-3}$	$1X10^{-8}$	$9X10^{-5}$
	I-129 S	$2X10^{-9}$	$1X10^{-5}$	$2X10^{-11}$	$6X10^{-8}$
	I	$7X10^{-8}$	$6X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
	I-131 S	$9X10^{-9}$	$6X10^{-5}$	$1X10^{-10}$	$3X10^{-7}$
	I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	I-132 S	$2X10^{-7}$	$2X10^{-3}$	$3X10^{-9}$	$8X10^{-6}$
	I	$9X10^{-7}$	$5X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
	I-133 S	$3X10^{-8}$	$2X10^{-4}$	$4X10^{-10}$	$1X10^{-6}$
	I	$2X10^{-7}$	$1X10^{-3}$	$7X10^{-9}$	$4X10^{-5}$
	I-134 S	$5X10^{-7}$	$4X10^{-3}$	$6X10^{-9}$	$2X10^{-5}$
	I	$3X10^{-6}$	$2X10^{-2}$	$1X10^{-7}$	$6X10^{-4}$
	I-135 S	$1X10^{-7}$	$7X10^{-4}$	$1X10^{-9}$	$4X10^{-6}$
	I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$7X10^{-5}$
Iridium (77)	Ir-190 S	$1X10^{-6}$	$6X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	I	$4X10^{-7}$	$5X10^{-3}$	$1X10^{-8}$	$2X10^{-4}$
	Ir-192 S	$1X10^{-7}$	$1X10^{-3}$	$4X10^{-9}$	$4X10^{-5}$
	I	$3X10^{-8}$	$1X10^{-3}$	$9X10^{-10}$	$4X10^{-5}$
	Ir-194 S	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$3X10^{-5}$
	I	$2X10^{-7}$	$9X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
Iron (26)	Fe-55 S	$9X10^{-7}$	$2X10^{-2}$	$3X10^{-8}$	$8X10^{-4}$
	I	$1X10^{-6}$	$7X10^{-2}$	$3X10^{-8}$	$2X10^{-3}$
	Fe-59 S	$1X10^{-7}$	$2X10^{-3}$	$5X10^{-9}$	$6X10^{-5}$
	I	$5X10^{-8}$	$2X10^{-3}$	$2X10^{-9}$	$5X10^{-5}$
Krypton (36)	Kr-85m Sub	$6X10^{-6}$	----	$1X10^{-7}$	----
	Kr-85 Sub	$1X10^{-5}$	----	$3X10^{-7}$	----
	Kr-87 Sub	$1X10^{-6}$	----	$2X10^{-8}$	----
	Kr-88 Sub	$1X10^{-6}$	----	$2X10^{-8}$	----
Lanthanum (57)	La-140 S	$2X10^{-7}$	$7X10^{-4}$	$5X10^{-9}$	$2X10^{-5}$
	I	$1X10^{-7}$	$7X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
Lead (82)	Pb-203 S	$3X10^{-6}$	$1X10^{-2}$	$9X10^{-8}$	$4X10^{-4}$
	I	$2X10^{-6}$	$1X10^{-2}$	$6X10^{-8}$	$4X10^{-4}$
	Pb-210 S	$1X10^{-10}$	$4X10^{-6}$	$4X10^{-12}$	$1X10^{-7}$
	I	$2X10^{-10}$	$5X10^{-3}$	$8X10^{-12}$	$2X10^{-4}$
	Pb-212 S	$2X10^{-8}$	$6X10^{-4}$	$6X10^{-10}$	$2X10^{-5}$
	I	$2X10^{-8}$	$5X10^{-4}$	$7X10^{-10}$	$2X10^{-5}$
Lutetium (71)	Lu-177 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Manganese (25)	Mn-52 S	$2X10^{-7}$	$1X10^{-3}$	$7X10^{-9}$	$3X10^{-5}$
	I	$1X10^{-7}$	$9X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
	Mn-54 S	$4X10^{-7}$	$4X10^{-3}$	$1X10^{-8}$	$1X10^{-4}$
	I	$4X10^{-8}$	$3X10^{-3}$	$1X10^{-9}$	$1X10^{-4}$
	Mn-56 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Mercury (80)	Hg-197m S	$7X10^{-7}$	$6X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
	I	$8X10^{-7}$	$5X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
	Hg-197 S	$1X10^{-6}$	$9X10^{-3}$	$4X10^{-8}$	$3X10^{-4}$
	I	$3X10^{-6}$	$1X10^{-2}$	$9X10^{-8}$	$5X10^{-4}$
	Hg-203 S	$7X10^{-8}$	$5X10^{-4}$	$2X10^{-9}$	$2X10^{-5}$
	I	$1X10^{-7}$	$3X10^{-3}$	$4X10^{-9}$	$1X10^{-4}$
Molybdenum (42)	Mo-99 S	$7X10^{-7}$	$5X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
	I	$2X10^{-7}$	$1X10^{-3}$	$7X10^{-9}$	$4X10^{-5}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
Neodymium (60)	Nd-144 S	$8X10^{-11}$	$2X10^{-3}$	$3X10^{-12}$	$7X10^{-5}$
	I	$3X10^{-10}$	$2X10^{-3}$	$1X10^{-11}$	$8X10^{-5}$
	Nd-147 S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	I	$2X10^{-7}$	$2X10^{-3}$	$8X10^{-9}$	$6X10^{-5}$
	Nd-149 S	$2X10^{-6}$	$8X10^{-3}$	$6X10^{-8}$	$3X10^{-4}$
	I	$1X10^{-6}$	$8X10^{-3}$	$5X10^{-8}$	$3X10^{-4}$
Neptunium (93)	Np-237 S	$4X10^{-12}$	$9X10^{-5}$	$1X10^{-13}$	$3X10^{-5}$
	I	$1X10^{-10}$	$9X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Np-239 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$7X10^{-7}$	$4X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Nickel (28)	Ni-59 S	$5X10^{-7}$	$6X10^{-3}$	$2X10^{-8}$	$2X10^{-4}$
	I	$8X10^{-7}$	$6X10^{-2}$	$3X10^{-8}$	$2X10^{-3}$
	Ni-63	$6X10^{-8}$	$8X10^{-4}$	$2X10^{-9}$	$3X10^{-5}$
	I	$3X10^{-7}$	$2X10^{-2}$	$1X10^{-8}$	$7X10^{-4}$
	Ni-65 S	$9X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Niobium (41)	Nb-93m S	$1X10^{-7}$	$1X10^{-2}$	$4X10^{-9}$	$4X10^{-4}$
	I	$2X10^{-7}$	$1X10^{-2}$	$5X10^{-9}$	$4X10^{-4}$
	Nb-95 S	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$1X10^{-7}$	$3X10^{-3}$	$3X10^{-9}$	$1X10^{-4}$
	Nb-97 S	$6X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$9X10^{-4}$
	I	$5X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$9X10^{-4}$
Osmium (76)	Os-185 S	$5X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$7X10^{-5}$
	I	$5X10^{-8}$	$2X10^{-3}$	$2X10^{-9}$	$7X10^{-5}$
	Os-191m S	$2X10^{-5}$	$7X10^{-2}$	$6X10^{-7}$	$3X10^{-3}$
	I	$9X10^{-6}$	$7X10^{-2}$	$3X10^{-7}$	$2X10^{-3}$
	Os-191 S	$1X10^{-6}$	$5X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	I	$4X10^{-7}$	$5X10^{-3}$	$1X10^{-8}$	$2X10^{-4}$
	Os-193 S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	I	$3X10^{-7}$	$2X10^{-3}$	$9X10^{-9}$	$5X10^{-5}$
Palladium (46)	Pd-103 S	$1X10^{-6}$	$1X10^{-2}$	$5X10^{-8}$	$3X10^{-4}$
	I	$7X10^{-7}$	$8X10^{-3}$	$3X10^{-8}$	$3X10^{-4}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
	Pd-109 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
	I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$7X10^{-5}$
Phosphorus (15)	P-32 S	$7X10^{-8}$	$5X10^{-4}$	$2X10^{-9}$	$2X10^{-5}$
	I	$8X10^{-8}$	$7X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
Platinum (78)	Pt-191 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	Pt-193m S	$7X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$1X10^{-3}$
	I	$5X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$1X10^{-3}$
	Pt-193 S	$1X10^{-6}$	$3X10^{-2}$	$4X10^{-8}$	$9X10^{-4}$
	I	$3X10^{-7}$	$5X10^{-2}$	$1X10^{-8}$	$2X10^{-3}$
	Pt-197m S	$6X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$1X10^{-3}$
	I	$5X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$9X10^{-4}$
	Pt-197 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Plutonium (94)	Pu-238 S	$2X10^{-12}$	$1X10^{-4}$	$7X10^{-14}$	$5X10^{-6}$
	I	$3X10^{-11}$	$8X10^{-4}$	$1X10^{-12}$	$3X10^{-3}$
	Pu-239 S	$2X10^{-12}$	$1X10^{-4}$	$6X10^{-14}$	$5X10^{-6}$
	I	$4X10^{-11}$	$8X10^{-4}$	$1X10^{-12}$	$3X10^{-5}$
	Pu-240 S	$2X10^{-12}$	$1X10^{-4}$	$6X10^{-14}$	$5X10^{-6}$
	I	$4X10^{-11}$	$8X10^{-4}$	$1X10^{-12}$	$3X10^{-5}$
	Pu-241 S	$9X10^{-11}$	$7X10^{-3}$	$3X10^{-12}$	$2X10^{-4}$
	I	$4X10^{-8}$	$4X10^{-2}$	$1X10^{-9}$	$1X10^{-3}$
	Pu-242 S	$2X10^{-12}$	$1X10^{-4}$	$6X10^{-14}$	$5X10^{-6}$
	I	$4X10^{-11}$	$9X10^{-4}$	$1X10^{-12}$	$3X10^{-5}$
	Pu-243 S	$2X10^{-6}$	$1X10^{-2}$	$6X10^{-8}$	$3X10^{-4}$
	I	$2X10^{-6}$	$1X10^{-2}$	$8X10^{-8}$	$3X10^{-4}$
	Pu-244 S	$2X10^{-12}$	$1X10^{-4}$	$6X10^{-14}$	$4X10^{-6}$
	I	$3X10^{-11}$	$3X10^{-4}$	$1X10^{-12}$	$1X10^{-5}$
Polonium (84)	Po-210 S	$5X10^{-10}$	$2X10^{-5}$	$2X10^{-11}$	$7X10^{-7}$
	I	$2X10^{-10}$	$8X10^{-4}$	$7X10^{-12}$	$3X10^{-5}$
Potassium (19)	K-42 S	$2X10^{-6}$	$9X10^{-3}$	$7X10^{-8}$	$3X10^{-4}$
	I	$1X10^{-7}$	$6X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
Praseodymium (59)	Pr-142 S	$2X10^{-7}$	$9X10^{-4}$	$7X10^{-9}$	$3X10^{-5}$
	I	$2X10^{-7}$	$9X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
	Pr-143 S	$3X10^{-7}$	$1X10^{-3}$	$1X10^{-8}$	$5X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$5X10^{-5}$
Promethium (61)	Pm-147 S	$6X10^{-8}$	$6X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
	I	$1X10^{-7}$	$6X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$
	Pm-149 S	$3X10^{-7}$	$1X10^{-3}$	$1X10^{-8}$	$4X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$4X10^{-5}$
Protactinium (91)	Pa-230 S	$2X10^{-9}$	$7X10^{-3}$	$6X10^{-11}$	$2X10^{-4}$
	I	$8X10^{-10}$	$7X10^{-3}$	$3X10^{-11}$	$2X10^{-4}$
	Pa-231 S	$1X10^{-12}$	$3X10^{-5}$	$4X10^{-14}$	$9X10^{-7}$
	I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$2X10^{-5}$
	Pa-233 S	$6X10^{-7}$	$4X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$2X10^{-7}$	$3X10^{-3}$	$6X10^{-9}$	$1X10^{-4}$
Radium (88)	Ra-223 S	$2X10^{-9}$	$2X10^{-5}$	$6X10^{-11}$	$7X10^{-7}$
	I	$2X10^{-10}$	$1X10^{-4}$	$8X10^{-12}$	$4X10^{-6}$
	Ra-224 S	$5X10^{-9}$	$7X10^{-5}$	$2X10^{-10}$	$2X10^{-6}$
	I	$7X10^{-10}$	$2X10^{-4}$	$2X10^{-11}$	$5X10^{-6}$
	Ra-226 S	$3X10^{-11}$	$4X10^{-7}$	$3X10^{-12}$	$3X10^{-8}$
	I	$5X10^{-11}$	$9X10^{-4}$	$2X10^{-12}$	$3X10^{-5}$
	Ra-228 S	$7X10^{-11}$	$8X10^{-7}$	$2X10^{-12}$	$3X10^{-8}$
	I	$4X10^{-11}$	$7X10^{-4}$	$1X10^{-12}$	$3X10^{-5}$
Radon (86)	Rn-220 S	$3X10^{-7}$	----	$1X10^{-8}$	----
	I	----	----	----	----
	Rn-222 S	$3X10^{-8}$	----	$3X10^{-9}$	----
Rhenium (75)	Re-183 S	$3X10^{-6}$	$2X10^{-2}$	$9X10^{-8}$	$6X10^{-4}$
	I	$2X10^{-7}$	$8X10^{-3}$	$5X10^{-9}$	$3X10^{-4}$
	Re-186 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$5X10^{-5}$
	Re-187 S	$9X10^{-6}$	$7X10^{-2}$	$3X10^{-7}$	$3X10^{-3}$
	I	$5X10^{-7}$	$4X10^{-2}$	$2X10^{-8}$	$2X10^{-3}$
	Re-188 S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
	I	$2X10^{-7}$	$9X10^{-4}$	$6X10^{-9}$	$3X10^{-5}$
Rhodium (45)	Rh-103m S	$8X10^{-5}$	$4X10^{-1}$	$3X10^{-6}$	$1X10^{-2}$
	I	$6X10^{-5}$	$3X10^{-1}$	$2X10^{-6}$	$1X10^{-2}$
	Rh-105 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Rubidium (37)	Rb-86 S	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$7X10^{-5}$
	I	$7X10^{-8}$	$7X10^{-4}$	$2X10^{-9}$	$2X10^{-5}$
	Rb-87 S	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$7X10^{-8}$	$5X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
Ruthenium (44)	Ru-97 S	$2X10^{-6}$	$1X10^{-2}$	$8X10^{-8}$	$4X10^{-4}$
	I	$2X10^{-6}$	$1X10^{-2}$	$6X10^{-8}$	$3X10^{-4}$
	Ru-103 S	$5X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$8X10^{-5}$
	I	$8X10^{-8}$	$2X10^{-3}$	$3X10^{-9}$	$8X10^{-5}$
	Ru-105 S	$7X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	Ru-106 S	$8X10^{-8}$	$4X10^{-4}$	$3X10^{-9}$	$1X10^{-5}$
	I	$6X10^{-9}$	$3X10^{-4}$	$2X10^{-10}$	$1X10^{-5}$
Samarium (62)	Sm-147 S	$7X10^{-11}$	$2X10^{-3}$	$2X10^{-12}$	$6X10^{-5}$
	I	$3X10^{-10}$	$2X10^{-3}$	$9X10^{-12}$	$7X10^{-5}$
	Sm-151 S	$6X10^{-8}$	$1X10^{-2}$	$2X10^{-9}$	$4X10^{-4}$
	I	$1X10^{-7}$	$1X10^{-2}$	$5X10^{-9}$	$4X10^{-4}$
	Sm-153 S	$5X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$8X10^{-5}$
	I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$8X10^{-5}$
Scandium (21)	Sc-46 S	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$4X10^{-5}$
	I	$2X10^{-8}$	$1X10^{-3}$	$8X10^{-10}$	$4X10^{-5}$
	Sc-47 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
	I	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
	Sc-48 S	$2X10^{-7}$	$8X10^{-4}$	$6X10^{-9}$	$3X10^{-5}$
	I	$1X10^{-7}$	$8X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
Selenium (34)	Se-75 S	$1X10^{-6}$	$9X10^{-3}$	$4X10^{-8}$	$3X10^{-4}$
	I	$1X10^{-7}$	$8X10^{-3}$	$4X10^{-9}$	$3X10^{-4}$
Silicon (14)	Si-31 S	$6X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$9X10^{-4}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
	I	$1X10^{-6}$	$6X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
Silver (47)	Ag-105 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$8X10^{-8}$	$3X10^{-3}$	$3X10^{-9}$	$1X10^{-4}$
	Ag-110m S	$2X10^{-7}$	$9X10^{-4}$	$7X10^{-9}$	$3X10^{-5}$
	I	$1X10^{-8}$	$9X10^{-4}$	$3X10^{-10}$	$3X10^{-5}$
	Ag-111 S	$3X10^{-7}$	$1X10^{-3}$	$1X10^{-8}$	$4X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$4X10^{-5}$
Sodium (11)	Na-22 S	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$4X10^{-5}$
	I	$9X10^{-9}$	$9X10^{-4}$	$3X10^{-10}$	$3X10^{-5}$
	Na-24 S	$1X10^{-6}$	$6X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	I	$1X10^{-7}$	$8X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
Strontium (38)	Sr-85m S	$4X10^{-5}$	$2X10^{-1}$	$1X10^{-6}$	$7X10^{-3}$
	I	$3X10^{-5}$	$2X10^{-1}$	$1X10^{-6}$	$7X10^{-3}$
	Sr-85 S	$2X10^{-7}$	$3X10^{-3}$	$8X10^{-9}$	$1X10^{-4}$
	I	$1X10^{-7}$	$5X10^{-3}$	$4X10^{-9}$	$2X10^{-4}$
	Sr-89 S	$3X10^{-8}$	$3X10^{-4}$	$3X10^{-10}$	$3X10^{-6}$
	I	$4X10^{-8}$	$8X10^{-4}$	$1X10^{-9}$	$3X10^{-5}$
	Sr-90 S	$1X10^{-9}$	$1X10^{-5}$	$3X10^{-11}$	$3X10^{-7}$
	I	$5X10^{-9}$	$1X10^{-3}$	$2X10^{-10}$	$4X10^{-5}$
	Sr-91 S	$4X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$7X10^{-5}$
	I	$3X10^{-7}$	$1X10^{-3}$	$9X10^{-9}$	$5X10^{-5}$
	Sr-92 S	$4X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$7X10^{-5}$
	I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
Sulfur (16)	S-35 S	$3X10^{-7}$	$2X10^{-3}$	$9X10^{-9}$	$6X10^{-5}$
	I	$3X10^{-7}$	$8X10^{-3}$	$9X10^{-9}$	$3X10^{-4}$
Tantalum (73)	Ta-182 S	$4X10^{-8}$	$1X10^{-3}$	$1X10^{-9}$	$4X10^{-5}$
	I	$2X10^{-8}$	$1X10^{-3}$	$7X10^{-10}$	$4X10^{-5}$
Technetium (43)	Tc-96m S	$8X10^{-5}$	$4X10^{-1}$	$3X10^{-6}$	$1X10^{-2}$
	I	$3X10^{-5}$	$3X10^{-1}$	$1X10^{-6}$	$1X10^{-2}$
	Tc-96 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$5X10^{-5}$
	Tc-97m S	$2X10^{-6}$	$1X10^{-2}$	$8X10^{-8}$	$4X10^{-4}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
	I	$2X10^{-7}$	$5X10^{-3}$	$5X10^{-9}$	$2X10^{-4}$
	Tc-97 S	$1X10^{-5}$	$5X10^{-2}$	$4X10^{-7}$	$2X10^{-3}$
	I	$3X10^{-7}$	$2X10^{-2}$	$1X10^{-8}$	$8X10^{-4}$
	Tc-99m S	$4X10^{-5}$	$2X10^{-1}$	$1X10^{-6}$	$6X10^{-3}$
	I	$1X10^{-5}$	$8X10^{-2}$	$5X10^{-7}$	$3X10^{-3}$
	Tc-99 S	$2X10^{-6}$	$1X10^{-2}$	$7X10^{-8}$	$3X10^{-4}$
	I	$6X10^{-8}$	$5X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
Tellurium (52)	Te-125m S	$4X10^{-7}$	$5X10^{-3}$	$1X10^{-8}$	$2X10^{-4}$
	I	$1X10^{-7}$	$3X10^{-3}$	$4X10^{-9}$	$1X10^{-4}$
	Te-127m S	$1X10^{-7}$	$2X10^{-3}$	$5X10^{-9}$	$6X10^{-5}$
	I	$4X10^{-8}$	$2X10^{-3}$	$1X10^{-9}$	$5X10^{-5}$
	Te-127 S	$2X10^{-6}$	$8X10^{-3}$	$6X10^{-8}$	$3X10^{-4}$
	I	$9X10^{-7}$	$5X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
	Te-129m S	$8X10^{-8}$	$1X10^{-3}$	$3X10^{-9}$	$3X10^{-5}$
	I	$3X10^{-8}$	$6X10^{-4}$	$1X10^{-9}$	$2X10^{-5}$
	Te-129 S	$5X10^{-6}$	$2X10^{-2}$	$2X10^{-7}$	$8X10^{-4}$
	I	$4X10^{-6}$	$2X10^{-2}$	$1X10^{-7}$	$8X10^{-4}$
	Te-131m S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$4X10^{-5}$
	Te-132 S	$2X10^{-7}$	$9X10^{-4}$	$7X10^{-9}$	$3X10^{-5}$
	I	$1X10^{-7}$	$6X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
Terbium (65)	Tb-160 S	$1X10^{-7}$	$1X10^{-3}$	$3X10^{-9}$	$4X10^{-5}$
	I	$3X10^{-8}$	$1X10^{-3}$	$1X10^{-9}$	$4X10^{-5}$
Thallium (81)	Tl-200 S	$3X10^{-6}$	$1X10^{-2}$	$9X10^{-8}$	$4X10^{-4}$
	I	$1X10^{-6}$	$7X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	Tl-201 S	$2X10^{-6}$	$9X10^{-3}$	$7X10^{-8}$	$3X10^{-4}$
	I	$9X10^{-7}$	$5X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
	Tl-202 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$2X10^{-7}$	$2X10^{-3}$	$8X10^{-9}$	$7X10^{-5}$
	Tl-204 S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$3X10^{-8}$	$2X10^{-3}$	$9X10^{-10}$	$6X10^{-5}$
Thorium (90)	Th-227 S	$3X10^{-10}$	$5X10^{-4}$	$1X10^{-11}$	$2X10^{-5}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
	I	$2X10^{-10}$	$5X10^{-4}$	$6X10^{-12}$	$2X10^{-5}$
	Th-228 S	$9X10^{-12}$	$2X10^{-4}$	$3X10^{-13}$	$7X10^{-6}$
	I	$6X10^{-12}$	$4X10^{-4}$	$2X10^{-13}$	$1X10^{-5}$
	Th-230 S	$2X10^{-12}$	$5X10^{-5}$	$8X10^{-14}$	$2X10^{-6}$
	I	$1X10^{-11}$	$9X10^{-4}$	$3X10^{-13}$	$3X10^{-5}$
	Th-231 S	$1X10^{-6}$	$7X10^{-3}$	$5X10^{-8}$	$2X10^{-4}$
	I	$1X10^{-6}$	$7X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	Th-232 S	$3X10^{-11}$	$5X10^{-5}$	$1X10^{-12}$	$2X10^{-6}$
	I	$3X10^{-11}$	$1X10^{-3}$	$1X10^{-12}$	$4X10^{-5}$
	Th-natural S	$6X10^{-11}$	$6X10^{-5}$	$2X10^{-12}$	$2X10^{-6}$
	I	$6X10^{-11}$	$6X10^{-4}$	$2X10^{-12}$	$2X10^{-5}$
	Th-234 S	$6X10^{-8}$	$5X10^{-4}$	$2X10^{-9}$	$2X10^{-5}$
	I	$3X10^{-8}$	$5X10^{-4}$	$1X10^{-9}$	$2X10^{-5}$
Thulium (69)	Tm-170 S	$4X10^{-8}$	$1X10^{-3}$	$1X10^{-9}$	$5X10^{-5}$
	I	$3X10^{-8}$	$1X10^{-3}$	$1X10^{-9}$	$5X10^{-5}$
	Tm-171 S	$1X10^{-7}$	$1X10^{-2}$	$4X10^{-9}$	$5X10^{-4}$
	I	$2X10^{-7}$	$1X10^{-2}$	$8X10^{-9}$	$5X10^{-4}$
Tin (50)	Sn-113 S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$9X10^{-5}$
	I	$5X10^{-8}$	$2X10^{-3}$	$2X10^{-9}$	$8X10^{-5}$
	Sn-125 S	$1X10^{-7}$	$5X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
	I	$8X10^{-8}$	$5X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
Tungsten (74)	W-181 S	$2X10^{-6}$	$1X10^{-2}$	$8X10^{-8}$	$4X10^{-4}$
	I	$1X10^{-7}$	$1X10^{-2}$	$4X10^{-9}$	$3X10^{-4}$
	W-185 S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
	I	$1X10^{-7}$	$3X10^{-3}$	$4X10^{-9}$	$1X10^{-4}$
	W-187 S	$4X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$7X10^{-3}$
	I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
Uranium (92)	U-230 S	$3X10^{-10}$	$1X10^{-4}$	$1X10^{-11}$	$5X10^{-6}$
	I	$1X10^{-10}$	$1X10^{-4}$	$4X10^{-12}$	$5X10^{-6}$
	U-232 S	$1X10^{-10}$	$8X10^{-4}$	$3X10^{-12}$	$3X10^{-5}$
	I	$3X10^{-11}$	$8X10^{-4}$	$9X10^{-13}$	$3X10^{-5}$
	U-233 S	$5X10^{-10}$	$9X10^{-4}$	$2X10^{-11}$	$3X10^{-5}$

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		Table I		Table II	
Element (atomic number)	Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
	I	$1X10^{-10}$	$9X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	U-234 S	$6X10^{-10}$	$9X10^{-4}$	$2X10^{-11}$	$3X10^{-5}$
	I	$1X10^{-10}$	$9X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	U-235 S	$5X10^{-10}$	$8X10^{-4}$	$2X10^{-11}$	$3X10^{-5}$
	I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	U-236 S	$6X10^{-10}$	$1X10^{-3}$	$2X10^{-11}$	$3X10^{-5}$
	I	$1X10^{-10}$	$1X10^{-3}$	$4X10^{-12}$	$3X10^{-5}$
	U-238 S	$7X10^{-11}$	$1X10^{-3}$	$3X10^{-12}$	$4X10^{-5}$
	I	$1X10^{-10}$	$1X10^{-3}$	$5X10^{-12}$	$4X10^{-5}$
	U-240 S	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$3X10^{-5}$
	I	$2X10^{-7}$	$1X10^{-3}$	$6X10^{-9}$	$3X10^{-5}$
	U-natural S	$1X10^{-10}$	$1X10^{-3}$	$5X10^{-12}$	$3X10^{-5}$
	I	$1X10^{-10}$	$1X10^{-3}$	$5X10^{-12}$	$3X10^{-5}$
Vanadium (23)	V-48 S	$2X10^{-7}$	$9X10^{-4}$	$6X19^{-9}$	$3X10^{-5}$
	I	$6X10^{-8}$	$8X10^{-4}$	$2X10^{-9}$	$3X10^{-5}$
Xenon (54)	Xe-131mSub	$2X10^{-5}$	----	$4X10^{-7}$	----
	Xe-133mSub	$1X10^{-5}$	----	$3X10^{-7}$	----
	Xe-133 Sub	$1X10^{-5}$	----	$3X10^{-7}$	----
	Xe-135 Sub	$4X10^{-6}$	----	$1X10^{-7}$	----
Ytterbium (70)	Yb-175 S	$7X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
	I	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Yttrium (39)	Y-88* S	$3X10^{-7}$	$2X10^{-3}$	$6X10^{-9}$	$7X10^{-5}$
	I	$5X10^{-8}$	$3X10^{-3}$	$2X10^{-9}$	$9X10^{-5}$
	Y-90 S	$1X10^{-7}$	$6X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
	I	$1X10^{-7}$	$6X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
	Y-91m S	$2X10^{-5}$	$1X10^{-1}$	$8X10^{-7}$	$3X10^{-3}$
	I	$2X10^{-5}$	$1X10^{-1}$	$6X10^{-7}$	$3X10^{-3}$
	Y-91 S	$4X10^{-8}$	$8X10^{-4}$	$1X10^{-9}$	$3X10^{-5}$
	I	$3X10^{-8}$	$8X10^{-4}$	$1X10^{-9}$	$3X10^{-5}$
	Y-92 S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	Y-93 S	$2X10^{-7}$	$8X10^{-4}$	$6X10^{-9}$	$3X10^{-5}$

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		Table I		Table II	
Element (atomic number)	**Isotope**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**	**Column 1 Air (uCi/ml)**	**Column 2 Water (uCi/ml)**
	I	$1X10^{-7}$	$8X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
Zinc (30)	Zn-65 S	$1X10^{-7}$	$3X10^{-3}$	$4X10^{-9}$	$1X10^{-4}$
	I	$6X10^{-8}$	$5X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
	Zn-69m S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$7X10^{-5}$
	I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	Zn-69 S	$7X10^{-6}$	$5X10^{-2}$	$2X10^{-7}$	$2X10^{-3}$
	I	$9X10^{-6}$	$5X10^{-2}$	$3X10^{-7}$	$2X10^{-3}$
Zirconium (40)	Zr-93 S	$1X10^{-7}$	$2X10^{-2}$	$4X10^{-9}$	$8X10^{-4}$
	I	$3X10^{-7}$	$2X10^{-2}$	$1X10^{-8}$	$8X10^{-4}$
	Zr-95 S	$1X10^{-7}$	$2X10^{-3}$	$4X10^{-9}$	$6X10^{-5}$
	I	$3X10^{-8}$	$2X10^{-3}$	$1X10^{-9}$	$6X10^{-5}$
	Zr-97 S	$1X10^{-7}$	$5X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
	I	$9X10^{-8}$	$5X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
Any single radio-nuclide not listed above with decay mode other than alpha emission or spontaneous fission with radioactive half-life less than tow (2) hours	Sub	$1X10^{-6}$	----	$3X10^{-8}$	----
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radio- active half-life greater than two (2) hours		$3X10^{-9}$	$9X10^{-5}$	$1X10^{-10}$	$3X10^{-6}$
Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission		$6X10^{-13}$	$4X10^{-7}$	$2X10^{-14}$	$3X10^{-8}$

(12-1-87)

* S = Soluble; I = Insoluble

"Sub" means that values given are for submersion in a semi-spherical infinite cloud of airborne material. The values for Ge-68, Au-195 and Y-88 have been calculated using the committed dose equivalent values of ICRP Publication 30 for the controlling organ. (12-1-87)

(a) The radon concentrations are appropriate for protection from radon-222 combined with its short-lived daughters. Alternatively, the value in Table I may be replaced by one-third (1/3) "working level." (A "working level" is defined as any combination of short-lived radon-222 daughters, polonium-218, lead-214, bismuth-214, and polonium-214, in one (1) liter of air, without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3×10^{-5} MeV of alpha particle energy.) The Table II value may be replaced by one-thirtieth (1/30) of a "working level." The limit on radon-222 concentrations in restricted areas may be based on an annual average. (5-5-81)

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(b) For soluble mixtures of U-238, U-234 and U-235 in air, chemical toxicity can be the limiting factor. If the percent by weight (enrichment) of U-235 is less than five (5), the concentration value for a forty (40) hour workweek, Table I, is two-tenths (0.2) milligrams uranium per cubic meter of air average. For any enrichment, the product of the average concentration and time of exposure during a forty (40) hour workweek must not exceed 8 X 10^{-3} SA uCi-hr/ml, where SA is the specific activity of the uranium inhaled. The concentration value for Table II, Subsection 110.03.a.ii., is seven one-thousandths (0.007) milligrams uranium per cubic meter of air. The specific activity for natural uranium is 6.77 X 10^{-7} curies per gram U. The specific activity for other mixtures of U-238, U-235 and U-234, if not known, will be:

$SA=3.6x10^{-7}$ curies/gram U U-depl
$SA=(.4+.38\ E+.0034\ E^2)\ \ 10^{-6}$ $E>.72$

where E is the percentage by weight of U-235, expressed as percent. (12-31-91)

b. In any case where there is a mixture in air or water of more than one (1) radionuclide, the limiting values for purposes of this section must be determined as follows: (5-5-81)

i. If the identity and concentration of each radionuclide in the mixture are known, the limiting values must be derived as follows: Determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the limit otherwise established in Subsection 110.03.a. for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture cannot exceed one (1), that is, "Unity"; and (12-31-91)

ii. If either the identity or the concentration of any radionuclide in the mixture is not known, the limiting values for purposes of the table in Subsection 110.03.a.ii. will be: (12-31-91)

(a) For purposes of Table 1, Col. 1 $6x10^{-13}$ uCi/ml; and (5-5-81)

(b) For purposes of Table 1, Col. 2 $4x10^{-7}$ uCi/ml; and (5-5-81)

(c) For purposes of Table II, Col. 1, $2x10^{-14}$ uCi/ml; and (5-5-81)

(d) For purposes of Table II, Col. 2, $3x10^{-8}$ uCi/ml; and (5-5-81)

iii. If any of the conditions specified below are met, the corresponding values specified below can be used in lieu of those specified in Subsection 110.03.a.ii. (12-31-91)

(a) If the identity of each radionuclide in the mixture is known but the concentration of one (1) or more of the radionuclides in the mixture is not known, the concentration limit for the mixture is the limit specified in Subsection 110.03.a. for the radionuclide in the mixture having the lowest concentration limit; or (12-31-91)

(b) If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in Subsection 110.03.a. are not present in the mixture, the concentration limit for the mixture is the lowest concentration limit specified in Subsection 110.03.a. for any radionuclide which not known to be absent from the mixture; or (12-31-91)

(c) TABLE

	Table I		Table II	
(atomic number) and Isotope	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)

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	Table I		Table II	
it is known that Sr-90, I-125, I-126, I-129, I-131, (I-133, Table II only), Pb-210, Po-210, At-211, Ra-223, Ra-224, Ra-226, Ac-227, Ra-228, Th-230, Pa-231, Th-232, Th-nat, Cm-248, Cf-254, and Fm-256 are not present	-----	9X10	------	3X10
it is known that Sr-90, I-125, I-126, I-129, (I-131, I-133, Table II only), Pb-210, Po-210, Ra-223, Ra-226, Ra-228, Pa-231, Th-nat, Cm-248, Cf-254, and Fm-256 are not present	------	6X10	------	2X10
it is known that Sr-90, I-129, (I-125, I-131, Table II only), Pb-210, Ra-226, Ra-228, Cm-248, and Cf-254 are not present	------	2X10	------	6X10
it is known that (I-129, Table II only), Ra-226, and Ra-228 are not present	------	3X10	------	1X10
it is known that alpha-emitters and Sr-90, I-129, Pb-210, Ac-227, Ra-228, Pa-230, Pu-241, and Bk-249 not present	3X10	------	1X10	------
it is known that alpha-emitters and Pb-210, Ac-227, Ra-228, and Pu-241are not present	3X10	------	1X10	------
it is known that alpha-emitters and Ac-227 are not present	3X10	------	1X10	------
it is known that Ac-227, Th-230, Pa-231, Pu-238, Pu-239, Pu-240, Pu-242, Pu-244, Cm-248, Cf-249 and Cf-251 are not present.	3X10	------	1X10	------

(5-5-81)

iv. If the mixture of radionuclides consists of uranium and its daughter products in ore dust prior to chemical processing of the uranium ore, the values specified below can be used in lieu of those determined in Subsections 110.03.b.i., 110.01.b.ii., and 100.03.b.iii. (12-31-91)

(a) For purposes of Column 1, Table I, Subsection 110,03.b. iii.(c), 1x10 uCi/ml gross alpha activity; or 5x10 uCi/ml natural uranium; or 75 micrograms per cubic meter of air natural uranium; and (12-31-91)

(b) For purposes of Column 1, Table II, Subsections 110.03.b.i., 110.03.b.ii., and 110.03.b.iii., 3x10 uCi/ml gross alpha activity; or 2x10 uCi/ml natural uranium; or three (3) micrograms per cubic meter of air natural uranium. (12-31-91)

c. Licensees must not possess, use, or transfer mixtures of U-234, U-235, and U-238 in soluble form in such a manner as to permit any individual in a restricted area to inhale a quantity of such material in excess of the intake limits specified in Column 1, Table I, Subsection 110.03.a.ii. If such soluble uranium is of a form such that absorption through the skin is likely, individual exposures to such material must be controlled so that the uptake of such material by any organ from either inhalation or absorption or both routes of intake does not exceed that which would result from inhaling such material at the limits specified in Column 1, Table I, Subsection 110.03.a.ii. (12-31-91)

d. For purposes of determining compliance with the requirements of Subsection 110.03 the licensee must use suitable measurements of concentrations of radioactive materials in air for detecting and evaluating airborne radioactivity in restricted areas and, in addition, as appropriate, must use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals. It is assumed that an individual inhales radioactive material at the airborne concentration in which such person is present unless such person uses respiratory protective equipment pursuant to Subsection 110.03.g. When assessment of a particular individual's intake of radioactive material is necessary, intakes less than those which would result from inhalation for

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two (2) hours in any one (1) day or for ten (10) hours in any one (1) week at uniform concentrations specified in Column 1, Table I, Subsection 110.03.a. need not be included in such assessment, provided that for any assessment in excess of those amounts the entire amount is included. (12-31-91)

e. The licensee must, as a precautionary procedure, use process or other engineering controls, to the extent practicable, to limit concentrations of radioactive materials in air to levels below those which delimit an airborne radioactivity area. (5-5-81)

f. When it is impracticable to apply process or other engineering controls to limit concentrations of radioactive material in air below those defined in Subsection 110.03.a.ii., other precautionary procedures, such as increased surveillance, limitation of working times, or provision of respiratory protective equipment, must be used to maintain intake of radioactive material by any individual within any period of seven (7) consecutive days as far below that intake of radioactive material which would result from inhalation of such material for forty (40) hours at the uniform concentrations specified in Subsection 110.03.a. as is reasonably achievable. Whenever the intake of radioactive material by any individual exceeds this forty (40) hour control measure, the licensee must make such evaluations and take such actions as are necessary to assure against recurrence. The licensee will maintain records of such occurrences, evaluations, and actions taken in a clear and readily identifiable form suitable for summary review and evaluation. (12-31-91)

g. When respiratory protective equipment is used to limit the inhalation of airborne radioactive material pursuant to Subsection 110.03.f., the licensee can make allowance for such use in estimating exposures of individuals to such materials provided that such equipment is used as stipulated in Regulatory Guide No. 815., "Acceptable Programs for Respiratory Protection", which can be obtained from the Office of Standards Development, US Nuclear Regulatory Commission, Washington, D.C. 20555. (5-5-81)

h. Notwithstanding the provisions of Subsections 110.03.f. and 110.03.g., the Radiation Control Agency can impose further restrictions: (12-31-91)

i. On the extent to which a licensee can make allowance for use of respirators in lieu of provision of process, containment, ventilation, or other engineering controls, if application of such controls is found to be practicable; and (5-5-81)

ii. As necessary to assure that the respiratory protective program of the license is adequate in limiting exposures of personnel to airborne radioactive materials. (5-5-81)

i. The licensee must notify in writing the Radiation Control Agency at least thirty (30) days before the date that respiratory protective equipment is first used under the provisions of this action. (5-5-81)

j. A licensee who was authorized to make allowance for use of respiratory protective equipment prior to the effective date of this regulation must bring his respiratory protective program into conformance with the requirements of Subsection 110.03.f. within one (1) year of that date, and is exempt from the requirements of Subsection 110.03.a. (12-31-91)

04. Exposure of Minors. (12-31-91)

a. Licensees or registrants must not possess, use or transfer sources of radiation in such a manner as to cause any individual within a restricted area, who is under eighteen (18) years of age, to receive in any period of one (1) calendar quarter from all sources of radiation in such licensee's or registrant's possession a dose in excess of ten percent (10%) of the limits specified in the table in Subsection 110.01.a. For determining the doses specified in Subsection 110.04.a., a dose from x-rays or gamma rays up to ten (10) MeV can be assumed to be equivalent to the exposure measured by a properly calibrated appropriate instrument in air at or near the body surface in the region of the highest dose rate. (12-31-91)

b. Licensees must not possess, use, or transfer radioactive material in such a manner as to cause any individual within a restricted area, who is under eighteen (18) years of age, to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in Table II, Subsection 110.03.a.ii. For purposes of this paragraph, concentrations can be averaged over periods not greater than one (1) week. (12-31-91)

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c. The provisions of Subsections 110.03.f. and 110.03.g. can apply to exposures subject to Subsection 110.04.b., except that the references in Subsections 110.03.f. and 110.03.g. to Table I, Column 1, Subsection 110.03.a.ii. shall be deemed to be references to Table II, Column 1, Subsection 110.03.a.ii. (12-31-91)

05. Permissible Levels of Radiation from External Sources in Unrestricted Areas. (12-31-91)

a. Except as authorized by the Radiation Control Agency pursuant to Subsection 110.05.c., licensees or registrants must not possess, use, or transfer sources of radiation in such a manner as to create in any unrestricted area from such sources of radiation in his possession: (12-31-91)

i. Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two (2) millirem in any one (1) hour; or (5-9-68)

ii. Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of one hundred (100) millirem in any seven (7) consecutive days. (5-9-68)

b. It is the intent of Subsection 110.05 to limit radiation levels so that it is unlikely that individuals in unrestricted areas would receive a dose to the whole body in excess of five-tenths (0.5) rem in any one (1) year. If in specific instances, it is determined by the Radiation Control Agency that this intent is not being met, the Radiation Control Agency can, pursuant to Section 010 impose such additional requirements on the licensee or registrant as necessary. (12-31-91)

c. Any person can apply to the Radiation Control Agency for proposed limits upon levels of radiation in unrestricted areas in excess of those specified in Subsection 110.05.a. resulting from the applicant's possession or use of sources of radiation. Such applications must include information as to anticipated average radiation levels and anticipated occupancy times for each unrestricted area involved. The Radiation Control Agency will approve the proposed limits if the applicant demonstrates to the satisfaction of the Radiation Control Agency that the proposed limits are not likely to cause any individual to receive a dose to the whole body in any period of one (1) calendar year in excess of five-tenths (0.5) rem. (12-31-91)

06. Concentration in Effluents to Unrestricted Areas. (12-31-91)

a. A licensee must not possess, use, or transfer licensed material so as to release to an unrestricted area radioactive material in concentrations which exceed the limits specified in Table II, Subsection 110.03.a.ii., except as authorized pursuant to Subsection 110.06.b. For purposes of Subsection 01.9110,06, concentrations can be averaged over a period not greater than one (1) year. (12-31-91)

b. An application for a license or amendment can include proposed limits higher than those specified in Subsection 110.06.a. The Radiation Control Agency will approve the proposed limits if the applicant demonstrates: (12-31-91)

i. That the applicant has made a reasonable effort to minimize the radioactivity contained in effluents to unrestricted areas; and (5-9-68)

ii. That it is not likely that radioactive material discharged in the effluent would result in the exposure of an individual to concentrations of radioactive material in air or water exceeding the limits specified in Subsection 110.03.a.ii. (12-31-91)

c. An application for higher limits pursuant to Subsection 110.06.b. must include information demonstrating that the applicant has made a reasonable effort to minimize the radioactivity discharged in effluents to unrestricted areas, and must include, as pertinent: (12-31-91)

i. Information as to flow rates, total volume of effluent, peak concentration of each radionuclide in the effluent, and concentration of each radionuclide in the effluent averaged over a period of one (1) year at the point where the effluent leaves a stack, tube, pipe, or similar conduit; and (5-9-68)

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ii. A description of the properties of the effluents, including: (5-5-81)

(a) Chemical composition; and (5-9-68)

(b) Physical characteristics, including suspended solids content in liquid effluents, and nature of gas or aerosol for air effluents; and (5-9-68)

(c) The hydrogen ion concentrations (pH) of liquid effluents; and (5-9-68)

(d) The size range of particulates in effluents released into air; and (5-9-68)

iii. A description of the anticipated human occupancy in the unrestricted area where the highest concentration of radioactive material from the effluent is expected, and, in the case of a river or stream, a description of water uses downstream from the point of release of the effluent; and (5-9-68)

iv. Information as to the highest concentration of each radionuclide in an unrestricted area, including anticipated concentrations averaged over a period of one (1) year: (5-5-81)

(a) In air at any point of human occupancy; or (5-9-68)

(b) In water at points of use downstream from the point of release of the effluent; and (5-9-68)

v. The background concentration of radionuclides in the receiving river or stream prior to the release of liquid effluent; and (5-9-68)

vi. A description of the environmental monitoring equipment, including sensitivity of the system, and procedures and calculations to determine concentrations of radionuclides in the unrestricted area and possible reconcentrations of radionuclides; and (5-9-68)

vii. A description of the waste treatment facilities and procedures used to reduce the concentration of radionuclides in effluents prior to their release. (5-9-68)

d. For the purposes of this section, the concentration limits in Table II, Subsection 110.03.a.ii. will apply at the boundary of the restricted area. The concentration of radioactive material discharged through a stack, pipe or similar conduit can be determined with respect to the point where the material leaves the conduit. If the conduit discharges within the restricted area, the concentration at the boundary can be determined by applying appropriate factors for dilution, dispersion, or decay between the point of discharge and the boundary. (12-31-91)

e. In addition to limiting concentrations in effluent streams, the Radiation Control Agency can limit quantities of radioactive materials released in air or water during a specified period of time if it appears that the daily intake of radioactive material from air, water, or food by a suitable sample of an exposed population group, averaged over a period not exceeding one (1) year, would otherwise exceed the daily intake resulting from continuous exposure to air or water containing one-third (1/3) the concentration of radioactive materials specified in Subsection 110.03.a.ii. (12-31-91)

f. The provisions of this section do not apply to disposal of radioactive materials into sanitary sewerage systems, which is governed by Subsection 130.03. (12-31-91)

07. Orders Requiring Furnishing of Bio-Assay Services. Where necessary or desirable in order to aid in determining the extent of an individual's exposure to concentrations of radioactive material, the Radiation Control Agency can incorporate license provisions or issue an order requiring a licensee or registrant to make available to the individual appropriate bio-assay services and to furnish a copy of the reports of such services to the Radiation Control Agency. (12-31-91)

111. -- 119. (RESERVED).

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120. PRECAUTIONARY PROCEDURES.

01. Surveys. Each licensee or registrant must make or cause to be made such surveys, as defined in Subsection 002.135, as necessary for him to establish compliance with these regulations, and as reasonable under the circumstances to evaluate the extent of radiation hazards that may be present. (12-31-91)

02. Personnel Monitoring. Each licensee or registrant must supply appropriate personnel monitoring equipment to, and must require the use of such equipment by: (5-5-81)

a. Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any one (1) calendar quarter in excess of twenty-five percent (25%) of the applicable value specified in Subsection 110.01.a.; and (12-31-91)

b. Each individual under eighteen (18) years of age who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any one (1) calendar quarter in excess of five percent (5%) of the applicable value specified in Subsection 110.01.a.; and (12-31-91)

c. Each individual who enters a high radiation area. (5-9-68)

03. Caution Signs, Labels, and Signals. (12-31-91)

a. General. (12-31-91)

i. Except as otherwise authorized by the Radiation Control Agency, symbols prescribed by Subsection 120.03 must use the conventional radiation caution colors, magenta or purple on yellow background. The radiation symbol is the conventional three-bladed design as follows: (12-31-91)

(a) Cross-hatched area must be magenta or purple; and (5-9-68)

(b) Background must be yellow. (5-9-68)

(c) Design must appear as follows: APPENDIX A

APPENDIX A IS LOCATED AT END OF THIS CHAPTER

(5-9-68)

ii. In addition to the contents of signs and labels prescribed in this section, a licensee or registrant can provide on or near such signs and labels any additional information which could be appropriate in aiding individuals to minimize exposure to radiation. (5-9-68)

b. Radiation Areas. Each radiation area must be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION" (or) "DANGER"

"RADIATION AREA"

(5-5-81)

c. High Radiation Areas. (5-5-81)

i. Each high radiation area must be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION" (or) "DANGER"

"HIGH RADIATION AREA"

(5-5-81)

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ii. Each entrance or access point to a high radiation area must be: (5-5-81)

(a) Equipped with a control device which will cause the level of radiation to be reduced below that at which an individual might receive a dose of one hundred (100) millirem in one (1) hour upon entry into the area; or (5-5-81)

(b) Equipped with a control device which will energize a conspicuous visible or audible alarm signal in such a manner that the individual entering the high radiation area and the licensee, registrant, or a supervisor of the activity are made aware of the entry; or (5-5-81)

(c) Maintained locked except during periods when access to the area is required, with positive control over each individual entry. (5-9-68)

iii. The controls required by Subsection 120.03.c.ii. must be established in such a way that no individual will be prevented from leaving a high radiation area. (12-31-91)

iv. In the case of a high radiation area established for a period of thirty (30) days or less, direct surveillance to prevent unauthorized entry can be substituted for the controls required by Subsection 120.03.c.ii. (12-31-91)

v. Any licensee or registrant can apply to the Radiation Control Agency for approval of methods not included in Subsections 120.03.c.ii. and 120.03.c.iv. for controlling access to high radiation area. The Radiation Control Agency will approve the proposed alternatives if the licensee or registrant demonstrates that the alternative method of control will prevent unauthorized entry into a high radiation area, and that the requirement of Subsection 120.03.c.iii. is met. (12-31-91)

vi. Each area in which there may exist radiation levels in excess of five hundred (500) rems in one (1) hour at one (1) meter from a sealed radioactive source that is used to irradiate materials shall have entry control devices and alarms meeting the criteria specified in Section 20.203(c)(6) of 10 CFR Part 20. (12-1-87)

vii. The requirements of Subsection 120.03.c.vi. will not apply to radioactive sources that are used in teletherapy, industrial radiography, or in completely self-contained irradiators. In the case of open field irradiators in which certain of the criteria specified in Subsection 110.03.c.vi. are impracticable, equivalent protection shall be provided by license conditions. (12-31-91)

d. Airborne Radioactivity Areas. Each airborne radioactivity area must be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION" or "DANGER"

"AIRBORNE RADIOACTIVITY AREA"

(12-1-87)

e. Additional Requirements. (12-1-87)

i. Each area or room in which any radioactive material, other than natural uranium or thorium, is used or stored in an amount exceeding ten (10) times the quantity of radioactive material specified in the following table must be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION" or "DANGER"

"RADIOACTIVE MATERIAL"

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Material	Microcuries
Americium-241	0.01
Antimony-122	100
Antimony-124	10
Antimony-125	10
Arsenic-73	100
Arsenic-74	10
Arsenic-76	10
Arsenic-77	100
Barium-131	10
Barium-133	10
Barium-140	10
Bismuth-210	1
Bromine-82	10
Cadmium-109	10
Cadmium-115m	10
Cadmium-115	100
Calcium-45	10
Calcium-47	10
Carbon-14	100
Cerium-141	100
Cerium-143	100
Cerium-144	1
Cesium-131	1,000
Cesium-134m	100
Cesium-134	1
Cesium-135	10
Cesium-136	10
Cesium-137	10
Chlorine-36	10
Chlorine-38	10
Chromium-51	1,000
Cobalt-57	100
Cobalt-58m	10

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Material	Microcuries
Cobalt-58	10
Cobalt-60	1
Copper-64	100
Dysprosium-165	10
Dysprosium-166	100
Erbium-169	100
Erbium-171	100
Europium-152 9.2h	100
Europium-152 13yr	1
Europium-154	10
Fluorine-18	1,000
Gadolinium-153	10
Gadolinium-159	100
Gallium-72	10
Germanium-71	100
Gold-198	100
Gold-199	100
Hafnium-181	10
Holmium-166	100
Hydrogen-3	1,000
Indium-113m	100
Indium-114m	10
Indium-115m	100
Indium-115	10
Iodine-125	1
Iodine-126	1
Iodine-129	0.1
Iodine-131	1
Iodine-132	10
Iodine-133	1
Iodine-134	10
Iodine-135	10
Iridium-192	10
Iridium-194	100

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Material	Microcuries
Iron-55	100
Iron-59	10
Krypton-85	100
Krypton-87	10
Lanthanum-140	10
Lutetium-177	100
Manganese-52	10
Manganese-54	10
Manganese-56	10
Mercury-197m	100
Mercury-197	100
Mercury-203	10
Molybdenum-99	100
Neodymium-147	100
Neodymium-149	100
Nickel-59	100
Nickel-63	10
Nickel-65	100
Niobium-93m	10
Niobium-95	10
Niobium-97	10
Osmium-185	10
Osmium-191m	100
Osmium-191	100
Osmium-193	100
Palladium-103	100
Palladium-109	100
Phosphorus-32	10
Platinum-191	100
Platinum-193m	100
Platinum-193	100
Platinum-197m	100
Platinum-197	100
Plutonium-239	0.01

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Material	Microcuries
Polonium-210	0.1
Potassium-42	10
Praseodymium-142	100
Praseodymium-143	100
Promethium-147	10
Promethium-149	10
Radium-226	0.01
Rhenium-186	100
Rhenium-188	100
Rhodium-103m	100
Rhodium-105	100
Rubidium-86	10
Rubidium-87	10
Ruthenium-97	100
Ruthenium-103	10
Ruthenium-105	10
Ruthenium-106	1
Samarium-151	10
Samarium-153	100
Scandium-46	10
Scandium-47	100
Scandium-48	10
Selenium-75	10
Silicon-31	100
Silver-105	10
Silver-110m	1
Silver-111	100
Sodium-22	1
Sodium-24	10
Strontium-85	10
Strontium-89	1
Strontium-90	0.1
Strontium-91	10
Strontium-92	10

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Material	Microcuries
Sulphur-35	100
Tantalum-182	10
Technetium-96	10
Technetium-97m	100
Technetium-97	100
Technetium-99m	100
Technetium-99	10
Tellurium-125m	10
Tellurium-127m	10
Tellurium-127	100
Tellurium-129m	10
Tellurium-129	100
Tellurium-131m	10
Tellurium-132	10
Terbium-160	10
Thallium-200	100
Thallium-201	100
Thallium-202	100
Thallium-204	10
Thorium (natural)	100
Thulium-170	10
Thulium-171	10
Tin-113	10
Tin-125	10
Tungsten-181	10
Tungsten-185	10
Tungsten-187	100
Uranium (natural)	100
Uranium-233	.01
Uranium-234/Uranium-235	.01
Vanadium-48	10
Xenon-131m	1,000
Xenon-133	100
Xenon-135	100

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Material	Microcuries
Ytterbium-175	100
Yttrium-90	10
Yttrium-91	10
Yttrium-92	100
Yttrium-93	100
Zinc-65	10
Zinc-69m	100
Zine-69	1,000
Zirconium-93	10
Zirconium-95	10
Zirconium-97	10
Any alpha emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	.01
Any radionuclide other than alpha emitting radio-nuclides, not listed above or mixtures of beta emitters of unknown composition	.1

NOTE: For purposes of Subsections 120.03 and 130.04, where there is involved a combination of isotopes in known amounts, the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination must not exceed one (1), that is, "unity". (12-31-91)

ii. Each area or room in which natural uranium or thorium is used or stored in an amount exceeding one hundred (100) times the quantity specified in Subsection 120.03.e.i. must be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION" or **"DANGER"**

"RADIOACTIVE MATERIAL"

(12-31-91)

f. Containers. (5-5-81)

i. Except as provided in Subsection 120.03.f.iii., each container of radioactive material must bear a durable, clearly visible label identifying the radioactive contents. (5-5-81)

ii. A label required pursuant to Subsection 120.03.f.i. must bear the radiation caution symbol and the words:

"CAUTION" or **"DANGER"**

"RADIOACTIVE MATERIAL"

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The label will also provide sufficient information to permit individuals handling or using the containers, or working in the vicinity thereof, to take precautions to avoid or minimize exposures. As appropriate, the information must include radiation levels, kinds of material, estimate of activity, and date for which activity is estimated. (12-31-91)

iii. Notwithstanding the provisions of Subsection 120.03.f.i., labeling is not required: (12-31-91)

(a) For containers that do not contain radioactive materials in quantities greater than the applicable quantities listed in Subsection 120.03.e.i.; nor (12-31-91)

(b) For containers containing only natural uranium or thorium in quantities no greater than ten (10) times the applicable quantities listed in Subsection 120.03.e.i.; nor (12-31-91)

(c) For containers that do not contain radioactive materials in concentrations greater than the applicable concentrations listed in Column 2, Table I, Subsection 110.03.a.ii.; nor (12-31-91)

(d) For containers attended by an individual who takes the precautions necessary to prevent the exposure of any individual to radiation or radioactive materials in excess of the limits established by these regulations; nor (5-9-68)

(e) For containers when they are in transport and packaged and labeled in accordance with regulations published by the Federal or State Department of Transportation; nor (5-9-68)

(f) For containers which are accessible only to individuals authorized to handle or use them or to work in the vicinity thereof, provided that the contents are identified to such individuals by a readily available written record; nor (5-5-81)

(g) For manufacturing and process equipment such as piping and tanks. (5-9-68)

iv. Each licensee shall, prior to disposal of an empty uncontaminated container to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive material. (12-1-87)

v. All radiation machines must be labeled in a manner which cautions individuals that radiation is produced when machine is being operated. (5-5-81)

04. Exceptions from Posting and Labeling Requirements. Notwithstanding the provisions of Subsection 120.03. (12-31-91)

a. A room or area is not required to be posted with a caution sign because of the presence of a sealed source, provided that the radiation level twelve (12) inches from the surface of the source container or housing does not exceed five (5) millirem per hour. (5-9-68)

b. Rooms or other areas in hospitals are not required to be posted with caution signs and control of entrance or access thereto, pursuant to Subsection 120.03.c., is not required, because of the presence of patients containing radioactive material, provided there are personnel in attendance who will take the precautions necessary to prevent the exposure of any individual to radiation or radioactive material in excess of the limits established in these regulations. (12-31-91)

c. Caution signs are not required to be posted in areas or rooms containing radioactive materials for periods of less than eight (8) hours provided: (5-5-81)

i. The materials are constantly attended during such periods by an individual who will take the precautions necessary to prevent the exposure of any individual to radiation or radioactive materials in excess of the limits established in these regulations; and (5-5-81)

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ii. Such area or room is subject to the licensee's control. (5-9-68)

d. A room or other area is not required to be posted with a caution sign, and control is not required for each entrance or access point to a room or other area which is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with regulations of the Federal Department of Transportation, which can be obtained from that agency. (12-1-87)

05. Instruction of Personnel. Instructions required for individuals working or frequenting any portion of a restricted area are specified in Subsection 450.03. (12-31-91)

06. Storage and Control of Sources of Radiation. (12-1-87)

a. Sources of radiation must be secured against unauthorized removal from the place of storage. (12-1-87)

b. Sources of radiation in an unrestricted area and not in storage shall be tended under the constant surveillance and immediate control of the licensee or registrant. (12-1-87)

07. Procedures for Picking Up, Receiving, and Opening Packages. (12-1-87)

a. Each licensee or registrant who expects to receive a package containing quantities of radioactive material in excess of the A or A quantities specified in Appendix A of 10 CFR 71 shall: (12-1-87)

i. If the package is to be delivered to the licensee's or registrant's facility by the carrier, make arrangements to receive the package when it is offered for delivery by the carrier; or (5-5-81)

ii. If the package is to be picked up by the licensee or registrant at the carrier's terminal, make arrangements to receive notification from the carrier of the arrival of the package, at the time of arrival. (5-5-81)

b. For isotopes not listed in Table A-1 of 10 CFR 71, the A_1 and A_2 quantities may be calculated in accordance with the procedures contained in Appendix A, Paragraph I, of 10 CFR 71. Mixtures of radionuclides must have their A or A quantities calculated by the ratio rule contained in Appendix A, Paragraph II, of 10 CFR 71. (12-1-87)

c. Each licensee or registrant who picks up a package of radioactive material from a carrier's terminal must pick up the package expeditiously upon receipt of notification from the carrier of its arrival. (5-5-81)

d. Each licensee or registrant, upon receipt of a package of radioactive material, must monitor the external surfaces of the package for radioactive contamination caused by leakage of the radioactive contents, excluding: (5-5-81)

i. Packages containing no more than ten (10) millicuries of radioactive material consisting solely of tritium, carbon-14, sulfur-35, or iodine-125; and (5-5-81)

ii. Packages containing only radioactive material in gaseous or special form; and (5-5-81)

iii. Packages containing only radioactive material in other than liquid form, including Mo-99/Tc-99m generators, and not exceeding the A_1 or A_2 limit specified in the table in Table A-1 of 10 CFR 71; and (12-1-87)

iv. Packages containing only radionuclides with half-lives of less than thirty (30) days and a total quantity of no more than one hundred (100) millicuries. (12-1-87)

e. The monitoring must be performed as soon as practicable after receipt, but no later than three (3) hours after the package is received at the licensee's facility if received during the licensee's normal working hours, or eighteen (18) hours if received after normal working hours. (5-5-81)

f. If removable radioactive contamination in excess of one one-hundredth (0.01) microcurie, twenty-

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two thousand two hundred (22,200) disintegrations per minute, per one hundred (100) square centimeters of package surface is found on the external surfaces of the package, the licensee must immediately notify the final delivering carrier and the Radiation Control Agency by telephone and telegraph. (12-1-87)

g. Each licensee or registrant upon receipt of a package containing quantities of radioactive material in excess of the A_1 or A_2 quantities specified in Appendix A of 10 CFR 71, other than those transported by exclusive use vehicle, must monitor the radiation levels external to the package. The package must be monitored as soon as practicable after receipt, but no later than three (3) hours after the package is received at the licensee's facility if received during the licensee's normal working hours or not later than eighteen (18) hours if received after normal working hours. (12-1-87)

h. If radiation levels are found on the external surface of the package in excess of two hundred (200) millirem per hour, or at three (3) feet from the external surface of the package in excess of ten (10) millirem per hour, the licensee or registrant must immediately notify, by telephone and telegraph, the final delivering carrier and the Radiation Control Agency. (5-5-81)

i. Each licensee or registrant must establish and maintain procedures for safely opening packages in which radioactive material is received, and must assure that such procedures are followed and that due consideration is given to special instructions for the type of package being opened. (5-5-81)

121. -- 129. (RESERVED).

130. WASTE DISPOSAL.

01. General Requirement. Licensees must not dispose of any radioactive material except: (5-5-81)

a. By transfer to an authorized recipient as provided in Subsection 081.30; or (12-31-91)

b. As authorized pursuant to Subsections 130.02, 130.03, 130.04 and 130.05. (12-31-91)

02. Methods of Obtaining Approval of Proposed Disposal Procedures. Any person can apply to the Radiation Control Agency for approval of proposed procedures to dispose of radioactive material in a manner not otherwise authorized in Section 130. Each application must include a description of the radioactive material, including the quantities and kinds of radioactive material and the levels of radioactivity involved, and the proposed manner and conditions of disposal. The application, where appropriate, must also include an analysis and evaluation of pertinent information as to the nature of the environment, including topographical, geological, meteorological, and hydrological characteristics; usage of ground and surface waters in the general area; the nature and location of other potentially affected facilities; and procedures to be observed to minimize the risk of unexpected or hazardous exposures. The Radiation Control Agency will not approve any application for a license to receive radioactive material from other persons for disposal on land not owned by a state or the Federal Government. (12-31-91)

03. Disposal by Release Into Sanitary Sewerage Systems. Licensees must not discharge radioactive material except excreta from individuals undergoing medical diagnosis or therapy with radioactive material into a sanitary sewerage system unless: (5-5-81)

a. It is readily soluble or dispersible in water; and (5-9-68)

b. The quantity of radioactive material released into the system by the licensee in any one (1) day does not exceed the larger of the following: (5-9-68)

i. The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the licensee, will result in an average concentration not greater than the limits specified in Column 2, Table I, Subsection 110.03.a.ii.; or (12-31-91)

ii. Ten (10) times the quantity of such material specified in Subsection 120.03.e.i. (12-31-91)

c. The quantity of any radioactive material released in any one (1) month, if diluted by the average

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monthly quantity of water released by the licensee, will not result in an average concentration exceeding the limits specified in Column 2, Table I, Subsection 110.03.a.ii.; and (12-31-91)

d. The gross quantity of radioactive material, excluding hydrogen-3 and carbon-14, released into the sewerage system by the licensee does not exceed one (1) curie per year. The quantities of hydrogen-3 and carbon-14 released into the sanitary sewage system may not exceed five (5) curies per year for hydrogen-3 and one (1) curie per year for carbon-14. (12-1-87)

e. No licensee may discharge radioactive material into an individual sewage disposal system used for the treatment of wastewater serving only a single dwelling, office building, industrial plant, or institution except as specifically approved by the Agency pursuant to Subsections 110.06 and 130.02. (12-31-91)

f. Excreta from individuals undergoing medical diagnosis or therapy with radioactive material will be exempt from any limitations contained in Subsection 130.03. (12-31-91)

04. Burial. Licensees must not dispose of radioactive material by burial unless burial is at a site licensed by the Radiation Control Agency or equivalent state agency or the U.S. Nuclear Regulatory Agency. (5-5-81)

05. Disposal by Incineration. Licensees must not incinerate radioactive material for the purpose of disposal or preparation for disposal except as specifically approved by the Radiation Control Agency pursuant to Subsection 110.06. (12-31-91)

06. Disposal of Specific Wastes. (12-31-91)

a. Any licensee may dispose of the following licensed radioactive material without regard to its radioactivity: (12-1-87)

i. Five one-hundredths (0.05) microcurie or less of hydrogen-3 or carbon-14, per gram of medium used for liquid scintillation counting; and (12-1-87)

ii. Five one-hundredths (0.05) mirocure or less of hydrogen-3 or carbon-14 per gram of animal tissue averaged over the weight of the entire animal; provided, however, tissue may not be disposed of under Subsection 130.06. in a manner that would permit its use either as food for humans or as animal feed. (12-31-91)

b. Nothing in Subsection 130.06, however, relieves the licensee of maintaining records showing the receipt, transfer and disposal of such radioactive material as specified in Section 007 of these regulations. (12-31-91)

c. Nothing in Subsection 130.06.a. relieves the licensee from complying with other applicable federal, state, and local regulations governing any other toxic or hazardous property of these materials. (12-1-87)

07. Classification of Radioactive Waste for Near-Surface Disposal. (12-31-91)

a. Considerations. Determination of the classification of radioactive waste involves two (2) considerations. First, consideration must be given to the concentration of long-lived radionuclides, and their shorter-lived precursors, whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective. (12-1-87)

b. Classes of waste. Waste shall be classified as follows: (12-1-87)

i. Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in Subsection 130.08.a. If Class A waste also meets the stability requirements set forth in Subsection 130.08.b., it is not necessary to

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segregate the waste for disposal. (12-31-91)

ii. Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in Subsection 130.08. (12-31-91)

iii. Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in Subsection 130.08. (12-31-91)

c. Classification determined by long-lived radionuclides. If the waste contains only radionuclides listed in Table 1 in subsection d. below classification may be determined as follows: (12-31-91)

i. If the concentration does not exceed one tenth (0.1) times the value in Table 1, the waste is Class A. (12-1-87)

ii. If the concentration exceeds one tenth (0.1) times the value in Table 1, the waste is Class C. (12-1-87)

iii. If the concentration exceeds the value in Table 1, the waste is not generally acceptable for near-surface disposal. (12-1-87)

iv. For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions rule described in Subsection 130.07.h. (12-31-91)

d. TABLE 1

Radionuclide	**Concentration curies/ cubic meter**
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3.
I-129	0.08
Radionuclide	**nanocuries/gram**
Alpha-emitting transuranic radionuclides with half-life greater than 5 years	100
Pu-241	3,500
Cm-242	20,000
Ra-226	100

(12-1-87)

e. Classification determined by short-lived radionuclides. If the waste does not contain any of the radionuclides listed in Table 1 in Subsection 130.07.d., classification shall be determined based on the concentrations shown in the following Table 2 below. If a nuclide is not listed in Tables 1 or 2 refer to Subsection 130.07.g.

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Table 2

Rradionuclide	Concentration (curies cubic meter)		
	Column 1	Column 2	Column 3
Total of all radionuclides with less than 5 year half-life			700
H-3			40
Co-60			700
Ni-63	3.5	70	700
NI-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

* See Subsection 130.07.e.vi. below (12-31-91)

i. If the concentration does not exceed the value in Column 1, the waste is Class A. (12-1-87)

ii. If the concentration exceeds the value in Column 1, but does not exceed the value in Column 2, the waste is Class B. (12-1-87)

iii. If the concentration exceeds the value in Column 2, but does not exceed the value in Column 3, the waste is Class C. (12-1-87)

iv. If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal. (12-1-87)

v. For wastes containing mixtures of the radionuclides listed in Table 2, the total concentration may be determined by the sum of fractions rule described in Subsection 130.07.h. (12-31-91)

vi. There are no limits established for cobalt 60, tritium H-3 or nuclides with half lives less than five (5) years in Columns 2 and 3 in Table 2 above in Class B or Class C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes must be Class B unless the concentrations of other radionuclides in Table 2 determine the wastes to be Class C independent of these radionuclides. (12-1-87)

f. Classification determined by both long- and short-lived radionuclides. If the waste contains a mixture of radionuclides, some of which are listed in Table 1 and some of which are listed in Table 2, classification shall be determined as follows: (12-1-87)

i. If the concentration of a radionuclide listed in Table 1 does not exceed one tenth (0.1) times the value listed in Table 1, the class shall be that determined by the concentration of radionuclides listed in Table 2. (12-1-87)

ii. If the concentration of a radionuclide listed in Table 1 exceeds one tenth (0.1) times the value listed in Table 1, the waste must be Class C, provided the concentration of radionuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2. (12-1-87)

g. Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If the waste does not contain any radionuclides listed in either Table 1 or 2, it is Class A. (12-1-87)

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h. The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. (12-1-87)

i. Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods such as the use of scaling factors which relate the inferred concentration of one (1) radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram. (12-1-87)

08. Radioactive Waste Characteristics. (12-1-87)

a. The following are minimum requirements for all classes of waste and are intended to facilitate handling and to provide protection of health and safety of personnel at the disposal site. (12-1-87)

i. Wastes must be packaged in conformance with the conditions of the license issued to the site operator to which the waste will be shipped. Where the conditions of the site license are more restrictive than the provisions of these regulations, the site license conditions shall govern. (12-1-87)

ii. Wastes must not be packaged for disposal in cardboard or fiberboard boxes. (12-1-87)

iii. Liquid waste must be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid. (12-1-87)

iv. Solid wastes containing liquid shall contain as little freestanding and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed one percent (1%) of the volume. (12-1-87)

v. Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water. (12-1-87)

vi. Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with Subsection 130.08.a.viii. below. (12-31-91)

vii. Pyrophoric materials contained in wastes shall be treated, prepared, and packaged to be nonflammable. (12-1-87)

viii. Wastes in gaseous form must be packaged at a gauge pressure that does not exceed one point five (1.5) atmospheres at twenty degrees celsius (20C). Total activity must not exceed one hundred (100) curies per container. (12-1-87)

ix. Wastes containing hazardous, biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the nonradiological materials. (12-1-87)

b. The following requirements are intended to provide stability of the waste. Stability is intended to ensure that the waste does not degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder since it provides a recognizable and nondispersible waste. (12-1-87)

i. Waste must have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal. (12-1-87)

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ii. Notwithstanding the provisions of Subsections 130.08.a.iii. and 130.08.a.iv., liquid wastes, or wastes containing liquid, must be converted into a form that contains as little freestanding and noncorrosive liquid as is reasonably achievable, but in no case may the liquid exceed one percent (1%) of the volume of the waste when the waste is in a disposal container designed to ensure stability, or one-half percent (.5%) of the volume of the waste for waste processed to a stable form. (12-31-91)

iii. Void spaces within the waste and between the waste and its package must be reduced to the extent practicable. (12-1-87)

09. Labeling. Each package of waste must be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with Subsection 130.07. (12-31-91)

10. Transfer for Disposal and Manifests. (12-31-91)

a. Each shipment of waste to a licensed land disposal facility must be accompanied by a shipment manifest that contains the name, address and telephone number of the person generating the waste. The manifest must also include the name, address and telephone number or the name and state or federal hazardous waste identification number of the person transporting the waste to the land disposal facility. The manifest must also indicate as completely as practicable: a physical description of the waste; the waste volume, radionuclide identity and quantity; the total radioactivity; and the principal chemical form. The solidification agent must be specified. Wastes containing more than one-tenth percent (.01%) chelating agents by weight must be identified and the weight percentage of the chelating agent estimated. Wastes classified as Class A, Class B, or Class C in Subsection 130.07 must be clearly identified as such in the manifest unless transferred to a waste processor who treats or repackages wastes. The total quantity of the radionuclides H-3, C-14, Tc-99 and I-129 must be shown. (12-31-91)

b. The required manifest may be shipping papers used to meet U.S. Department of Transportation or U.S. Environmental Protection Agency regulations or requirements of the receiver, provided all the required information is included. (12-1-87)

c. Each manifest shall include a certification by the waste generator that the transported materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation and the Agency. An authorized representative of the waste generator shall sign and date the manifest. (12-1-87)

d. Any generating licensee who transfers waste to a land disposal facility or a licensed waste collector shall comply with all of the following requirements. Any generating licensee who transfers waste to a licensed waste processor who treats or repackages waste shall comply with the requirements of Subsections 130.10.d.iv. through 130.10.d.viii. A licensee shall: (12-31-91)

i. Prepare all wastes so that the waste is classified according to Subsection 130.07 and meets the requirements for waste characteristics in Subsection 130.08; (12-31-91)

ii. Label each package of waste to identify whether it is Class A, Class B, or Class C waste, in accordance with Subsection 130.07; (12-31-91)

iii. Conduct a quality control program to assure compliance with Subsections 130.07 and 130.08, which program must include management evaluation of audits; (12-31-91)

iv. Prepare shipping manifests to meet the requirements of Subsections 130.10.a. through 130.10.c.; (12-31-91)

v. Forward a copy of the manifest to the intended recipient at the time of shipment or deliver to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest from the collector; (12-1-87)

vi. Include one (1) copy of the manifest with the shipment; (12-1-87)

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vii. Retain a copy of the manifest with documentation of acknowledgment of receipt as the record of transfer of licensed material as required by these regulations; and (12-1-87)

viii. For any shipments or any part of a shipment for which acknowledgment of receipt has not been received within the times set forth in Subsection 130.10, conduct an investigation in accordance with Subsection 130.10.g. (12-31-91)

e. Any waste collector licensee who handles only prepackaged waste shall: (12-1-87)

i. Acknowledge receipt of the waste from the generator within one (1) week of receipt by returning a signed copy of the manifest; (12-1-87)

ii. Prepare a new manifest to reflect consolidated shipments. The new manifest shall serve as a listing or index for the detailed generator manifests. Copies of the generator manifests shall be a part of the new manifest. The waste collector may prepare a new manifest without attaching the generator manifests, provided the new manifest contains for each package the information specified in Subsection 130.10.a. The collector licensee shall certify that nothing has been done to the waste which would invalidate the generator's certification; (12-31-91)

iii. Forward a copy of the new manifest to the land disposal facility operator at the time of shipment; (12-1-87)

iv. Include the new manifest with the shipment to the disposal site; (12-1-87)

v. Retain a copy of the manifest with documentation of acknowledgment of receipt as the record of transfer of licensed material as required by these regulations, and retain information from generator manifests until disposition is authorized by the Agency; and (12-1-87)

vi. For any shipments or any part of a shipment for which acknowledgment of receipt is not received within the times set forth in Subsection 130.10, conduct an investigation in accordance with Subsection 130.10.g. (12-31-91)

f. Any licensed waste processor who treats or repackages wastes shall: (12-1-87)

i. Acknowledge receipt of the waste from the generator within one (1) week of receipt by returning a signed copy of the manifest; (12-1-87)

ii. Prepare a new manifest that meets the requirements of Subsections 130.10.a. through 130.10.c. Preparation of the new manifest reflects that the processor is responsible for the waste; (12-31-91)

iii. Prepare all wastes so that the waste is classified according to Subsection 130.07 and meets the waste characteristics requirement in Subsection 130.08. (12-31-91)

iv. Label each package of waste to identify whether it is Class A, Class B, or Class C waste, in accordance with Subsections 130.07 and 130.09. (12-31-91)

v. Conduct a quality control program to assure compliance with Subsections 130.07 and 130.08. The program shall include management evaluation of audits; (12-31-91)

vi. Forward a copy of the new manifest to the disposal site operator or waste collector at the time of shipment, or deliver to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest by the collector; (12-1-87)

vii. Include the new manifest with the shipment; (12-1-87)

viii. Retain copies of original manifests and new manifests with documentation of acknowledgment of receipt as the record of transfer of licensed material required by these regulations; and (12-1-87)

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ix. For any shipment or part of a shipment for which acknowledgment is not received within the times set forth in Subsection 130.10, conduct an investigation in accordance with Subsection 130.10.g. (12-31-91)

g. Any shipment or part of a shipment for which acknowledgment is not received within the times set forth in Subsection 130.10 must: (12-31-91)

i. Be investigated by the shipper if the shipper has not received notification of receipt within twenty (20) days after transfer; and (12-1-87)

ii. Be traced and reported. The investigation shall include tracing the shipment and filing a report with the Agency. Each licensee who conducts a trace investigation must file a written report with the Agency within two (2) weeks of completion of the investigation. (12-1-87)

131. -- 139. (RESERVED).

140. RECORDS, REPORTS, AND NOTIFICATIONS.

01. Records of Surveys, Radiation Monitoring, and Disposal. (12-31-91)

a. Each licensee or registrant shall maintain records showing the radiation exposures of all individuals for whom personnel monitoring is required under Subsection 120.02. Such records must be kept on clear and legible records containing all the information required below: (12-31-91)

i. Name; and (5-5-81)

ii. Social Security Number; and (5-5-81)

iii. Date of Birth; and (5-5-81)

iv. Name of Licensee or Registrant; and (5-5-81)

v. Dose Records for the whole body, skin, or hands and forearms, feet and ankles; and (5-5-81)

vi. Whole Body Dose Status; and (5-5-81)

vii. Method of Monitoring; and (5-5-81)

viii. Period of Exposure; and (5-5-81)

ix. X-Ray or Gamma Dose for Period; and (5-5-81)

x. Beta Dose for Period; and (5-5-81)

xi. Neutron Dose for Period; and (5-5-81)

xii. Total Dose for Period; and (5-5-81)

xiii. Running Dose for Calendar Quarter; and (5-5-81)

xiv. Total Lifetime Accumulated Dose. (5-5-81)

b. The doses entered in the forms or records required above must be for periods of time not exceeding one (1) calendar quarter. (5-5-81)

c. Each licensee or registrant shall maintain records in the same units used in Section 100 showing the results of surveys required by Subsection 120.01, monitoring required by Subsections 120.07.d. and 120.07.f. and disposals made under Subsection 130.02 and 130.03. (12-31-91)

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d. Records of individual exposure to radiation and to radioactive material which must be maintained pursuant to Subsection 140.01.a. and records of bio-assays, including results of whole body counting examinations, made pursuant to Subsection 110.07 must be preserved indefinitely or until the Radiation Control Agency authorizes their disposal. (12-31-91)

e. The discontinuance of or curtailment of activities, does not relieve the licensee or registrant of responsibility for retaining all records required by this section. A licensee or registrant can, however, request the Radiation Control Agency to accept such records. Acceptance of the records by the Radiation Control Agency relieves the licensee or registrant of subsequent responsibility only in respect to their preservation as required by this section. (5-9-68)

f. Records of the results of surveys and monitoring which must be maintained pursuant to Subsection 140.01.c. must be preserved for two (2) years after completion of the survey except that the following records may be maintained until the Agency authorized their disposition: (12-31-91)

i. Records of the results of surveys to determine compliance with Subsection 110.03; and (12-31-91)

ii. In the absence of personnel monitoring data, records of the results of surveys to determine external radiation dose; and (12-1-87)

iii. Records of the results of surveys used to evaluate the release of radioactive effluents to the environment. (12-1-87)

g. Records of disposal of licensed material made pursuant to Subsection 130.02, 130.03 or 130.04 must be maintained until the Agency authorizes their disposition. (12-31-91)

h. Records which must be maintained pursuant to this part may be the original or a reproduced copy or microform if such reproduced copy or microform is duly authenticated by authorized personnel and the microform is capable of producing a clear and legible copy after storage for the period specified by Agency regulations. (12-1-87)

i. If there is a conflict between the Agency's regulations in this part, license condition, or other written Agency approval or authorization pertaining to the retention period for the same type of record, the retention period specified in the regulations in this part for such records will apply unless the Agency, pursuant to Section 006 of this chapter, has granted a specific exemption from the record retention requirements specified in the regulations in this part. (12-31-91)

02. Report of Theft or Loss of Sources of Radiation. Each licensee or registrant must report by telephone and telegraph to the Radiation Control Agency the theft or loss of any source of radiation immediately after such occurrence becomes known. (5-9-68)

03. Notification of Incidents. (5-5-81)

a. Each licensee or registrant must immediately notify the Radiation Control Agency by telephone and telegraph of any incident involving any source of radiation possessed by him and which may have caused or threatens to cause: (5-5-81)

i. A dose to the whole body of any individual of twenty-five (25) rems or more of radiation; a dose to the skin of the whole body of any individual of one hundred fifty (150) rem or more of radiation; or a dose to the feet, ankles, hands, or forearms of any individual of three hundred seventy-five (375) rems or more of radiation; or (12-1-87)

ii. The release of radioactive material in concentrations which, if averaged over a period of twenty-four (24) hours, would exceed five thousand (5,000) times the limits specified for such materials in Table II, Subsection 110.03.a.ii.; or (12-31-91)

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iii. A loss of one (1) working week or more of the operation of any facilities affected; or (5-9-68)

iv. Damage to property in excess of two hundred thousand dollars ($200,000). (12-1-87)

b. Each licensee or registrant must, within twenty-four (24) hours, notify the Radiation Control Agency by telephone and telegraph of any incident involving any source of radiation possessed by him and which may have caused or threatens to cause: (5-5-81)

i. A dose to the whole body of any individual of five (5) rem or more of radiation; a dose to the skin of the whole body of any individual of thirty (30) rem or more of radiation; or a dose to the feet, ankles, hands, or forearms of seventy-five (75) rems or more of radiation; or (5-9-68)

ii. The release of radioactive material in concentrations which, if averaged over a period of twenty-four (24) hours, would exceed five hundred (500) times the limits specified for such materials in Table II of Subsection 110.03.a.ii.; or (12-31-91)

iii. A loss of one (1) day or more of the operation of any facilities affected; or (5-5-81)

iv. Damage to property in excess of two thousand dollars ($2,000). (12-1-87)

c. Any report filed with the Radiation Control Agency pursuant to this section must be prepared in such a manner that names of individuals who have received exposure to radiation will be stated in a separate part of the report. (5-5-81)

d. Details of any report filed with the Radiation Control Agency pursuant to this section will be held confidential except as necessary for protection of the public health and to prevent accidental overexposure of individuals. (5-9-68)

04. Reports of Overexposure and Excessive Levels and Concentration (5-5-81)

a. In addition to any notification required by Subsection 140.03, each licensee or registrant must make a report in writing within thirty (30) days to the Radiation Control Agency of: (12-31-91)

i. Each exposure of an individual to radiation or concentrations of radioactive material in excess of any applicable limit as set forth in Section 100 or as otherwise approved by the Radiation Control Agency; and (12-31-91)

ii. Any incident for which notification is required by Subsection 140.03; and (12-31-91)

iii. Levels of radiation or concentrations of radioactive material, whether or not involving excessive exposure of any individual, in an unrestricted area in excess of ten (10) times any applicable limit as set forth in Section 100 or as otherwise approved by the Radiation Control Agency. Each report required under Subsection 140.04 must describe the extent of exposure of individuals to radiation or to radioactive material, including estimates of each individual's exposure as required by Subsection 140.01.b.; levels of radiation and concentrations of radioactive material involved; the cause of the exposure, levels of concentration; and corrective steps taken or planned to assure against a recurrence. (12-31-91)

b. Any report filed with the Radiation Control Agency pursuant to this section must include, for each individual exposed, the name, social security number, date of birth, and an estimate of the individual's exposure. The report must be prepared so that this information is stated in a separate part of the report. (5-5-81)

c. In any case where a licensee or registrant is required pursuant to the provisions of this section to report to the Radiation Control Agency any exposure of an individual to radiation or to concentrations of radioactive material, the licensee or registrant must, not later than the making of such report to the Radiation Control Agency, also notify such individual of the nature and extent of exposure. Such notice must be in writing and must contain the following statement:

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"This report is furnished to you under the provisions of the Radiation Control Agency regulations entitled "Rules Governing Radiation Control in Idaho," Title 1, Chapter 9, Rules of the Department of Health and Welfare. You should preserve this report for future reference." (5-5-81)

d. Each report required under Subsection 140.04.d. shall describe the extent of exposures of individuals to radiation or to radioactive material, levels of radiation and concentrations of radioactive material involved, the cause of exposure, levels or concentrations, and corrective steps taken or planned to assure against a recurrence. (12-31-91)

05. Vacating Premises. Each specific licensee must, no less than thirty (30) days before vacating or relinquishing possession or control of premises which may have been contaminated with radioactive material as a result of his activities, notify the Radiation Control Agency in writing of intent to vacate. When deemed necessary by the Radiation Control Agency, the licensee must decontaminate the premises in such a manner as the Radiation Control Agency will specify. (5-5-81)

06. Notifications and Reports to Individuals. (12-31-91)

a. Requirements for notification and reports to individuals of exposure to radiation or radioactive material are specified in Subsection 450.04. (12-31-91)

b. When a licensee or registrant is required pursuant to Subsection 140.04 to report to the Radiation Control Agency any exposure of an individual to radiation or radioactive material, the licensee or registrant must also notify the individual. Such notice must be transmitted at a time not later than the transmittal to the Radiation Control Agency, and must comply with the provisions of Subsection 450.04.a. (12-31-91)

07. Records and Reports of Misadministrations. (12-1-87)

a. When a misadministration involves any therapy procedure, the licensee shall notify by telephone the Radiation Control Agency. The licensee shall also notify the referring physician of the affected patient and the patient or a responsible relative (or guardian), unless the referring physician agrees to inform the patient or believes, based on medical judgment, that telling the patient or the patient's responsible relative (or guardian) would be harmful to one or the other, respectively. These notifications must be made within twenty-four (24) hours after the licensee discovers the misadministration. If the referring physician, patient, or the patient's responsible relative or guardian cannot be reached within twenty-four (24) hours, the licensee shall notify them as soon as practicable. The licensee is not required to notify the patient or the patient's responsible relative or guardian without first consulting the referring physician; however, the licensee shall not delay medical care for the patient because of this. (12-1-87)

b. Within fifteen (15) days after an initial therapy misadministration report to the Radiation Control Agency, the licensee shall report, in writing to the Radiation Control Agency and to the referring physician, and furnish a copy of the report to the patient or the patient's responsible relative (or guardian) if either was previously notified by the licensee under the provisions of Subsection 140.07.a. The written report must include the licensee's name; the referring physician's name; a brief description of the event; the effect on the patient; the action taken to prevent recurrence; whether the licensee informed the patient or the patient's responsible relative (or guardian), and if not, why not. The report must not include the patient's name or other information that could lead to identification of the patient. (12-31-91)

c. When a misadministration involves a diagnostic procedure, the Radiation Safety Officer shall promptly investigate its cause, make a record for review, and retain the record as directed in Subsection 140.07. The licensee shall also notify the referring physician within fifteen (15) days if the misadministration involved the use of radioactive material not intended for medical use, administration of a dosage five (5) fold different from the intended dosage, or administration of radioactive material such that the patient is likely to receive an organ dose greater then two (2) rem or a whole body dose greater than five hundred (500) millirem. Licensees may use dosimetry tables in package inserts, corrected only for amount of radioactivity administered, to determine whether a report is required. (12-31-91)

d. Each licensee shall retain a record of each misadministration for ten (10) years. The record must contain the names of all individuals involved in the event (including the physician, allied health personnel, the

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patient, and the patient's referring physician), the patient's social security number or identification number if one has been assigned, a brief description of the event, the effect on the patient, and the action taken, if any, to prevent recurrence.

(12-1-87)

e. Aside from the notification requirement, nothing in this section affects any rights or duties of licensees and physicians in relation to each other, patients, or responsible relatives (or guardians). (12-1-87)

141. -- 149. (RESERVED).

150. RADIATION SAFETY REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHIC OPERATIONS.
The regulations in Section 150 apply to all licensees or registrants who use sources of radiation for industrial radiography; provided, however, that nothing in Section 150 will apply to the use of sources of radiation in the healing arts. The requirements of Section 150 are in addition to and not in substitution for the other requirements of this chapter. (12-31-91)

151. -- 152. (RESERVED).

153. EQUIPMENT CONTROL.

01. Limits on Levels of Radiation for Radiographic Exposure Devices and Storage Containers. Radiographic exposure devices measuring less than four (4) inches from the sealed source storage position to any exterior surface of the device must have no radiation level in excess of fifty (50) milliroentgens per hour at six (6) inches from any exterior surface of the device. Radiographic exposure devices measuring a minimum of four (4) inches from the sealed source storage position to any exterior surface of the device, and all storage containers for sealed sources or outer containers for radiographic exposure devices, must have no radiation level in excess of two hundred (200) milliroentgens per hour at any exterior surface and ten (10) milliroentgens per hour at one (1) meter from any exterior surface. The radiation levels specified are with the sealed source in the shielded, that is, "off" position. (5-5-81)

02. Locking of Sources of Radiation. (12-31-91)

a. Each source of radiation must be provided with a lock or outer-locked container designed to prevent unauthorized or accidental production of radiation or removal or exposure of a sealed source and be kept locked at all times except when under the direct surveillance of a radiographer or radiographer's assistant, or as otherwise authorized pursuant to Subsection 155.02. Each source storage container or source changer, likewise, must be provided with a lock and kept locked when containing sealed sources except when the container is under the direct surveillance of a radiographer or radiographer's assistant. (12-31-91)

b. Radiographic exposure devices, source changers, and storage containers, prior to being moved from one (1) location to another and also prior to being secured at a given location, must be locked and surveyed to assure that the sealed source is in the shielded position. (12-1-87)

03. Storage Precautions. Locked radiographic exposure devices, storage containers and radiation machines must be physically secured to prevent tampering or removal by unauthorized personnel. (12-1-87)

04. Radiation Survey Instruments. (12-31-91)

a. The licensee or registrant must maintain sufficient calibrated and operable radiation survey instruments to make physical radiation surveys as required by this Section and Subsection 120.01. (12-31-91)

b. Each radiation survey instrument must be calibrated at intervals not to exceed three (3) months and after each instrument servicing and a record maintained of the latest date of calibration. Instrumentation required under this Section must have a range such that two (2) milliroentgens per hour through one (1) roentgen per hour can be measured; (12-1-87)

i. At energies appropriate for use and at intervals not to exceed three (3) months and after each

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instrument servicing; (12-1-87)

ii. Such that accuracy within plus or minus twenty percent (20%) can be demonstrated; and (12-1-87)

iii. At two (2) or more widely separated points, other than zero, on each scale. (12-1-87)

c. Records of these calibrations must be maintained for two (2) years after the calibration date for inspection by the Radiation Control Agency. (12-1-87)

05. Leak Testing, Repair, Tagging, Opening, Modification, and Replacement of Sealed Sources. (12-31-91)

a. The replacement of any sealed source fastened to or contained in a radiographic exposure device and leak testing, repair, tagging, opening, or any other modification of any sealed source must be performed only by persons specifically authorized to do so by the Radiation Control Agency, the U.S. Nuclear Regulatory Commission, or any Agreement State. (5-5-81)

b. Each sealed source must be tested for leakage at intervals not to exceed six (6) months. In the absence of a certificate from a transferor indicating that a test has been made within the six (6) month period prior to the transfer, the sealed source must not be put into use until tested. (12-1-87)

c. The leak test must be capable of detecting the presence of five one-thousandths (0.005) microcurie of removable contamination on the sealed source. An acceptable leak test for sealed sources in the possession of a radiography licensee would be to test at the nearest accessible point to the sealed source storage position, or other appropriate measuring point, by a procedure to be approved pursuant to Subsection 081.07.e. Records of leak test results will be kept in units of microcuries and maintained for inspection by the Radiation Control Agency. (12-31-91)

d. Any test conducted pursuant to Subsections 153.05.a. and 153.05.b. which reveals the presence of five one-thousandths (0.005) microcurie or more of removable radioactive material will be considered evidence that the sealed source is leaking. The licensee must immediately withdraw the equipment involved from use and must cause it to be decontaminated and repaired or to be disposed of, in accordance with these regulations. Within five (5) days after obtaining results of the test, the licensee must file a report with the Radiation Control Agency describing the equipment involved, the test results, and the corrective action taken. (12-31-91)

e. A sealed source which is not fastened to or contained in a radiographic exposure device must have permanently attached to it a durable tag at least one (1) inch square bearing the prescribed radiation caution symbol in conventional colors, magenta or purple on a yellow background, and at least the instructions: "Danger - Radioactive Material - Do Not Handle - Notify Civil Authorities if Found." (5-5-81)

06. Quarterly Inventory. Each licensee or registrant must conduct a quarterly physical inventory to account for all sources of radiation received or possessed by that person. The records of the inventories must be maintained for inspection by the Radiation Control Agency for two (2) years from the date of the inventory and must include the quantities and kinds of radioactive material, the location of all sources of radiation, and the date of the inventory. (12-1-87)

07. Utilization Logs. Each licensee or registrant must maintain current logs, which must be kept available for inspection by the Radiation Control Agency, showing for each source of radiation the following information: (5-5-81)

a. A description, or make and model number, of each source of radiation or storage container in which the sealed source is located; and (5-9-68)

b. The identity of the radiographer to whom assigned; and (5-9-68)

c. Locations where used and dates of use; and (5-9-68)

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d. The voltage and current, where applicable, and exposure time for each radiographic exposure employing a radiation source. (5-9-68)

08. Inspection and Maintenance. (12-31-91)

a. Each licensee or registrant must ensure that checks for obvious defects in radiation machines, radiographic exposure devices, storage containers, and source changers are performed prior to each day of use. (12-1-87)

b. Each licensee or registrant must conduct a program of at least quarterly inspection and maintenance of radiation machines, radiographic exposure devices, storage containers, and source changers to assure proper functioning of components important to safety. All appropriate parts must be maintained in accordance with manufacturer's specifications. Records of inspection and maintenance must be maintained for inspection by the Radiation Control Agency until their disposal is authorized by the Radiation Control Agency. (12-1-87)

c. If any inspection conducted pursuant to a. and b. reveals damage to components critical to radiation safety, the device must be removed from service until repairs have been made. (12-1-87)

09. Permanent Radiographic Installation. Permanent radiographic installations having high radiation area entrance controls of the type described in Subsections 120.03.c.ii.(b), 120.03.c.ii.(c) and 120.03.c.iv. must also meet the following requirements: (12-31-91)

a. Each entrance that is used for personnel access to the high radiation area must have both visible and audible warning signals to warn of the presence of radiation. The visible signal must be activated by radiation. The audible signal must be activated when an attempt is made to enter the installation while the source is exposed. (12-1-87)

b. The control device or alarm system must be tested for proper operation at the beginning of each period of use. Records of these tests must be maintained for inspection by the Agency until their disposal is authorized. (12-1-87)

154. PERSONAL RADIATION SAFETY REQUIREMENTS FOR RADIOGRAPHERS AND RADIOGRAPHERS' ASSISTANTS.

01. Limitations. (12-31-91)

a. Licensees or registrants must not permit any individuals to act as radiographers as defined in these regulations until such individuals: (5-5-81)

i. Have been instructed in the subjects outlined in Subsection 154.04, and have demonstrated understanding thereof; and (12-31-91)

ii. Have received copies of and instruction in the regulations contained in Section 150 and the applicable sections of Section 100 and Section 450 Radiation Control Agency licenses, and the licensee's or registrant's operating and emergency procedures; and have demonstrated understanding thereof; and (12-31-91)

iii. Have demonstrated competence to use the source of radiation, related handling tools, and survey instruments which will be employed in their assignment. (5-9-68)

iv. Have demonstrated an understanding of the instructions in Subsection 154.01.a. by successful completion of a written test and a field examination on the subjects covered. (12-31-91)

b. Licensees or registrants must not permit any individuals to act as a radiographer's assistant as defined in these regulations until such individuals: (5-5-81)

i. Have received copies of and instructions in the licensee's or registrant's operating and emergency procedures; and have demonstrated understanding thereof; and (5-5-81)

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ii. Have demonstrated competence to use under the personal supervision of the radiographer the sources of radiation, related handling tools, and radiation survey instruments which will be employed in their assignment. (5-9-68)

iii. Have demonstrated an understanding of the instructions in Section 154.01.b. by successfully completing a written or oral test and a field examination on the subjects covered. (12-31-91)

c. Records of the above training, including copies of written tests and dates of oral tests and field examinations, must be maintained for inspection by the Radiation Control Agency for three (3) years following termination of employment. (12-1-87)

d. Each licensee or registrant must conduct an internal audit program to ensure that the Radiation Control Agency's radioactive material license conditions and the licensee's or registrant's operating and emergency procedures are followed by each radiographer and radiographer's assistant. These internal audits must be performed at least quarterly, and each radiographer must be audited at least annually. Records of internal audits must be maintained for inspection by the Agency for two (2) years from the date of the audit. (12-1-87)

02. Operating and Emergency Procedures. The licensee's or registrant's operating and emergency procedures must include instructions in at least the following: (5-5-81)

a. The handling and use of sources of radiation to be employed such that no individual is likely to be exposed to radiation doses in excess of the limits established in Section 100, "Standards for Protection Against Radiation"; and (12-31-91)

b. Methods and occasions for conducting radiation surveys; and (5-9-68)

c. Methods for controlling access to radiographic areas; and (5-9-68)

d. Methods and occasions for locking and securing sources of radiation; and (5-9-68)

e. Personnel monitoring and the use of personnel monitoring equipment including steps that must be taken immediately by radiography personnel in the event a pocket dosimeter is found to be off-scale; and (12-1-87)

f. Transportation to field locations, including packing of sources of radiation in the vehicles, posting of vehicles, and control of sources of radiation during transportation; and (5-9-68)

g. Minimizing exposure of individuals in the event of an accident; and (5-5-81)

h. The procedure for notifying proper personnel in the event of an accident; and (5-9-68)

i. Maintenance of records; and (5-9-68)

j. The inspection and maintenance of radiographic exposure devices and storage containers. (5-9-68)

03. Personnel Monitoring Control. (12-31-91)

a. Licensees or registrants must not permit any individual to act as a radiographer or as a radiographer's assistant unless, at all times during the radiographic operations, each such individual will wear a film badge or thermoluminescent dosimeter (TLD) and either a pocket dosimeter or pocket chamber. Pocket dosimeters and pocket chambers will be capable of measuring doses from zero (0) to at least two hundred (200) milliroentgens and must be recharged daily or at the beginning of each shift. A film badge or TLD will be assigned to and worn by only one (1) individual. (12-1-87)

b. Pocket dosimeters and pocket chambers must be read and doses recorded daily. A film badge or TLD must be immediately processed if a pocket chamber or pocket dosimeter is discharged beyond its range. The film badge or TLD reports received from the processor and records of pocket dosimeter and pocket chamber readings

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must be maintained for inspection by the Radiation Control Agency. (12-1-87)

c. Pocket dosimeters and chambers must be checked for correct response to radiation at periods not to exceed one (1) year. Acceptable dosimeters must read within plus or minus thirty percent (30%) of the true radiation exposure. (12-1-87)

04. Subjects to be Covered During the Instruction of Radiographers. (12-31-91)

a. Fundamentals of Radiation Safety, to include at least: (5-5-81)

i. Characteristics of gamma and x-radiation; and (5-9-68)

ii. Units of radiation dose (millirem) and quantity of radioactivity (curie); and (5-9-68)

iii. Bioeffects of excessive exposure of radiation; and (12-1-87)

iv. Levels of radiation from sources of radiation; and (5-9-68)

v. Methods of controlling radiation dose, including: (5-5-81)

(a) Working time; and (5-9-68)

(b) Working distances; and (5-5-81)

(c) Shielding; and (5-9-68)

vi. Radiation Protection Standards; and (12-1-87)

b. Radiation Detection Instrumentation, to include at least: (5-5-81)

i. Use of radiation surveys instruments, including: (5-5-81)

(a) Operation; and (5-9-68)

(b) Calibration; and (5-5-81)

(c) Limitations; and (5-9-68)

ii. Survey techniques; and (5-9-68)

iii. Use of Personnel Monitoring Equipment, including: (5-5-81)

(a) Film badges, TLDs; and (5-9-68)

(b) Pocket dosimeters; and (5-5-81)

(c) Pocket chambers; and (5-9-68)

c. Radiographic Equipment, to include at least: (5-5-81)

i. Remote handling equipment; and (5-9-68)

ii. Radiographic exposure devices and sealed sources; and (5-9-68)

iii. Storage containers; and (5-5-81)

iv. Operation and control of x-ray equipment; and (5-9-68)

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d. The Requirements of Pertinent Federal and State Regulations; and (5-9-68)

e. The licensee's or Registrant's Written Operating and Emergency Procedures; and (5-9-68)

f. Case histories of radiography accidents. (12-1-87)

05. Supervision of Radiographers' Assistants. Whenever a radiographer's assistant uses radiographic exposure devices, sealed sources or related source handling tools, or conducts radiation surveys required by Subsections 155.04.b. and 155.04.c. to determine that the sealed source has returned to the shielded position after an exposure, the radiographer's assistant must be under the personal supervision of a radiographer. (12-31-91)

155. PRECAUTIONARY PROCEDURES IN RADIOGRAPHIC OPERATION.

01. Documents Required at Field Radiography Sites. Each licensee or registrant conducting industrial radiography at a temporary jobsite must have the following records available at that site for inspection by the Agency: (12-1-87)

a. Appropriate license or certificate of registration or equivalent document; (12-1-87)

b. Operating and emergency procedures; (12-1-87)

c. Applicable regulations; (12-1-87)

d. Survey records required pursuant to Section 155 for the period of operation at the site; (12-31-91)

e. Daily pocket dosimeter records for the period of operation at the site; and (12-1-87)

f. The latest instrument calibration and leak test records for specific devices in use at the site. Acceptable records include tags or labels which are affixed to the device or survey meter. (12-1-87)

02. Security. During each radiographic operation, the radiographer or radiographer's assistant must maintain a direct surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in Section 001, except: (12-31-91)

a. Where the high radiation area is equipped with a control device or alarm system as described in Subsection 120.03; or (12-31-91)

b. Where the high radiation area is locked to protect against unauthorized or accidental entry. (5-9-68)

03. Posting. Notwithstanding any provisions in Subsection 120.04.c., areas in which radiography is being performed must be conspicuously posted as required by Subsections 120.03.b. and 120.02.c.i. (12-31-91)

04. Radiation Surveys and Survey Records. (12-31-91)

a. No radiographic operation will be conducted unless calibrated and operable radiation survey instrumentation, as described in Subsection 153.04, is available and used at each site where radiographic exposures are made. (12-31-91)

b. A physical radiation survey must be made after each radiographic exposure utilizing radiographic exposure devices or sealed sources of radioactive material to determine that the sealed source has been returned to its shielded condition. The entire circumference of the radiographic exposure device must be surveyed. If the radiographic exposure device has a source guide tube, the survey must include the guide tube. (12-1-87)

c. A physical radiation survey must be made to determine that each sealed source is in its shielded condition prior to securing the radiographic exposure device or storage container as specified in Subsection 153.04. (12-31-91)

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d. Records must be kept of the surveys required by Subsection 155.04.c. and maintained for inspection by the Radiation Control Agency for two (2) years after completion of the surveys. (12-31-91)

e. A physical radiation survey must be made after each radiographic exposure using radiation machines to determine that the machine is "off." (12-1-87)

05. Special Requirements and Exemptions for Enclosed Radiography. (12-31-91)

a. Systems for enclosed radiography designed to allow admittance of individuals must: (12-1-87)

i. Comply with all applicable requirements of this part and Subsection 110.05. If such a system is a certified cabinet x-ray system, it must comply with all applicable requirements of this part and 21 CFR 1020.40. (12-31-91)

ii. Be evaluated at intervals not to exceed one (1) year to assure compliance with the applicable requirements as specified in Subsection 155.05.a. Records of these evaluations must be maintained for inspection by the Radiation Control Agency for a period of two (2) years after the evaluation. (12-31-91)

b. Certified cabinet x-ray systems designed to exclude individuals are exempt from the requirements of this part except that: (12-1-87)

i. Operating personnel must be provided with either a film badge or a thermoluminescent dosimeter, and reports of the results must be maintained for inspection by the Radiation Control Agency. (12-1-87)

ii. No registrant may permit any individual to operate a cabinet x-ray system until such individual has received a copy of and instruction in the operating procedures for the unit and has demonstrated competence in its use. Records which demonstrate compliance with this subparagraph must be maintained for inspection by the Radiation Control Agency until disposition is authorized by the Radiation Control Agency. (12-1-87)

iii. Tests for proper operation of high radiation area control devices or alarm systems, where applicable, must be conducted, recorded, and maintained in accordance with Subsection 153.09. (12-31-91)

iv. The registrant must perform an evaluation, at intervals not to exceed one (1) year, to determine conformance with Subsection 110.05. If such a system is a certified cabinet x-ray system, it must be evaluated at intervals not to exceed one (1) year to determine conformance with 21 CFR 1020.40. Records of these evaluations must be maintained for inspection by the Radiation Control Agency for a period of two (2) years after the evaluation. (12-1-87)

c. Certified cabinet x-ray systems must be maintained in compliance with 21 CFR 1020.40 unless prior approval has been granted by the Radiation Control Agency pursuant to Section 006. (12-31-91)

156. -- 199. (RESERVED).

200. USE OF X-RAYS IN THE HEALING ARTS.
Section 200 establishes requirements, for which a registrant is responsible, for use of x-ray equipment by or under the supervision of an individual authorized by and licensed in accordance with state statutes to engage in the healing arts or veterinary medicine. The provisions of Section 200 are in addition to, and not in lieu of, other applicable provisions of these regulations. (12-31-91)

201. -- 202. (RESERVED).

203. GENERAL REQUIREMENTS.
The following general requirements must be followed in the use of x-rays in the healing arts. (5-5-81)

01. Administrative Controls. (7-1-93)

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a. The registrant will be responsible for directing the operation of the x-ray machines which have been registered with the Radiation Control Agency under Subsection 090.01. Such persons or designated agents will assure that the following provisions are met in the operation of the x-ray machine(s): (12-31-91)

i. An x-ray machine which does not meet the provisions of these regulations must not be operated for diagnostic or therapeutic purposes, if so directed by the Radiation Control Agency; and (5-5-81)

ii. Individuals who will be operating the x-ray equipment must be adequately instructed in the safe operating procedures and be competent in the safe use of the equipment. (5-5-81)

b. In the vicinity of each x-ray system's control panel a chart must be provided which specifies, for all examinations which are performed by that system, a listing of current information, including but not limited to the following, for each projection within that examination: (5-5-81)

i. Patient's anatomical size versus technique factors to be utilized; (5-5-81)

ii. Type and size of the film or film-screen combination to be used; (5-5-81)

iii. Type of grid to be used if any, and focal distance; (5-5-81)

iv. Source to image receptor distance to be used; and (5-5-81)

v. Type and location of placement of gonadal shielding to be used. (5-5-81)

c. Written safety procedures and rules will be provided to each individual operating x-ray equipment under the registrant's control; such procedures and rules will include any restrictions of the operating technique required for the safe operating of the particular x-ray system. The operator must be able to demonstrate familiarity with these rules. (12-1-87)

d. Except for patients who cannot be moved out of the room, only the staff and ancillary personnel required for the medical procedure or training can be in the room during the radiographic exposure. For all persons other than the patient being examined, the following must be observed: (5-5-81)

i. All individuals will be positioned such that no part of the body, including the extremities not protected by five-tenths (0.5) mm lead equivalent, will be struck by the useful beam; (5-5-81)

ii. Staff and ancillary personnel must be protected from the direct scatter radiation by protective aprons or whole body protective barriers of not less than twenty-five hundredths (0.25) mm lead equivalent; (5-5-81)

iii. Patients who cannot be removed from the room will be protected from the direct scatter radiation by whole body protective barriers of twenty-five hundredths (0.25) mm lead equivalent or will be positioned such that the nearest portion of the body is at least two (2) meters from both the tube head and the nearest edge of the image receptor; and (5-5-81)

iv. When a portion of the body of any staff or ancillary personnel is potentially subjected to stray radiation which could result in that individual receiving one-quarter (1/4) of the maximum permissible dose, as defined in Section 100 additional protective devices can be required by the Radiation Control Agency. (12-31-91)

e. Gonadal shielding of not less than five-tenths (0.5) mm lead equivalent must be used for patients who have not passed the productive age (18-45) during radiographic procedures in which the gonads are in the direct (useful) beam, except for cases where this would interfere with the diagnostic procedure. (5-5-81)

f. Persons must not be exposed to the useful beam except for healing arts purposes, each exposure of which has been authorized by a licensed practitioner of the healing arts. Deliberate exposure for the following purposes is specifically prohibited: (5-5-81)

i. Exposure of an individual for training, demonstration or other purposes, unless there are also

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healing arts requirements and proper prescription has been provided; and (5-5-81)

ii. Exposure of an individual for the purpose of healing arts screening without prior written approval of the Radiation Control Agency. Screening for this purpose will mean an exposure of a person without a prior examination by a licensed practitioner. (5-5-81)

g. When a patient or film must be provided with auxiliary support during a radiation exposure: (5-5-81)

i. Mechanical holding devices will be used when the technique permits. The safety rules required by Subsection 203.01.c. will list individual projections where holding devices cannot be utilized; (12-31-91)

ii. Written safety procedures, as required by Subsection 203.01.c., will indicate the requirements for selecting a human holder and the procedure the holder will follow; (12-31-91)

iii. The human holder will be protected as required by Subsection 203.01.d.; (12-31-91)

iv. No person can be used routinely to hold film or patients; (5-5-81)

v. A record must be made of the examination and must include the name of the human holder, date of the examination, number of exposures and technique factors utilized for the exposure(s); and (5-5-81)

vi. In those cases where the patient must hold the film, except during intraoral examinations, any portion of the body other than the area of clinical interest struck by the useful beam must be protected by not less than five-tenths (0.5) mm lead equivalent material. (5-5-81)

h. Procedures and auxiliary equipment designed to minimize patient and personnel exposure commensurate with the needed diagnostic information must be utilized. This includes but is not limited to: (5-5-81)

i. The speed of film or screen and film combinations, using the fastest speed consistent with the diagnostic objective of the examinations; (5-5-81)

ii. Using the minimum radiation exposure to the patient required to produce images of good diagnostic quality; and (5-5-81)

iii. Portable or mobile equipment only for examinations where it is impractical to transfer patients to a stationary radiographic installation. (5-5-81)

i. Regarding personnel monitoring, all persons who are associated with the operation of an x-ray system are subject to the occupational exposure limits and the requirements for the determination of the doses as stated in Section 100. In addition, the following requirements apply: (12-31-91)

i. When protective clothing or other devices are worn on portions of the body and when a monitoring device is required, at least one (1) such device must be worn at the collar outside of the protective clothing. The dose to the whole body based on the maximum dose attributed to any one (1) critical organ, which includes the gonads, blood forming organs, head and trunk, or lens of the eye, must be recorded in the reports required by Subsection 140.01. If more than one (1) device is used and a record is made of the data, each dose must be identified with the area where the device was worn on the body; and (12-31-91)

ii. Exposure of a personnel monitoring device to deceptively indicate a dose delivered to an individual is prohibited. (5-5-81)

j. Any person proposing to conduct a healing arts screening program must not initiate such a program without prior approval of the Radiation Control Agency. When requesting such approval, that person must submit the information outlined in the following subsections. If any information submitted to the Radiation Control Agency becomes invalid or outdated, the Agency must be immediately notified. Persons requesting that the Radiation Control Agency approve a healing arts screening program must submit the following information and evaluations: (12-1-87)

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i. Name and address of the applicant and, where applicable, the names and addresses of agents within this State. (12-1-87)

ii. Diseases or conditions for which the x-ray examinations are to be used in diagnoses. (12-1-87)

iii. A detailed description of the x-ray examinations proposed in the screening program. (12-1-87)

iv. Description of the population to be examined in the screening program, i.e., age, sex, physical condition, and other appropriate information. (12-1-87)

v. An evaluation of any known alternate methods not involving ionizing radiation which could achieve the goals of the screening program and why these methods are not used instead of the x-ray examinations. (12-1-87)

vi. An evaluation by a qualified expert of the x-ray system(s) to be used in the screening program. The evaluation by the qualified expert must show that such system(s) do satisfy all requirements of these regulations. (12-1-87)

vii A description of the diagnostic film quality control program. (12-1-87)

viii. A copy of the technique chart for the x-ray examination procedures to be used. (12-1-87)

ix. The qualifications of each individual who will be operating the x-ray system(s). (12-1-87)

x. The qualifications of the individual who will be supervising the operators of the x-ray system(s). The extent of supervision and the method of work performance evaluation must be specified. (12-1-87)

xi. The name and address of the individual who will interpret the radiograph(s). (12-1-87)

xii. A description of the procedures to be used in advising the individuals screened and their private practitioners of the healing arts of the results of the screening procedure and any further medical needs indicated. (12-1-87)

xiii. A description of the procedures for the retention or disposition of the radiographs and other records pertaining to the x-ray examinations. (12-1-87)

02. Exemptions. The Radiation Control Agency can waive compliance with the specific requirements of Section 203 for an existing machine or installation if: (12-31-91)

a. Such compliance would require replacement or substantial modification of the machine or installation; and (5-9-68)

b. The registrant demonstrates to the Radiation Control Agency's satisfaction, achievement through other means of radiation protection equivalent to that required by these regulations. (5-9-68)

03. Structural Shielding. Each installation must be provided with primary barriers and/or secondary barriers as necessary to assure compliance with Subsections 110.01, 110.04 and 110.05. This requirement will be deemed to be met if the thicknesses of such barriers are equivalent to those as computed in accordance with National Council of Radiation Protection Report No. 49, "Structural Shielding Design and Evaluation for Medical Use of X-rays and Gamma Rays of Energies up to Ten (10) MeV", which may be obtained from NCRP Publications, 7910 Woodmont, Bethesda, MD 20814. (12-31-91)

04. Minimum Design Requirements for an X-ray Machine Operator's Booth. (12-31-91)

a. The operator will be allotted not less than seven and five-tenths (7.5) square feet of unobstructed floor space in the booth. The booth must protect the operator from the useful beam and from any radiation which has

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been scattered only once. (5-5-81)

i. The minimum space, as indicated above, can be any geometric configuration but with no dimension less than two (2) feet. (5-5-81)

ii. The space allotted will not include any encumbrance by the console, such as overhang, cable, or other similar encroachments. (5-5-81)

iii. The booth must be located or constructed such that unattenuated direct scatter radiation originating on the examination table or at the wall cassette does not reach the operator's station in the booth. (12-1-87)

iv. The booth walls must be at least seven (7) feet high and must be permanently fixed to the floor or other structure. (5-5-81)

v. When a door or movable panel is used as an integral part of the booth structure, it must have a permissive device which prevents an exposure when the door or panel is not closed. (5-5-81)

b. The operator's switch for the radiographic machine will be fixed within the booth and: (5-5-81)

i. Must be at least forty (40) inches from any open edge of the booth wall which is proximal to the examining table; and (5-5-81)

ii. Must allow the operator to use the majority of the available viewing window. (5-5-81)

c. Viewing system requirements: (5-5-81)

i. Each booth must have at least one (1) viewing device which will: (5-5-81)

(a) Be so placed that the operator can view the patient during any exposure; and (5-5-81)

(b) Be so placed that the operator can have full view of any occupant of the room and can view any entry into the room. If any door which allows access to the room cannot be seen from the booth, then that door must have a permissive device controlling the exposure which will prevent exposure if the door is not closed. (12-1-87)

ii. If the viewing system is a window, the following requirements also apply: (5-5-81)

(a) The window must have a visible area of at least one (1) square foot, the base of which is at least four and one-half (4.5) feet above the floor; and (5-5-81)

(b) The window materials must have at least the same lead equivalence as that required in the booth's wall in which it is to be mounted. (12-1-87)

iii. When the viewing system utilizes one (1) or more mirrors, the mirrors must be so located as to accomplish the general requirements as in Subsection 203.04.c.i. (12-31-91)

iv. When the viewing system utilizes electronic means, such as a TV: (5-5-81)

(a) The camera must be so located as to accomplish the general requirements in Subsection 203.04.c.i.; and (12-31-91)

(b) There must be an alternate viewing system to serve as a back-up in case of electronic failure. (5-5-81)

204. GENERAL REQUIREMENTS FOR ALL DIAGNOSTIC X-RAY SYSTEMS.
In addition to other requirements of Section 200, all diagnostic x-ray systems must meet the following requirements: (12-31-91)

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01. Battery Charge Indicator. On battery-powered generators, visual means must be provided on the control panel to indicate whether the battery is in a state of charge adequate for proper operation. (5-5-81)

02. Leakage Radiation From the Diagnostic Source Assembly. The leakage radiation from the diagnostic source assembly measured at a distance of one (1) meter in any direction from the source must not exceed one hundred (100) milliroentgens in one (1) hour when the x-ray tube is operated at its leakage technique factors. Compliance will be determined by measurements averaged over an area of one hundred (100) square centimeters with no linear dimension greater than twenty (20) centimeters. (12-1-87)

03. Beam Quality. (5-5-81)

a. The half-value layer (HVL) of the useful beam for a given x-ray tube potential must not be less than the values shown in the following table. If it is necessary to determine such half-value layer at an x-ray tube potential which is not listed in the table, linear interpolation or extrapolation can be made. (5-5-81)

Design Operating Range (kilovolts peak)	Measured Potential (kilovolts peak)	Half-Value Layers (millimeters of aluminum)
Below 50	30	0.3
	40	0.4
	49	0.5
50 to 70	50	1.2
	60	1.3
	70	1.5
Above 70	71	2.1
	80	2.3
	90	2.5
	100	2.7
	110	3.0
	120	3.2
	130	3.5
	140	3.8
	150	4.1

b. The above HVL criteria will be considered to have been met if it can be demonstrated that the aluminum equivalent of the total filtration in the primary beam is not less than that shown in the following table: (5-5-81)

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FILTRATION REQUIRED vs OPERATING VOLTAGE

Operating Voltage (kVp)	Total Filtration (inherent plus added)
	(millimeters aluminum equivalent)
Below 50	0.5 millimeters
50 -- 70	1.5 millimeters
Above 70	2.5 millimeters

c. In addition to the requirements of Subsection 204.03.a., all intraoral dental radiographic systems manufactured on and after December 1, 1980, must have a minimum half-value layer not less than one point five (1.5) millimeters aluminum equivalent filtration permanently installed in the useful beam. (12-31-91)

d. Beryllium window tubes must have a minimum of five tenths (0.5) millimeter aluminum equivalent filtration permanently installed in the useful beam. (12-1-87)

e. For capacitor energy storage equipment, compliance with the requirements of Subsection 204.03 must be determined with the maximum quantity of charge per exposure. (12-31-91)

f. The required minimal aluminum equivalent filtration must include the filtration contributed by all materials which are always present between the source and the patient. (12-1-87)

g. For x-ray systems which have variable kVp and variable filtration for the useful beam, a device must link the kVp selector with the filter(s) and must prevent an exposure unless the minimum amount of filtration required by Subsection 204.03 is in the useful beam for the given kVp which has been selected. (12-31-91)

04. Multiple Tubes. Where two (2) or more radiographic tubes are controlled by one (1) exposure switch, the tube or tubes which have been selected must be clearly indicated prior to initiation of the exposure. This indication shall be both on the x-ray control panel and at or near the tube housing assembly which has been selected. (12-1-87)

05. Mechanical Support of Tube Head. The tube housing assembly supports must be adjusted such that the tube housing assembly will remain stable during an exposure unless tube housing movement is a designed function of the x-ray system. (12-1-87)

06. Technique Indicators. (12-1-87)

a. The technique factors to be used during an exposure must be indicated before the exposure begins. If automatic exposure controls are used, the technique factors which are set prior to the exposure must be indicated. (12-1-87)

b. The requirement of Subsection 204.06.a. may be met by permanent markings on equipment having fixed technique factors. Indication of technique factors must be visible from the operator's position except in the case of spot films made by the fluoroscopist. (12-31-91)

07. Warning Label. The control panel containing the main power switch must bear the warning statement, legible and accessible to view: "WARNING: This x-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed.". (12-1-87)

08. Radiation From Components Other Than the Diagnostic Source Assembly. The radiation emitted by a component other than the diagnostic source assembly must not exceed two (2) milliroentgens in one (1) hour at five (5) centimeters from any accessible surface of the component when it is operated in an assembled x-ray system

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under any conditions for which it was designed. Compliance must be determined by measurements averaged over an area of one hundred (100) square centimeters with no linear dimension greater than twenty (20) centimeters. (12-1-87)

205. FLUOROSCOPIC X-RAY SYSTEMS.
All fluoroscopic x-ray systems must meet the following requirements: (5-5-81)

01. Limitation of Useful Beam. (5-5-81)

a. The fluoroscopic tube must not produce x-rays unless the primary protective barrier is in position to intercept the useful beam at all times. (5-5-81)

b. The entire cross section of the useful beam must be intercepted by the primary protective barrier of the fluoroscopic image assembly at any Source to Image Distance (SID). (5-5-81)

c. Radiation therapy simulation systems will be exempt from all the requirements of Subsections 205.01.a., 205.03, 205.04 and 205.07, provided that: (12-31-91)

i. Such systems are designed and used in such a manner that no individual other than the patient is in the x-ray room during periods of time when the system is producing x-rays; and (12-1-87)

ii. Systems which do not meet the requirements of Subsection 205.07 are provided with a means of indicating the cumulative time that an individual patient has been exposed to x-rays. Procedures must require in such cases that the timer be reset between examinations. (12-31-91)

d. The x-ray field produced by fluoroscopic equipment without image intensification must not extend beyond the entire visible area of the image receptor. This requirement applies to field size for both fluoroscopic procedures and spot filming procedures. In addition: (12-1-87)

i. Means must be provided for stepless adjustment of the field size; (12-1-87)

ii. The minimum field size at the greatest SID must be equal to or less than five (5) by five (5) centimeters. (12-1-87)

e. For image-intensified fluoroscopic equipment, neither the length nor the width of the x-ray field in the plane of the image receptor can exceed the visible area of the image receptor by more than three percent (3%) of the SID. The sum of the excess length and the excess width must be no greater than four percent (4%) of the SID. (12-1-87)

i. Means must be provided to permit further limitation of the field. Beam-limiting devices manufactured after May 22, 1979, and incorporated in equipment with a variable SID and/or a visible area of greater than three hundred (300) square centimeters must be provided with means for stepless adjustment of the x-ray field; (12-1-87)

ii. All equipment with a fixed SID and a visible area of three hundred (300) square centimeters or less must be provided with either stepless adjustment of the x-ray field or with means to further limit the x-ray field size at the plane of the image receptor to one hundred twenty-five (125) square centimeters or less. Stepless adjustment must, at the greatest SID, provide continuous field sizes from the maximum obtainable to a field size of five (5) by five (5) centimeters or less. (12-1-87)

iii. For rectangular x-ray fields used with circular image reception, the error in alignment must be determined along the length and width dimensions of the x-ray field which pass through the center of the visible area of the image receptor. (12-1-87)

f. Spot-film devices which are certified components must meet the following additional requirements: (12-1-87)

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i. Means must be provided between the source and the patient for adjustment of the x-ray field size in the plane of the film to the size of that portion of the film which has been selected on the spot film selector. Such adjustment must be automatically accomplished except when the x-ray field size in the plane of the film is smaller than that of the selected portion of the film. For spot film devices manufactured after June 21, 1979, if the x-ray field size is less than the size of the selected portion of the film, the means for adjustment of the field size must be only at the operator's option; (12-1-87)

ii. It must be possible to adjust the x-ray field size in the plane of the film to a size smaller than the selected portion of the film. the minimum field size at the greatest SID must be equal to, or less than, five (5) by five (5) centimeters; (12-1-87)

iii. The center of the x-ray field in the plane of the film must be aligned with the center of the selected portion of the film to within two percent (2%) of the SID; and (12-1-87)

iv. On spot-film devices manufactured after February 25, 1978, if the angle between the plane of the image receptor and beam axis is variable, means must be provided to indicate when the axis of the x-ray beam is perpendicular to the plane of the image receptor, and compliance must be determined with the beam axis indicated to be perpendicular to the plane of the image receptor. (12-1-87)

02. Activation of the Fluoroscopic Tube. X-ray production in the fluoroscopic mode must be controlled by a device which requires continuous pressure by the fluoroscopist for the entire time of any exposure. When recording serial fluoroscopic images, the fluoroscopist must be able to terminate the x-ray exposures at any time; however, means can be provided to permit completion of any single exposure of the series in process. (5-5-81)

03. Exposure Rate Limits. (12-31-91)

a. Entrance exposure rate - allowable limits: (12-31-91)

i. Except as provided below in Subsections 205.03.a.ii. and iii., the exposure measured at the point where the center of the useful beam enters the patient must not exceed ten (10) roentgens per minute. (12-31-91)

ii. When provided with optional high level control, the equipment must not be operable at any combination of tube potential and current which will result in an exposure rate in excess of five (5) roentgens per minute at the points where the center of the useful beam enters the patient, unless the high level control is activated. Special means of activation of high level controls, such as additional pressure applied continuously by the operator, will be required to avoid accidental use. (5-5-81)

iii. In addition to the other requirements of Section 205, any new equipment installed after the effective date of these regulations which does not incorporate an automatic exposure control, such as automatic brightness control or ionization chamber control, must not be operable at any combination of tube potential and current which will result in an exposure rate in excess of five (5) roentgens per minute at the point where the center of beam enters the patient except during recording of fluoroscopic images. (12-31-91)

iv. Compliance with Subsection 205.03 will be determined as follows: (12-31-91)

(a) If the source is below the tabletop, exposure rate will be measured one (1) centimeter above the tabletop or cradle; (5-5-81)

(b) If the source is above the tabletop, the exposure rate will be measured at thirty (30) centimeters above the tabletop with the end of the beam-limiting device or spacer positioned as closely as possible to the point of measurement; (5-5-81)

(c) In a C-arm type of fluoroscope, the exposure rate will be measured thirty (30) centimeters from the input surface of the fluoroscopic imaging assembly; (5-5-81)

(d) Movable grids and compression devices must be removed from the useful beam during the measurement. (12-1-87)

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b. Periodic measurement of entrance exposure rate will be performed as follows: (12-1-87)

i. Measurements must be made annually or after any maintenance of the system which might affect the exposure rate; (12-1-87)

ii. Results of these measurements must be posted where any fluoroscopist may have ready access to such results while using the fluoroscope. The measurement results must be stated in roentgens per minute and include the technique factors used in determining such results. The name of the person performing the measurements and the date the measurements were performed must be included in the results; (12-1-87)

iii. Personnel monitoring devices may be used to perform the measurements required by Subsection 205.03.b.i., provided the measurements are made as described below. (12-31-91)

iv. Conditions of periodic measurement of entrance exposure rate are as follows: (12-1-87)

(a) The measurement must be made under the conditions that satisfy the requirements of Subsection 205.03.a.iv.; (12-31-91)

(b) The kVp must be the kVp typical of clinical use of the x-ray system; (12-1-87)

(c) The x-ray system(s) that incorporates automatic exposure control must have sufficient material placed in the useful beam to produce a milliamperage typical of the use of the x-ray system; and (12-1-87)

(d) X-ray system(s) that do not incorporate an automatic exposure control must utilize a milliamperage typical of the clinical use of the x-ray system. Materials should be placed in the useful beam when conducting these periodic measurements to protect the imaging system. (12-1-87)

04. Radiation Transmitted Through Barrier. (5-5-81)

a. The exposure rate resulting from transmission through the primary protective barrier with the attenuation block in the useful beam, combined with radiation from the image intensifier, if provided, must not exceed two (2) milliroentgens per hour at ten (10) centimeters from any accessible surface of the fluoroscopic imaging assembly beyond the plane of the image receptor for each roentgen per minute of entrance exposure rate. (5-5-81)

b. For measuring compliance of barrier transmission, the following will apply: (5-5-81)

i. The exposure rate resulting from transmission through the primary protective barrier combined with the radiation from the image intensifier will be determined by measurements averaged over an area of one hundred (100) square centimeters with no linear dimension greater than twenty (20) centimeters; (5-5-81)

ii. If the source is below the tabletop, the measurement will be made with the input surface of the fluoroscopic imaging assembly, positioned thirty (30) centimeters above the tabletop; (5-5-81)

iii. If the source is above the tabletop and the SID is variable, the measurement will be made with the end of the beam-limiting device or spacer as close to the tabletop as it can be placed, provided that it will not be closer than thirty (30) centimeters; (5-5-81)

iv. The attenuation block will be positioned between the point of entrance exposure rate measurement and the input surface of the fluoroscopic imaging assembly, and the block will be ten (10) centimeters from the point of entrance exposure rate measurement; (5-5-81)

v. Movable grids and compression devices must be removed from the useful beam during the measurement. (12-1-87)

05. Indication of Potential and Current. During fluoroscopy and cinefluorography, x-ray tube potential

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and current will be continuously indicated; and (5-5-81)

06. Source-to-Skin Distance. The source-to-skin distance must not be less than: (5-5-81)

a. Thirty-eight (38) centimeters on stationary fluoroscopes installed after May 8, 1968; (5-5-81)

b. Thirty-five and one-half (35.5) centimeters on stationary fluoroscopes which were in operation prior to May 8, l968; (5-5-81)

c. Thirty (30) centimeters on all mobile fluoroscopes; and (5-5-81)

d. Twenty (20) centimeters for image intensified fluoroscopes used for specific surgical application. The user's operating manual must provide precautionary measures to be adhered to during the use of this device; (12-1-87)

07. Fluoroscopic Timer. (5-5-81)

a. Means must be provided to preset the cumulative on-time of the fluoroscopic tube. (5-5-81)

b. The maximum cumulative time of the timing device must not exceed five (5) minutes without resetting. (5-5-81)

c. A signal audible to the fluoroscopist, or the appropriate operator, must indicate the completion of any preset cumulative on-time. Such signal shall continue to sound while x-rays are produced until the timing device is reset. (12-1-87)

08. Mobile Fluoroscopes. (5-5-81)

a. In addition to the other requirements of Section 205., mobile fluoroscopes must provide image intensification. (12-31-91)

09. Control of Scattered Radiation. (5-5-81)

a. Fluoroscopic table designs, when combined with procedures utilized, must be such that no unprotected part of any staff or ancillary person's body will be exposed to unattenuated scattered radiation which originated from under the table. The attenuation required must be not less than twenty-five hundredths (0.25) mm equivalent. (5-5-81)

b. Equipment configuration, when combined with procedures utilized, must be such that no portion of any staff or ancillary person's body, except the extremities, will be exposed to the unattenuated scattered radiation emanating from above the tabletop unless: (5-5-81)

i. That individual is at least one hundred twenty (120) cm from the center of the useful beam; (5-5-81)

ii. The radiation has passed through not less than twenty-five hundredths (0.25) mm lead equivalent material, such as drapes, Bucky-slot cover, sliding or folding panel, or self-supporting curtains, in addition to any lead equivalency provided by the protective apron referred to in Subsection 203.01.d.; (12-31-91)

iii. Upon application to the Radiation Control Agency with adequate justification, exceptions to Subsection 205.09. may be made in some special procedures where a sterile field will not permit the use of the normal protective barriers or where the protective barriers would interfere with the procedures. (12-31-91)

206. RADIOGRAPHIC SYSTEMS OTHER THAN FLUOROSCOPIC, DENTAL INTRAORAL, OR VETERINARIAN SYSTEMS.
For those radiographic systems, other then fluoroscopic, dental intraoral or veterinarian systems, the following requirements must be met: (5-5-81)

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01. Beam Limitation. The useful beam must be limited to the area of clinical interest. (5-5-81)

a. General Purpose Stationary and Mobile X-ray Systems: (12-31-91)

i. In regard to variable x-ray field limitations, there must be provided a means for stepless adjustment of the size of the x-ray field. (12-1-87)

ii. Means must be provided for visually defining the perimeter of the x-ray field. The total misalignment of the edges of the visually defined field with the respective edges of the x-ray field along either the length or width of the visually defined field must not exceed two percent (2%) of the distance from the source to the center of the visually defined field when the surface upon which it appears is perpendicular to the axis of the x-ray beam. (5-5-81)

iii. The Radiation Control Agency may grant an exemption on noncertified x-ray systems to Subsections 206.01.a.i. and 206.01.a.ii. provided the registrant makes a written application for such exemption and in that application: (12-31-91)

(a) Demonstrate it is impractical to comply with Subsections 206.01.a.i. and 206.01.a.ii; and (12-31-91)

(b) The purpose of Subsections 206.01.a.i. and 206.01.a.ii. will be met by other methods. (12-31-91)

b. In addition to the requirements of Subsection 206.01.a., all stationary general purpose x-ray systems must meet the following requirements: (12-31-91)

i. Means must be provided to indicate when the axis of the x-ray beam is perpendicular to the plane of the image receptor, to align the center of the x-ray field with respect to the center of the image receptor to within two percent (2%) of the SID, and to indicate the SID to within two percent (2%); (5-5-81)

ii. The beam-limiting device must numerically indicate the field size in the plane of the image receptor to which it is adjusted; (5-5-81)

iii. Indication of field size dimensions and SID's must be specified in inches and/or centimeters, and must be such that aperture adjustments result in x-ray field dimensions in the plane of the image receptor which correspond to those of the image receptor to within two percent (2%) of the SID when the beam axis is perpendicular to the plane of the image receptor. (5-5-81)

c. Radiographic equipment designed for only one (1) image receptor size at a fixed SID must be provided with means to limit the field at the plane of the image receptor to dimensions no greater than those of the image receptor, and to align the center of the x-ray field with the center of the image receptor to within two percent (2%) of the SID or must be provided with means to both size and align the x-ray field such that the x-ray field at the plane of the image receptor does not extend beyond any edge of the image receptor. (12-1-87)

d. Radiographic systems designed only for mammography and general purpose radiographic systems, when special attachments for mammography are in service, must be provided with means to limit the useful beam such that the x-ray field at the plane of the image receptor does not extend beyond any edge of the image receptor at any designated SID except the edge of the image receptor designed to be adjacent to the chest wall where the x-ray field may not extend beyond this edge by more than two percent (2%) of the SID. This requirement can be met with a system which performs as prescribed in Subsection 206.01.g. When the beam-limiting device and image receptor support device are designed to be used to immobilize the breast during a mammographic procedure and the SID may vary, the SID indication specified in Subsections 206.01.g.i. and 206.01.g.ii. must be the maximum SID for which the beam-limiting device or aperture is designed. In addition, each image receptor support intended for installation on a system designed only for mammography must have clear and permanent markings to indicate the maximum image receptor size for which it is designed. (12-31-91)

e. Special purpose x-ray systems will be provided with means to limit the x-ray field in the plane of

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the image receptor so that such field does not exceed each dimension of the image receptor by more than two percent (2%) of the SID when the axis of the x-ray beam is perpendicular to the plane of the image receptor. (5-5-81)

f. Additionally, special purpose x-ray systems will be provided with means to align the center of the x-ray field with the center of the image receptor to within two percent (2%) of the SID or means must be provided to both size and align the x-ray field such that the x-ray field at the plane of the image receptor does not extend beyond any edge of the image receptor. (12-1-87)

g. Requirements of Subsections 206.01.e. and 206.01.f. can be met with a system that meets the requirements for a general purpose x-ray system as specified in Subsection 206.01.a. or, when alignment means are also provided, can be met by compliance with either of the following two (2) provisions: (12-31-91)

i. An assortment of removable, fixed-aperture, beam-limiting devices sufficient to meet the requirement for each combination of image receptor size and SID for which the unit is designed; each such device must have clear and permanent markings to indicate the image receptor size and SID for which it is designed; or (5-5-81)

ii. A beam-limiting device having multiple fixed apertures sufficient to meet the requirement for each combination of image receptor size and SID for which the unit is designed. Permanent, clearly legible markings must indicate the image receptor size and SID for which each aperture is designed and must indicate which aperture is in position for use. (5-5-81)

02. Radiation Exposure Control Devices. (5-5-81)

a. A means, such as a timer, must be provided to terminate the exposure at a preset time interval, at a preset product of current and time, at a preset number of pulses, or at a preset radiation exposure to the image receptor. In addition: (5-5-81)

i. Termination of exposure must cause automatic resetting of the timer to its initial setting or to zero (0); (5-5-81)

ii. It must be impossible to make an exposure when the timer is set to a zero (0) or "off" position, if either position is provided. (5-5-81)

b. X-ray Control (Exposure Switch): (5-5-81)

i. A control must be incorporated into each x-ray system such that an exposure can be terminated at any time except for: (5-5-81)

(a) Exposure of one-half (1/2) second or less; or (5-5-81)

(b) During serial radiography when means must be provided to permit completion of any single exposure of the series in process. (5-5-81)

ii. Each x-ray control must be located for stationary x-ray systems in such a way as to be permanently mounted in a protected area so that the operator is required to remain in that protected area during the entire exposure. (5-5-81)

iii. X-ray controls for mobile and portable x-ray systems: (12-31-91)

(a) If used for greater than one (1) week in one (1) location, such as one (1) room or suite, must meet the requirements of Subsections 106.02.a. and 106.02.b.; (12-31-91)

(b) If used for more than one (1) hour and less than one (1) week at one (1) location, such as one room, or suite, must meet the requirement of Subsection 206.02.b.iii.(a) or be provided with a six and one-half (6.5) foot high protective barrier which is placed at least six (6) feet from the tube housing assembly and at least six (6) feet from the patient; (12-31-91)

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(c) If used to make an exposure of only one (1) patient at the use location, must meet the requirement of Subsections 206.02.b.iii.a. or 206.02.b., or be provided with a method of control which will permit the operator to be at least twelve (12) feet from the tube head assembly during an exposure. (12-31-91)

iv. The x-ray control must provide visual indication observable at or from the operator's protected position whenever x-rays are produced. In addition, a signal audible to the operator must indicate that the esposure has terminated. (12-1-87)

c. When an automatic exposure control, such as a phototimer, is provided: (5-5-81)

i. Indication must be made on the control panel when this mode of operation is selected; (5-5-81)

ii. When the x-ray tube potential is equal to or greater than fifty (50) kVp, the minimum exposure time for field emission equipment rated for pulsed operation must be equal to or less than a time interval equivalent to two (2) pulses; (5-5-81)

iii. The minimum exposure time for all equipment, other than that specified in Subsection 206.02.c.ii., must be equal to or less than one-sixtieth (1/60) second or a time interval required to deliver five (5) mAs, whichever is greater; (12-31-91)

iv. Either the product or peak x-ray tube potential, current and exposure time must be limited to not more than sixty (60) kWs per exposure or the product of x-ray tube current and exposure time must be limited to not more than six hundred (600) mAs per exposure, except when the x-ray tube potential is less than fifty (50) kVp, in which case the product of x-ray tube current and exposure time must be limited to not more than two thousand (2000) mAs per exposure; (5-5-81)

v. A visible signal must indicate when an exposure has been terminated at the limits described in Subsection 206.02.c.iv., and manual resetting must be required before further automatically timed exposures can be made. (12-31-91)

d. When four (4) timer tests are performed, at identical timer settings, the average time period (T) will be greater than five (5) times the maximum period (Tmax) less the minimum period (Tmin). T must be equal to or less than five-tenths (0.5) seconds. (5-5-81)

03. Source-to-Skin Distance. All radiographic systems must be provided with a durable, securely fastened means to limit the source-to-skin distance to not less than thirty (30) centimeters. This can be met when the collimator or cone provides the required limits. (12-1-87)

04. Exposure Reproducibility. The coefficient of variation of exposure must not exceed one-twentieth (0.05) when all technique factors are held constant. This requirement will be deemed to have been met if, when four (4) exposures are made at identical technique factors, the value of the average exposure (E) is greater than or equal to five (5) times the maximum exposure (Emax) minus the minimum exposure (Emin): E >5(Emax-Emin). (12-1-87)

05. Standby Radiation From Capacitor Energy Storage Equipment. Radiation emitted from the x-ray tube when the exposure switch or timer is not activated must not exceed a rate of two (2) milliroentgens per hour at five (5) centimeters from any accessible surface of the diagnostic source assembly, with the beam-limiting device fully open. (5-5-81)

06. Additional Requirements Applicable to Certified Systems Only. Diagnostic x-ray systems incorporating one (1) or more certified components will be required to comply with the following requirements which relate to that certified component in addition to other applicable requirements of these regulations. (12-1-87)

a. When the equipment is operated on an adequate power supply as specified by the manufacturer in accordance with the requirements of applicable federal standards, the estimated coefficient of variation of radiation exposures must be no greater than five one-hundredths (0.05). (12-1-87)

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b. When the equipment allows a choice of x-ray tube current settings and is operated on a power supply as specified by the manufacturer in accordance with the requirements of applicable federal standards, for any fixed x-ray to be potential within the range of forty (40) to one hundred (100) percent of the maximum rating, the average ratios of exposure to the indicated milliampere-seconds product, mR/mAs, obtained at any two (2) consecutive tube current settings must not differ by more than $[\overline{X}_1 - \overline{X}_2] < 0.10(X_1 \text{ Plus } X_2)$, where X_1 and X_2 are the average mR/mAs (microcoulomb/kilogram per mAs) one-tenth (0.10) times their sum. (12-1-87)

c. Deviation of technique factors from indicated values must not exceed the limits provided for that system by its manufacturer. (5-5-81)

d. Beam Limitation for Stationary and Mobile General Purpose X-ray Systems. (5-5-81)

i. There must be provided a means of stepless adjustment of the size of the x-ray field. The minimum field size at an SID of one hundred (100) centimeters must be equal to or less than five (5) by five (5) centimeters. (12-1-87)

ii. When a light localizer is used to define the x-ray field, it must provide an average illumination of not less than one hundred sixty (160) lux, that is, fifteen (15) footcandles, at one hundred (100) centimeters or at the maximum SID, whichever is less. The average illumination will be based upon measurements made in the approximate center of each quadrant of the light field. Radiation therapy simulation systems manufactured on or after May 27, 1980, are exempt from this requirement. (12-1-87)

iii. The edge of the light field at one hundred (100) centimeters or at the maximum SID, whichever is less, must have a contrast ratio, corrected for ambient lighting, of not less than four (4) in the case of beam-limiting devices designed for use on stationary equipment, and a contrast ratio of not less than three (3) in the case of beam-limiting devices designed for use on mobile equipment. The contrast ratio is defined in I_1 I_2 where I_1 is the illumination three (3) millimeters from the edge of the light field toward the center of the field; and I_2 is the illumination three (3) millimeters from the edge of the light field away from the center of the field. Compliance will be determined with a measuring instrument-aperture of one (1) millimeter in diameter. (5-5-81)

e. Beam limitation for portable x-ray systems must meet the field limitation requirements of Subsection 206.01.a. and 206.06.f. (12-31-91)

f. Field Limitation and Alignment on Stationary General Purpose X-ray Systems. For stationary, general purpose x-ray systems which contain a tube housing assembly, an x-ray control and, for those systems so equipped, a table, all certified in accordance with 21 CFR 1020.30(c): (12-1-87)

i. Means must be provided for positive beam limitation which will, at the SID for which the device is designed, either cause automatic adjustment of the x-ray field in the plane of the image receptor to the image receptor size within five (5) seconds after insertion of the image receptor or, if adjustment is accomplished automatically in a time interval greater than five (5) seconds or is manual, will prevent production of x-rays until such adjustment is completed. At SID's at which the device is not intended to operate, the device will prevent the production of x-rays. (5-5-81)

ii. The x-ray field size in the plane of the image receptor, whether automatically or manually adjusted, will be such that neither the length nor the width of the x-ray field differs from that of the image receptor by greater than three percent (3%) of the SID and that the sum of the length and width differences without regard to sign be no greater than four percent (4%) of the SID when the equipment indicates that the beam axis is perpendicular to the plane of the image receptor. (5-5-81)

iii. The radiographic system must be capable of operation, at the discretion of the operator, such that the field size at the image receptor can be adjusted to a size smaller than the image receptor. The minimum field size at a distance of one hundred (100) centimeters must be equal to or less than five (5) by five (5) centimeters. Return to positive beam limitation as defined in Subsections 206.06.f.i. and 206.06.f.ii. will occur upon a change in image receptor. (12-31-91)

iv. Positive beam limitation can be bypassed when radiography is conducted which does not use the

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cassette tray or permanently mounted vertical cassette holder, or when either the beam axis or table angulation is not within ten (10) degrees of the horizontal or vertical during any part of the exposure, or during stereoscopic radiography. If the bypass mode is provided, return to positive beam limitation will be automatic. (5-5-81)

v. A capability can be provided for overriding positive beam limitation in the event of system failure or to perform special procedures which cannot be performed in the positive mode. If so provided, a key will be required to override the positive mode. It must be impossible to remove the key while the positive mode is overridden. (5-5-81)

g. Timers. Except for dental panoramic systems, termination of exposure must cause automatic resetting of the timer to its initial setting or to "zero." (12-1-87)

h. Transmission Limit for Image Receptor Supporting Devices Used for Mammography. For x-ray systems manufactured after September 5, 1978, which are designed only for mammography, the transmission of the primary beam through any image receptor support provided with the system must be limited such that the exposure five (5) centimeters from any accessible surface beyond the plane of the image receptor supporting device does not exceed 0.1 milliroentgen for each activation of the tube. Exposure must be measured with the system operated at the minimum SID for which it is designed. Compliance must be determined at the maximum rated peak tube potential for the system and at the maximum rated product of tube current and exposure time (mAs) for that peak tube potential. Compliance must be determined by measurements averaged over an area of one hundred (100) square centimeters with no linear dimension greater than twenty (20) centimeters. (12-1-87)

207. INTRAORAL DENTAL RADIOGRAPHIC SYSTEMS.
In addition to the provisions of Sections 203. and 204. the requirements of Section 207. apply to x-ray equipment and associated facilities used for dental radiography. (See Section 206. for criteria for extraoral dental radiographic systems.) (12-31-91)

01. Source-to-Skin Distance. X-ray systems designed for use with an intraoral image receptor must be provided with means to limit source-to-skin distance to not less than: (5-5-81)

a. Eighteen (18) centimeters if operable above fifty (50) kilovolts peak; (5-5-81)

b. Ten (10) centimeters if not operable above fifty (50) kilovolts peak. (5-5-81)

02. Field Limitation. (5-5-81)

a. Radiographic systems designed for use with an intraoral image receptor must be provided with means to limit the x-ray beam such that: (5-5-81)

i. If the minimum source-to-skin distance (SSD) is eighteen (18) centimeters or more, the x-ray field, at the minimum SSD, must be containable in a circle having a diameter of no more than seven (7) centimeters; and (5-5-81)

ii. If the minimum SSD is less than eighteen (18) centimeters, the x-ray field, at the minimum SSD, must be containable in a circle having a diameter of no more than six (6) centimeters. (5-5-81)

b. An open ended shielded position indicating device must be used. The shielding must be equivalent to that required for the diagnostic source assembly in Subsection 204.03. (12-31-91)

c. Units installed previous to the effective date of these regulations will be exempted from Subsection 207.02.b. (12-31-91)

03. Timers. A means, such as a timer, must be provided to terminate the exposure at a preset time interval, at a preset product of current and time, at a preset number of pulses, or at a preset radiation exposure to the image receptor. In addition: (5-5-81)

a. Termination of exposure must cause automatic resetting of the timer to its initial setting or to zero

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(0); and (5-5-81)

b. It must not be possible to make an exposure when the timer is set to a zero (0) or "off" position, if either position is provided; and (5-5-81)

c. When four (4) timer tests taken at identical timer settings are performed, the average time period (T) must be greater than five (5) times the maximum period (Tmax) less the minimum period (Tmin). T must be less than or equal to five (5) seconds. (5-5-81)

04. X-ray Control (Exposure Switch). (5-5-81)

a. A control must be incorporated into each x-ray system such that an exposure can be terminated at any time, except for exposures of one-half (1/2) second or less. (5-5-81)

b. Each x-ray control must be located in such a way as to meet the following criteria: (5-5-81)

i. Stationary x-ray systems must have the control switch permanently mounted in a protected area so that the operator is required to remain in that protected area during the entire exposure; and (5-5-81)

ii. Mobile and portable x-ray systems which are: (5-5-81)

(a) Used for greater than one (1) week in one (1) location must meet the requirements of Subsection 207.04.b.i.; or (12-31-91)

(b) Used for more than one (1) hour and less than one (1) week at one (1) location must meet the requirements of Subsection 207.04.b.ii.(a) or be provided with a six and one-half (6.5) foot high protective barrier which is placed at least six (6) feet from the tube housing assembly and at least six (6) feet from the patient; or (12-31-91)

(c) Used to make an exposure(s) of only one (1) patient at the use location must meet the requirement of Subsections 207.04.b.ii.(a) or 207.04. b.ii.(b), or be provided with a method of control which will permit the operator to be at least twelve (12) feet from the tube head assembly during an exposure. (12-31-91)

c. The x-ray control must provide visual indication observable at or from the operator's protected position whenever x-rays are produced. In addition, a signal audible to the operator must indicate that the exposure has terminated. (12-1-87)

d. When dental units are installed in adjacent rooms or areas, protective barriers must be provided between the rooms or areas. (5-5-81)

05. Exposure Reproducibility. The exposure produced must be reproducible to within the following criteria: When all technique factors are held constant, the coefficient of variation must not exceed one-tenth (0.10). This will be deemed to have been met when four (4) exposures at identical technique factors are made and the value of the average exposure (E) is equal to or greater than five (5) times the maximum exposure (Emax) minus the minimum exposure (Emin) E >5(Emax-Emin). (12-1-87)

06. Operating Controls. (5-5-81)

a. Patient and film holding devices must be used when the techniques permit. The safety rules, required by Subsection 203.01., must list individual projections where holding devices cannot be utilized. (12-31-91)

b. Neither the tube housing nor the position indicating device can be hand held during an exposure. (5-5-81)

c. The x-ray system must be arranged and operated in such a manner that the useful beam at the patient's skin does not exceed the dimensions specified in Subsection 207.02.a. (12-31-91)

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d. Dental fluoroscopy without image intensification is prohibited. (12-1-87)

07. Additional Requirements Applicable to Certified Systems Only. Only diagnostic x-ray systems incorporating one (1) or more certified components will be required to comply with the following requirements which relate to that certified component in addition to other applicable requirements of these regulations. (5-5-81)

a. Regarding reproducibility, Subsection 207.07.b. will apply when the equipment is operated on an adequate power supply as specified by the manufacturer. (12-31-91)

b. For any specific combination of selected technique factors, the estimated coefficient of variation or radiation exposures must be no greater than five one-hundredths (0.05). (5-5-81)

c. Regarding linearity, Subsection 207.07.d. applies when the equipment allows a choice of x-ray tube current settings and is operated on a power supply as specified by the manufacturer in accordance with the requirements of 21 CFR 1000 for any fixed x-ray tube potential within the range of forty percent (40%) to one hundred percent (100%) of the maximum rated. (5-5-81)

d. The average ratios of exposure to the indicated milliampere-seconds product (mR/mAs) obtained at any two (2) consecutive tube current settings must not differ by more than one-tenth (0.10) times their sum. (5-5-81)

e. To insure accuracy, deviation of technique factors from indicated values must not exceed the limits provided for that system by its manufacturer. (5-5-81)

f. All certified dental x-ray systems manufactured on and after December 1, 1980, must have a minimum half-value layer not less than 1.5 millimeters aluminum equivalent. Systems operating above 70 kVp are subject to the filtration requirements of Subsection 204.03.a. (12-31-91)

208. VETERINARY MEDICINE RADIOGRAPHIC INSTALLATIONS.

01. Equipment. (7-1-93)

a. The protective tube housing must be of diagnostic type. (5-5-81)

b. Diaphragms or cones must be provided for collimating the useful beam to the area of clinical interest and must provide the same degree of protection as is required of the housing. (5-5-81)

c. The total filtration permanently in the useful beam must not be less than five-tenths (0.5) millimeters aluminum equivalent for machines operating up to fifty (50) kVp, one and one-half (1.5) millimeters aluminum equivalent for machines operating between fifty to seventy (50-70) kVp, and two and one-half (2.5) millimeters aluminum equivalent for machines operating above seventy (70) kVp. (5-5-81)

d. A device must be provided to terminate the exposure after a preset time or exposure. (5-5-81)

e. A dead-man type of exposure switch must be provided, together with an electrical cord of sufficient length, so that the operator can stand out of the useful beam and at least six (6) feet from the animal during all x-ray exposures. (5-5-81)

02. Structural Shielding. All wall, ceiling, and floor areas will be equivalent to or provided with applicable protective barriers as required in Subsections 110.01., 110.04. and 110.05. (12-31-91)

03. Operating Procedures. (5-5-81)

a. The operator must stand well away from the useful beam and the animal during radiographic exposures. (5-5-81)

b. No individual other than the operator can be in the x-ray room while exposures are being made

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unless such individual's assistance is required. (5-5-81)

c. When an animal must be held in position during radiography, mechanical supporting or restraining devices can be used. If the animal must be held by an individual, that individual must be protected with appropriate shielding devices, such as protective gloves and apron, and he must be so positioned that no part of his body will be struck by the useful beam. The exposure of any individual used for this purpose must be monitored. (5-5-81)

04. Veterinary Medicine Therapeutic X-ray Installations. All of the requirements for equipment, installation, construction and operation contained in Sections 209. and 210. are effective as applicable to veterinary practice. (12-31-91)

209. THERAPEUTIC X-RAY INSTALLATIONS.

01. Therapeutic X-Ray Systems of Less Than One MeV. (5-5-81)

a. Equipment requirements are as follows: (12-1-87)

i. When the tube is operated at its leakage technique factors, the leakage radiation must not exceed the value specified at the distance specified for the classification of that x-ray system. (12-1-87)

(a) In contact therapy systems leakage radiation shall not exceed one hundred (100) milliroentgens per hour at five (5) centimeters from the surface of the tube housing assembly. (12-1-87)

(b) In 0-150 kVp systems which were manufactured or installed prior to the effective date of these regulations must have a leakage radiation which does not exceed one (1) roentgen in one (1) hour at one (1) meter from the source. (12-1-87)

(c) In 0-150 kVp systems which are manufactured on or after the effective date of these regulations must have a leakage radiation which does not exceed one hundred (100) milliroentgens in one (1) hour at one (1) meter from the source. (12-1-87)

(d) In 151-999 kVp systems the leakage radiation must not exceed one (1) roentgen in one (1) hour at one (1) meter from the source except systems that operate in excess of five hundred (500) kVp may have a leakage radiation at one (1) meter from the source not to exceed one-tenth of one percent (0.1%) of the useful beam one (1) meter from the source. (12-1-87)

ii. Permanent fixed diaphragms or cones used for limiting the useful beam must provide the same or a higher degree of protection as required for the tube housing assembly. (12-1-87)

iii. Removable and adjustable beam limiting devices are as follows: (12-1-87)

(a) Removable beam limiting devices must, for the portion of the useful beam to be blocked by these devices, transmit not more than one percent (1%) of the useful beam at the maximum kilovoltage and maximum treatment filter. This requirement does not apply to auxiliary blocks or materials placed in the useful beam to shape the useful beam to the individual patient. (12-1-87)

(b) Adjustable beam limiting devices installed after the effective date of these regulations must meet the requirements of Subsection 209.01.a.iii.(a). (12-31-91)

(c) Adjustable beam limiting devices installed before the effective date of these regulations must, for the portion of the x-ray beam to be blocked by these devices, transmit not more than five percent (5%) of the useful beam at the maximum kilovoltage and maximum treatment filter. (12-1-87)

iv. The filter system must be so designed that: (12-1-87)

(a) The filters cannot be accidentally displaced at any possible tube orientation; (12-1-87)

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(b) The radiation at five (5) centimeters from the filter insertion slot opening does not exceed thirty (30) roentgens per hour under any operating conditions; and (12-1-87)

(c) Each filter is marked as to its material of construction and its thickness. For wedge filters, the wedge angle must appear on the wedge or wedge tray. (12-1-87)

v. The tube housing assembly must be capable of being immobilized for stationary treatments. (12-1-87)

vi. The tube housing assembly must be so marked that it is possible to determine the location of the focal spot to within five (5) millimeters, and such markings must be readily accessible for use during calibration procedures. (12-1-87)

vii. Contact therapy tube housing assemblies must have a removable shield of at least five-tenths (0.5) millimeter lead equivalency at one hundred (100) kVp that can be positioned over the entire useful beam exit port during periods when the beam is not in use. (12-1-87)

viii. Systems of greater than one hundred fifty (150) kVp manufactured after the effective date of these regulations must be provided with a beam monitor system which: (12-1-87)

(a) Has the detector of the monitor system interlocked to prevent incorrect positioning; (12-1-87)

(b) Does not allow irradiation until a preselected value of exposure has been made at the treatment control panel; (12-1-87)

(c) Independently terminates irradiation when the preselected exposure has been reached; (12-1-87)

(d) Is so designed that, in the event of a system malfunction or electrical power failure, the dose administered to a patient prior to the system malfunction or power failure can be accurately determined; (12-1-87)

(e) Has a display at the control panel from which the dose at a reference point in soft tissue can be calculated; (12-1-87)

(f) Has a control panel display which maintains the administered dose reading until intentionally reset to zero; and (12-1-87)

(g) Has a control panel display which does not have scale multiplying factors and utilizes a design such that increasing dose is displayed by increasing numbers. (12-1-87)

ix. The requirements for a timer are: (12-1-87)

(a) A timer which has a display must be provided at the treatment control panel. The timer must have a pre-set time selector and an elapsed time indicator. (12-1-87)

(b) The timer must be a cumulative timer which activates with the production of radiation and retains its reading after irradiation is interrupted or terminated. After irradiation is terminated and before irradiation can be reinitiated, it must be necessary to reset the elapsed time indicator to zero (0). (12-1-87)

(c) The timer must terminate irradiation when a preselected time has elapsed if any dose monitoring system present has not previously terminated irradiation. (12-1-87)

(d) The timer must permit accurate presetting and determination of exposure times as short as one (1) second. (12-31-91)

(e) The timer must not permit an exposure if set at zero (0). (12-1-87)

(f) The timer must not activate until the shutter is opened when irradiation is controlled by a shutter

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mechanism. (12-1-87)

x. The control panel, in addition to the displays required in other provisions of Section 209. must have: (12-31-91)

(a) An indication of whether electrical power is available at the control panel and if activation of the x-ray tube is possible; (12-1-87)

(b) An indication of whether x-rays are being produced; (12-1-87)

(c) Means for indicating x-ray tube potential and current; (12-1-87)

(d) Means for terminating an exposure at any time; (12-1-87)

(e) A locking device which will prevent unauthorized use of the x-ray system; and (12-1-87)

(f) For x-ray systems manufactured after the effective date of these regulations, a positive display of specific filter(s) in the beam. (12-1-87)

xi. When a control panel may energize more than one (1) x-ray tube: (12-1-87)

(a) It must be possible to activate only one (1) x-ray tube at any time. (12-1-87)

(b) There must be an indication at the control panel identifying which x-ray tube is energized. (12-1-87)

(c) There must be an indication at the tube housing assembly when that tube is energized. (12-1-87)

xii. There must be means of determining the source-to-skin distance (SSD) to within one (1) centimeter. (12-1-87)

xiii. Unless it is possible to bring the x-ray output to the prescribed exposure parameters within five (5) seconds, the beam must be automatically attenuated by a shutter having a lead equivalency not less than that of the tube housing assembly. In addition: (12-1-87)

(a) After the unit is at operating parameters, the shutter must be controlled electrically by the operator from the control panel; and (12-1-87)

(b) An indication of shutter position must appear at the control panel. (12-1-87)

xiv. Each x-ray system equipped with a beryllium or other low-filtration window must be clearly labeled as such upon the tube housing assembly and at the control panel. (12-1-87)

02. Facility Design Requirement for X-Ray Systems Capable of Operating Above Fifty kVp. (12-1-87)

a. Provision must be made for two-way aural communication between the patient and the operator at the control panel. However, where excessive noise levels or treatment requirements make aural communication impractical, other methods of communication must be used. (12-1-87)

b. The requirements for viewing systems are as follows: (12-1-87)

i. Windows, mirrors, closed-circuit television, or an equivalent system must be provided to permit continuous observation of the patient during irradiation and must be so located that the operator can observe the patient from the control panel. (12-1-87)

ii. When the primary viewing system is by electronic means, an alternate viewing system, which may

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be electronic, must be available for use in the event of failure of the primary viewing system. (12-1-87)

c. Additional requirements for X-ray systems capable of operation above 150 kVp. (12-1-87)

i. All protective barriers must be fixed except for entrance door or beam interceptors. (12-1-87)

ii. The control panel must be located outside the treatment room. (12-1-87)

iii. Entrance interlocks shall be provided such that all entrance doors must be closed before treatment can be initiated or continued. If the radiation beam is interrupted by any door opening, it must not be possible to restore the machine to operation without closing the door and reinitiating irradiation by manual action at the control panel. (12-1-87)

iv. When any door referred to in Subsection 209.02.c.iii. is opened while the x-ray tube is activated, the exposure at a distance of one (1) meter from the source shall be reduced to less than one hundred (100) milliroentgens per hour. (12-31-91)

03. Operating Procedures. (12-1-87)

a. X-ray systems must not be left unattended unless the system is secured against unauthorized use. (12-1-87)

b. When a patient must be held in position for radiation therapy, mechanical supporting or restraining devices must be used. (12-1-87)

c. The tube housing assembly must not be held by hand during operation unless the system is designed to require such holding and the peak tube potential of the system does not exceed fifty (50) kVp. In such cases, the holder must wear protective gloves and apron of not less than five-tenths (0.5) mm lead equivalency at one hundred (100) kVp. (12-1-87)

d. No individual other than the patient may be in the treatment room unless such individual is protected by a barrier sufficient to meet the requirements of Section 110. No individual other than the patient may be in the treatment room during exposures from x-ray systems operating above one hundred fifty (150) kVp. (12-1-87)

e. The x-ray system must not be used in the administration of radiation therapy unless the requirements of Subsections 209.03. and 209.05.e. have been met. (12-31-91)

04. Surveys. (12-1-87)

a. All new facilities, and existing facilities not previously surveyed, must have a survey made by, or under the direction of a qualified expert. In addition, such surveys must be done after any change in the facility or equipment which might produce a significant increase in radiation hazard. (12-1-87)

b. The registrant must obtain a written report of the survey from the qualified expert and a copy of the report must be transmitted by the registrant to the Radiation Control Agency within thirty (30) days of receipt of the report. (12-1-87)

c. The survey and report must indicate all instances where the installation, in the opinion of the qualified expert, is in violation of applicable regulations. (12-1-87)

05. Calibrations. (12-1-87)

a. The calibration of an x-ray system must be performed at intervals not to exceed one (1) year and after any change or replacement of components which could cause a change in the radiation output. (12-1-87)

b. The calibration of the radiation output of the x-ray system must be performed by or under the direction of a qualified expert who is physically present at the facility during such calibration. (12-1-87)

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c. Calibration of the radiation output of an x-ray system must be performed with a calibrated dosimetry system. The calibration of such system must be traceable to a national standard. The system must have been calibrated within the preceding two (2) years. (12-1-87)

d. The calibration must be such that the dose at a reference point in soft tissue can be calculated to within an uncertainty of five percent (5%). (12-1-87)

e. The calibration of the x-ray system may include, but not be limited to, the following determinations: (12-1-87)

i. Verification that the x-ray system is operating in compliance with the design specifications; (12-1-87)

ii. The exposure rates as a function of field size, technique factors, filter, and treatment distance used; (12-1-87)

iii. The degree of congruence between the radiation field and the field indicated by the localizing device if such device is present; and (12-1-87)

iv. An evaluation of the uniformity of the largest radiation field used. (12-1-87)

f. Records of calibration must be maintained by the registrant for five (5) years after completion of the calibration. (12-1-87)

g. A copy of the most recent x-ray system calibration must be available at or in the area of the control panel. (12-1-87)

06. Spot Checks. Spot checks must be performed on x-ray systems capable of operation at greater than one hundred fifty (150) kVp. Such spot-checks must meet the following requirements: (12-1-87)

a. The spot-check procedures must be in writing and shall have been developed by a qualified expert. A copy of the procedures must be submitted to the Radiation Control Agency prior to its implementation. (12-1-87)

b. If a qualified expert does not perform the spot-check measurement, the results of the spot-check measurements must be reviewed by a qualified expert within fifteen (15) days. (12-1-87)

c. The spot-check procedures must specify the frequency at which tests or measurements are to be performed. The spot-check procedures must specify that the spot-checks shall be performed during the calibration specified in Subsection 209.05. The acceptable tolerance for each parameter measured in the spot-check when compared to the value for that parameter determined in the calibration specified in Subsection 209.05. must be stated. (12-31-91)

d. The cause for a parameter exceeding a tolerance set by the qualified expert must be investigated and corrected before the system is used for patient irradiation. (12-1-87)

e. Whenever a spot-check indicates a significant change in the operating characteristics of a system, as specified in the qualified expert's spot-check procedures, the system must be recalibrated as required in Subsection 209.05. (12-31-91)

f. Records of spot-check measurements must be maintained by the registrant for two (2) years after completion of the spot-check measurements and any necessary corrective actions. (12-1-87)

g. Where a spot-check involves a radiation measurement, such measurement must be obtained using a system satisfying the requirements of Subsection 209.05. or which has been intercompared with a system meeting those requirements within the previous year. (12-31-91)

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210. X-RAY AND ELECTRON THERAPY SYSTEMS WITH ENERGIES OF ONE MeV AND ABOVE. Section 350. except Subsections 354.06.c. and 354.06.d, shall apply to medical facilities using therapy systems with energies one (1) MeV and above. (12-31-91)

01. Requirements for Equipment. (12-1-87)

a. Leakage radiation to the patient area. (12-1-87)

i. Equipment built after the effective date of these regulations shall meet the following requirements: (12-1-87)

(a) For operating conditions producing maximum leakage radiation, the absorbed dose in rads due to leakage radiation, including x-rays, electrons, and neutrons, at any point in a circular plane of two (2) meters radius centered on and perpendicular to the central axis of the beam at the isocenter or normal treatment distance and outside the maximum useful beam size must not exceed one-tenth of one percent (0.1%) of the maximum absorbed dose in rads of the unattenuated useful beam measured at the point of intersection of the central axis of the beam and the plane surface. Measurements excluding those for neutrons may be averaged over an area up to but not exceeding one hundred (100) square centimeters at the positions specified. Measurements of the portion of the leakage radiation dose contributed by neutrons may be averaged over an area up to but not exceeding two hundred (200) square centimeters. (12-1-87)

(b) For each system, the registrant must determine or obtain documentation from the manufacturer the leakage radiation existing at the positions specified in Subsection 210.01.a.i.(a). for the specified operating conditions. Records on leakage radiation measurements must be maintained for inspection by the Radiation Control Agency. (12-31-91)

ii. Equipment installed before the effective date of these regulations shall meet the following requirements: (12-1-87)

(a) For operating conditions producing maximum leakage radiation, the absorbed dose in rads due to leakage radiation excluding neutrons at any point in a circular plane of two (2) meters radius centered on a perpendicular to the central axis of the beam one (1) meter from the virtual source, and outside the maximum size useful beam, shall not exceed one-tenth of one percent (0.1%) of the maximum absorbed dose in rads of the unattenuated useful beam measured at the point of intersection of the central axis of the beam and the surface of the circular plane. Measurements shall be averaged over an area up to but not exceeding one hundred (100) square centimeters at the positions specified. (12-1-87)

(b) For each system, the registrant shall determine or obtain documentation from the manufacturer the leakage radiation existing at the positions specified in Subsection 210.01.a.11.(a) for the specified operating conditions. Records on radiation leakage must be maintained for inspection by the Radiation Control Agency. (12-31-91)

b. Leakage radiation outside the patient area for equipment installed after the effective date of these regulations: (12-1-87)

i. The absorbed dose in rads due to leakage radiation except in the area specified in Subsection 210.01.a.i.(a) when measured at any point one (1) meter from the path of the charged particle, before the charged particle strikes the target or window, must not exceed one-tenth of one percent (0.1%) for x-ray leakage nor five hundredths of one percent (0.05%) for neutron leakage of the maximum absorbed dose in rads of the unattenuated useful beam measured at the point of intersection of the central axis of the beam and the circular plane specified in Subsection 210.01.a.i.(a). (12-31-91)

ii. The registrant must determine or obtain documentation from the manufacturer, the actual leakage radiation existing at the positions specified in Subsection 210.01.b.i. for specified operating conditions. Radiation measurements excluding neutrons must be averaged over an area up to but not exceeding one hundred (100) square centimeters. Neutron measurements may be averaged over an area up to but not exceeding two hundred (200) square centimeters. (12-31-91)

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c. Adjustable or interchangeable beam limiting devices must be provided, and such devices must transmit no more than two percent (2%) of the useful beam at the normal treatment distance for the portion of the useful beam which is to be attenuated by the beam limiting device. The neutron component of the useful beam shall not be included in this requirement. (12-1-87)

d. The requirements for filters are as follows: (12-1-87)

i. Each filter which is removable from the system must be clearly marked with an identification number. Documentation available at the control panel must contain a description of the filter. For wedge filters, the wedge angle shall appear on the wedge or wedge tray. (12-1-87)

ii. If the absorbed dose rate data required by Subsection 210.01.p. relates exclusively to operation with a field flattening or beam scattering filter in place, such filter must be readily removable only by the use of tools. (12-31-91)

iii. For equipment installed after the effective date of these regulations which utilizes a system of wedge filters, interchangeable field flattening filters, or interchangeable beam scattering filters: (12-31-91)

(a) Irradiation must not be possible until a selection of a filter has been made at the treatment control panel; (12-1-87)

(b) An interlock system must be provided to prevent irradiation if the filter selected is not in the correct position; (12-1-87)

(c) A display must be provided at the treatment control panel showing the filter(s) in use; and (12-1-87)

(d) An interlock must be provided to prevent irradiation if any filter selection operation carried out in the treatment room does not agree with the filter selection operation carried out at the treatment control panel. (12-1-87)

e. The registrant must determine, or obtain from the manufacturer, data sufficient to assure that the following beam quality requirements are met: (12-1-87)

i. The absorbed dose resulting from x-rays in a useful electron beam at a point on the central axis of the beam ten (10) centimeters greater than the practical range of the electrons must not exceed the values stated in the following table. Linear interpolation shall be used for values not stated. (12-1-87)

Maximum Energy of Electron Beam in MeV	X-Ray Absorbed Dose as a Fraction of Maximum Absorbed Dose
1	0.03
15	0.05
35	0.10
50	0.20

ii. Compliance with Subsection 210.01.e.i. may be determined using: (12-31-91)

(a) A measurement within a phantom with the incident surface of the phantom at the normal treatment distance and normal to the central axis of the beam; (12-1-87)

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(b) The largest field size available which does not exceed fifteen (15) by fifteen (15) centimeters; and (12-1-87)

(c) A phantom whose cross-sectional dimensions exceed the measurement radiation field by at least five (5) centimeters and whose depth is sufficient to perform the required measurement. (12-1-87)

iii. The absorbed dose at a surface located at the normal treatment distance, at the point of intersection of that surface with the central axis of the useful beam during x-ray irradiation, must not exceed the limits stated in the following table. Linear interpolation shall be used for values not stated: (12-1-87)

Maximum Photon Energy in MV	Absorbed Dose at the Surface as a Fraction of the Maximum Absorbed Dose
1	0.80
2	0.70
5	0.60
15	0.50
35	0.40
50	0.20

iv. Compliance with Subsection 210.01.e.ii. may be determined by measurements made: (12-31-91)

(a) With a phantom using an instrument which will allow extrapolation to the surface absorbed dose; (12-1-87)

(b) Using a phantom whose size and placement meet the requirements of Subsection 210.01.e.ii. (12-31-91)

(c) After removal of all beam modifying devices which can be removed without the use of tools, except for beam scattering or beam flattening filters; and (12-1-87)

(d) Using the largest field size available which does not exceed fifteen (15) by fifteen (15) centimeters. (12-1-87)

v. The registrant must determine, or obtain from the manufacturer, the maximum percentage absorbed dose in the useful beam due to neutrons, excluding stray neutron radiation, for specified operating conditions. (12-1-87)

f. All therapy systems must be provided with radiation detectors in the radiation head. (12-1-87)

i. Equipment installed after the effective date of these regulations must be provided with at least two (2) radiation detectors. The detectors must be incorporated into two (2) separate dose monitoring systems. (12-1-87)

ii. Equipment installed before the effective date of these regulations must be provided with at least one (1) radiation detector. This detector must be incorporated into a primary dose monitoring system. (12-1-87)

iii. The detector and the system into which that detector is incorporated must meet the following requirements. (12-1-87)

(a) Each detector must be removable only with tools and shall be interlocked to prevent incorrect positioning. (12-1-87)

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(b) Each detector must form part of a dose monitoring system from whose readings in dose monitor units the absorbed dose at a reference point in the treatment volume can be calculated. (12-1-87)

(c) Each dose monitoring system must be capable of independently monitoring, interrupting, and terminating irradiation. (12-1-87)

(d) For equipment installed after the effective date of these regulations, the design of the dose monitoring systems must assure that the malfunction of one system does not affect the correction functioning of the second system, and the failure of any element common to both systems which could affect the correct function of both systems terminates irradiation. (12-1-87)

(e) Each dose monitoring system must have a legible display at the treatment control panel. For equipment installed after the effective date of these regulations, each display must maintain a reading until intentionally reset to zero (0); have only one scale and no scale multiplying factors, utilize a design such that increasing dose is displayed by increasing numbers, and shall be so designed that, in the event of an overdosage of radiation, the absorbed dose may be accurately determined; and in the event of power failure, the dose monitoring information required in Subsection 210.01,f.iii.(e) displayed at the control panel at the time of failure will be retrievable in at least one (1) system for a twenty (20) minute period of time. (12-31-91)

g. In equipment installed after the effective date of these regulations inherently capable of producing useful beams with asymmetry exceeding five percent (5%), the asymmetry of the radiation beam in two (2) orthogonal directions must be monitored before the beam passes through the beam limiting device. Facilities must be provided so that, if the difference in dose rate between one (1) region and another region symmetrically displaced from the central axis of the beam exceeds five percent (5%) of the central axis dose rate, indication of this condition is made at the control panel, and if this difference exceeds ten percent (10%), the irradiation is terminated. (12-1-87)

h. Selection and display of dose monitor units. (12-1-87)

i. Irradiation must not be possible until a selection of a number of dose monitor units has been made at the treatment control panel. (12-1-87)

ii. The preselected number of dose monitor units must be displayed at the treatment control panel until reset manually for the next irradiation. (12-1-87)

iii. After termination of irradiation, it must be necessary to reset the dosimeter display to zero (0) before subsequent treatment can be initiated. (12-1-87)

iv. For equipment installed after the effective date of these regulations after termination of irradiation, it must be necessary to manually reset the preselected dose monitor units before irradiation can be initiated.(12-1-87)

i. Termination of irradiation by the dose monitoring system or systems during stationary beam therapy. (12-1-87)

i. Each primary system must terminate irradiation when the preselected number of dose monitor units has been detected by the system. (12-1-87)

ii. If original design of the equipment included a second dose monitoring system, that system must be capable of terminating irradiation when not more than fifteen percent (15%) or forty (40) dose monitor units above the preselected number of dose monitor units set at the control panel has been detected by the second dose monitoring system. (12-1-87)

iii. For equipment installed after the effective date of these regulations, a second dose monitoring system must be present. That system shall be capable of terminating irradiation when not more than ten percent (10%) or twenty-five (25) dose monitoring units above the preselected number of dose monitor units set at the control panel has been detected by the second dose monitoring system. (12-1-87)

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iv. For equipment installed after the effective date of these regulations, an indicator on the control panel must show which dose monitoring system has terminated irradiation. (12-1-87)

j. It must be possible to interrupt irradiation and equipment movements at any time from the operator's position at the treatment control panel. Following an interruption, it must be possible to restart irradiation by operator action without any reselection of operating conditions. If any change is made of a preselected value during an interruption, irradiation and equipment movements must be automatically terminated. (12-1-87)

k. It must be possible to terminate irradiation and equipment movements, or go from an interruption condition to termination conditions, at any time, from the operator's position at the treatment control panel. (12-1-87)

l. The requirements for timers are as follows: (12-1-87)

i. A timer which has a display must be provided at the treatment control panel. The timer must have a preset time selector and an elapsed time indicator. (12-1-87)

ii. The timer must be a cumulative timer which activates with the production of radiation and retains its reading after irradiation is interrupted or terminated. After irradiation is terminated and before irradiation can be reinitiated, it must be necessary to reset the elapsed time indicator to zero (0). (12-1-87)

iii. For equipment installed after the effective date of these regulations after termination of irradiation and before irradiation can be reinitiated, it must be necessary to manually reset the preset time selector. (12-1-87)

iv. The timer must terminate irradiation when a preselected time has elapsed if the dose monitoring systems have not previously terminated irradiation. (12-1-87)

m. Equipment capable of both x-ray therapy and electron therapy must meet the following additional requirements: (12-1-87)

i. Irradiation must not be possible until a selection of radiation type has been made at the treatment control panel. (12-1-87)

ii. An interlock system must be provided to insure that the equipment can emit only the radiation type which has been selected. (12-1-87)

iii. An interlock system must be provided to prevent irradiation if any selected operations carried out in the treatment room do not agree with the selected operations carried out at the treatment control panel. (12-1-87)

iv. An interlock system must be provided to prevent irradiation with x-rays except to obtain a port film when electron applicators are fitted. (12-1-87)

v. An interlock system must be provided to prevent irradiation with electrons when accessories specific for x-ray therapy are fitted. (12-1-87)

vi. The radiation type selected must be displayed at the treatment control panel before and during irradiation. (12-1-87)

n. Equipment capable of generating radiation beams of different energies must meet the following requirements: (12-1-87)

i. Irradiation must not be possible until a selection of energy has been made at the treatment control panel. (12-1-87)

ii. An interlock system must be provided to prevent irradiation if any selected operations carried out in the treatment room do not agree with the selected operations carried out at the treatment control panel. (12-1-87)

iii. The nominal energy value selected must be displayed at the treatment control panel before and

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during irradiation. (12-1-87)

iv. For equipment installed after the effective date of these regulations, an interlock system must be provided to terminate irradiation if the energy of the electrons striking the x-ray target or electron window deviates by more than twenty percent (20%) or three (3) MeV, whichever is smaller, from the selected nominal energy. (12-1-87)

o. Equipment capable of both stationary beam therapy and moving beam therapy must meet the following requirements: (12-1-87)

i. Irradiation must not be possible until a selection of stationary beam therapy or moving beam therapy has been made at the treatment control panel. (12-1-87)

ii. An interlock system must be provided to insure that the equipment can operate only in the mode which has been selected. (12-1-87)

iii. An interlock system must be provided to prevent irradiation if any selected operations carried out in the treatment room do not agree with the selected operations carried out at the treatment control panel. (12-1-87)

iv. The mode of operation must be displayed at the treatment control panel. (12-1-87)

v. For equipment installed after the effective date of these regulations, an interlock system must be provided to terminate irradiation if: (12-1-87)

(a) Movement of the gantry occurs during stationary beam therapy; or (12-1-87)

(b) Movement of the gantry stops during moving beam therapy unless such stoppage is a preplanned function. (12-1-87)

vi. Moving beam therapy must be controlled to obtain the selected relationships between incremental dose monitor units and incremental angle of movement. (12-1-87)

(a) For equipment installed after the effective date of these regulations, an interlock system must be provided to terminate irradiation if the number of dose monitor units delivered in any ten degrees (10) of arc differs by more than twenty percent (20%) from the selected value. (12-1-87)

(b) For equipment installed after the effective date of these regulations, where gantry angle terminates the irradiation in arc therapy, the dose monitor units must differ by less than five percent (5%) from the value calculated from the absorbed dose per unit angle relationship. (12-1-87)

vii. Where the dose monitor system terminates the irradiation in arc therapy, the termination of irradiation must be as required by Subsection 210.01.i. (12-31-91)

p. For equipment installed after the effective date of these regulations, a system must be provided from which readings the absorbed dose rate at a reference point in the treatment volume may be calculated. Radiation detectors specified in Subsection 210.01.f. may form part of this system. In addition: (12-31-91)

i. The dose monitor unit rate shall be displayed at the treatment control panel. (12-1-87)

ii. If the equipment can deliver under any conditions an absorbed dose rate at the normal treatment distance more than twice the maximum value specified by the manufacturer for any machine parameters utilized, a device must be provided which terminates irradiation when the absorbed dose rate exceeds a value twice the specified maximum. The value at which the irradiation will be terminated must be in a record maintained by the registrant. (12-1-87)

q. The registrant must determine, or obtain from the manufacturer, the location, with reference to an accessible point on the radiation head, of: (12-1-87)

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i. The x-ray target or the virtual source of x-rays; and (12-1-87)

ii. The electron window or the virtual source of electrons if the system has electron beam capabilities. (12-1-87)

r. Capabilities must be provided so that all radiation safety interlocks can be checked for correct operation. When preselection of any of the operating conditions requires action in the treatment room and at the treatment control panel, selection at one location must not give a display at the other location until the requisite selected operations have been completed in both locations. (12-1-87)

02. Facility and Shielding Requirements. In addition to Section 100., the following design requirements shall apply: (12-31-91)

a. All protective barriers must be fixed except for entrance doors or beam interceptors. (12-1-87)

b. The control panel must be located outside the treatment room. (12-1-87)

c. The requirements of viewing systems are as follows: (12-1-87)

i. Windows, mirrors, closed-circuit television, or an equivalent system must be provided to permit continuous observation of the patient during irradiation and must be so located that the operator may observe the patient from the control panel. (12-1-87)

ii. When the primary viewing system is by electronic means, an alternate viewing system, which may be electronic, must be available for use in the event of failure of the primary viewing system. (12-1-87)

d. Provision must be made for two-way aural communication between the patient and the operator at the control panel. However, where excessive noise levels or treatment requirements makes aural communication impractical, other methods of communication must be used. (12-1-87)

e. Treatment room entrances must be provided with warning lights in readily observable positions near the outside of all access doors to indicate when the useful beam is "on". (12-1-87)

f. Interlocks must be provided such that all entrance doors must be closed before treatment can be initiated or continued. If the radiation beam is interrupted by any door opening, it must not be possible to restore the machine to operation without closing the door and reinitiating irradiation by manual action at the control panel. (12-1-87)

03. Surveys. (12-1-87)

a. All facilities must have a survey made by, or under the direction of, a qualified expert. In addition, such surveys must be done after any change in the facility or equipment, which might cause a significant increase in radiation hazard such as shielding changes, or x-ray unit relocation. (12-1-87)

b. The registrant must obtain a written report of the survey from the qualified expert, and a copy of the report must be transmitted by the registrant to the Radiation Control Agency within thirty (30) days of receipt of the report. (12-1-87)

c. The survey and report must indicate all instances where the installation, in the opinion of the qualified expert, is in violation of applicable regulations. (12-1-87)

04. Calibrations. (12-1-87)

a. The calibration of systems subject to Section 210. must be performed in accordance with an established calibration protocol acceptable to the Radiation Control Agency before the system is first used for irradiation of a patient, and thereafter at time intervals which do not exceed twelve (12) months and after any change which might significantly alter the calibration, spatial distribution, or other characteristics of the therapy beam. The

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calibration protocol published by the American Association of Physicists in Medicine is accepted as an established protocol. For other protocols, the user must submit that protocol to the Radiation Control Agency for concurrence that the protocol is acceptable before any calibration. (12-31-91)

b. The calibration must be performed under the direct supervision of a radiological physicist who is physically present at the facility during the calibration. (12-1-87)

c. Calibration radiation measurements required by Subsection 210.04. must be performed using a dosimetry system: (12-31-91)

i. Having a calibration factor for cobalt-60 gamma rays traceable to a national standard; (12-1-87)

ii. Which has been calibrated within the previous two (2) years and after any servicing that may have affected its calibration; (12-1-87)

iii. Which has been calibrated in such a fashion that any uncertainty can be stated for the radiation quantities monitored by the system; and (12-1-87)

iv. Which has had constancy checks performed on the system as specified by a radiological physicist. (12-1-87)

d. Calibrations must be in sufficient detail that the dose at a reference point in soft tissue may be calculated to within an uncertainty of five percent (5%). (12-1-87)

e. The calibration of the therapy beam must include, but not be limited to, the following determinations: (12-1-87)

i. Verification that the equipment is operating in compliance with the design specifications concerning the light localizer, side light, and back-pointer alignment with the isocenter when applicable, variation in the axis of rotation for the table, gantry, and jaw system, and beam flatness and symmetry at the specified depth; (12-1-87)

ii. The absorbed dose rate at various depths of water for the range of field sizes used, for each effective energy, that will verify the accuracy of the dosimetry of all therapy procedures utilized with that therapy beam; (12-1-87)

iii. The uniformity of the radiation field and any dependency upon the direction of the useful beam; (12-1-87)

iv. Verification that existing depth-dose data and isodose charts applicable to the specific machine continue to be valid or are updated to existing machine conditions; and (12-1-87)

v. Verification of transmission and electron buildup factors for all accessories such as wedges, shadow trays, and compensators. (12-1-87)

f. Records of calibration measurements under Subsection 210.04.a. and dosimetry system calibrations under Subsection 210.04.c. must be maintained for five (5) years after completion of the full calibration. (12-31-91)

g. A copy of the latest calibration performed pursuant to Subsection 210.04.a. must be available in the area of the control panel. (12-31-91)

05. Spot Checks. Spot checks must be performed on systems subject to Section 210. during calibrations, and thereafter at intervals not to exceed one (1) month. Such spot-checks must meet the following requirements: (12-31-91)

a. The spot-check procedures must be in writing and must have been developed by a radiological physicist. A copy of the procedure must be submitted to the Radiation Control Agency prior to its implementation.

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(12-1-87)

b. If a radiological physicist does not perform the spot-check measurements, then the results of the spot-check measurements must be reviewed by a radiological physicist within fifteen (15) days. (12-1-87)

c. The spot-check procedures must specify the frequency at which tests or measurements are to be performed and the acceptable tolerance for each parameter measured in the spot-check when compared to the value for that parameter determined in the calibration. (12-1-87)

d. Spot-checks shall be made of absorbed dose measurements at a minimum of two (2) depths in a phantom at intervals not to exceed one (1) week. (12-1-87)

e. Where a system has built-in devices which provide a measurement of any parameters during irradiation, such measurement must not be utilized as a spot-check measurement. (12-1-87)

f. The cause for a parameter exceeding a tolerance set by the radiological physicist must be investigated and corrected before the system is used for patient irradiation. (12-1-87)

g. Whenever a spot-check indicates a significant change in the operating characteristics of a system, as specified in the radiological physicist's spot-check procedures, the system must be recalibrated as required in Subsection 210.04. (12-31-91)

h. Records of spot-check measurements must be maintained by the registrant for a period of two (2) years after completion of the spot-check measurements or any necessary corrective actions, whichever is later. (12-1-87)

i. Where a spot-check involves a radiation measurement, such measurement must be obtained using a system satisfying the requirements of Subsection 210.04.c. or which has been calibrated with a system meeting those requirements within the previous year. (12-31-91)

06. Operating Procedures. (12-1-87)

a. No individual other than the patient may be in the treatment room during treatment of a patient. (12-1-87)

b. If a patient must be held in position during treatment, mechanical supporting or restraining devices must be used. (12-1-87)

c. The system must not be used in the administration of radiation therapy unless the requirements of Subsections 210.01., 210.02., 210.03., 210.04. and 210.05. have been met. (12-31-91)

211. RADIOGRAPHIC MACHINES USED FOR MAMMOGRAPHY.
In addition to other applicable requirements of the Idaho Radiation Control Rules, radiation machines used for mammography shall comply with these requirements: (11-6-93)

01. General Requirements. (11-6-93)

a. Only radiation machines specifically designed for mammography shall be used; (11-6-93)

b. Radiation machines used for mammography shall be evaluated to ensure conformance to the requirements of these rules at intervals not to exceed 12 months, and upon installation prior to being used on human beings. (11-6-93)

c. The registrant shall record the results of all tests made to evaluate compliance with these rules, and shall maintain these records available for inspection by the agency for a minimum of 3 years. (11-6-93)

02. Radiation Machine Standards. (11-6-93)

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a. X-ray Beam Quality. (11-6-93)

i. When used with screen-film image receptors, the useful beam shall have a half-value layer (HVL) between the values of: measured kilovoltage/100 and measured kilovoltage/100 + 0.1 millimeters aluminum equivalent. (11-6-93)

ii. All other mammography imaging modalities shall meet the requirements for minimum half-value layer specified in 01.09204,03.a. of the Idaho Radiation Control Rules. (11-6-93)

iii. Determination of half-value layer for mammography systems shall include the contribution to useful beam equivalent aluminum filtration made by the compression device. (11-6-93)

iv. The actual kilovolts-peak (kVp) shall be within plus or minus 5% of the indicated kVp. (11-6-93)

b. Radiation Output. (11-6-93)

i. Radiation machines used for mammography shall be capable of producing 500 milliroentgens/ second (129 microCoulomb/ kilogram/second) for at least 3 seconds, and producing a minimum output of 8 milliroentgens (2.1 microCoulomb/kilogram) per milliAmpere-second. (11-6-93)

ii. The minimum radiation output requirements of this part shall be measured at a point 4.5 centimeters from the surface of the patient support device with the source-to-image receptor distance (SID) at maximum and the output attenuation of the compression device included. (11-6-93)

c. X-ray Beam Alignment\Limitation\Transmission. (11-6-93)

i. The radiation machine used for mammography shall be provided with means to limit the useful x-ray beam so that the x-ray field at the plane of the image receptor does not extend beyond any edge of the image receptor at any designated source to image receptor distance except the edge of the image receptor adjacent to the chest wall, where the x-ray field may extend beyond this edge by no more than 2% of the SID. (11-6-93)

ii. The projected collimator light field shall extend beyond the projected radiation field along both the length or width of the radiation field, at any designated source to image receptor distance, by no more than 2% of the SID. (11-6-93)

d. Mammographic Exposure Control. (11-6-93)

i. Radiation machines used for mammography shall incorporate means to terminate the exposure at a preset time interval, a preset product of tube current and exposure duration, a preset number of pulses, or a preset radiation exposure at the plane of the image receptor. (11-6-93)

ii. Exposure shall only be possible by the use of an exposure switch of the "deadman" type as defined in Subsection 002.30 of the Idaho Radiation Control Rules. (11-6-93)

iii. When both manual and automatic exposure control modes are available, the x-ray control panel shall clearly indicate which mode is selected. (11-6-93)

iv. The coefficient of variation between exposures for both automatic and manual exposure modes shall not exceed (0.05). This requirement is met when four (4) successive exposures are made at identical exposure factors, and the standard devation of the four (4) exposure values divided by the mean exposure value is less than or equal to 0.05. (11-6-93)

v. Exposure control in the automatic exposure mode shall provide the capability of maintaining constant film density to within plus or minus 0.3 optical density unit of the average optical density over the range of clinically used kilovoltage, for acrylic or BR-12 phantom thicknesses of 2 centimeters to 6 centimeters. (11-6-93)

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vi. The mammography exposure control system(s) shall limit the mean glandular dose, for one craniocaudal view of a 4.5 centimeter compressed breast composed of 50% adipose50% glandular tissue, not to exceed these values: (11-6-93)

(a) One milligray (100 millirads) for non-grid screen-film imaging modes; (11-6-93)

(b) Two milligray (300 millirads) for screen-film systems with grid. (11-6-93)

(c) The technical exposure factors used to determine compliance with this part shall be those used by the facility for its clinical images of a 50% adipose 50% glandular tissue 4.5 centimeter compressed breast, craniocaudal view. (11-6-93)

vii. Determination of mean glandular dose shall be made with a breast phantom in the useful beam. The breast phantom shall be equivalent in attenuation to the RMI 156 breast phantom. (11-6-93)

e. Integral Ancillary Equipment (11-6-93)

i. Radiation machines used for mammography shall be provided with an integral anti-scatter grid available for use with all image receptor sizes. (11-6-93)

ii. The mammography radiation machine shall be provided with a compression device which is capable of compressing the breast with a force of at least 25 pounds and no more than 40 pounds for a period of at least fifteen (15) seconds. (11-6-93)

iii. The chest wall edge of the compression paddle must be aligned with the chest wall edge of the image receptor to within - one percent (1%) of the SID when the compression paddle is placed 4.5 centimeters above the patient support device. (11-6-93)

iv. Radiation machines used for mammography, and which are newly installed after the effective date of these rules shall incorporate a post-exposure milliampere-seconds indicator when used in automatic exposure control mode. (11-6-93)

03. Quality Assurance Program. (11-6-93)

a. QA Program Responsibilities. The registrant shall maintain, and have in place prior to the initiation of mammography imaging, a written quality assurance program for each mammography x-ray system. The registrant shall be responsible for providing qualified individuals whose duties include: (11-6-93)

i. Conducting equipment performance monitoring functions; (11-6-93)

ii. Analyzing the monitoring results to determine if there are problems requiring correction; (11-6-93)

iii. Carrying out or arranging for the necessary corrective actions when quality assurance testing indicates a standard in these rules is not met. (11-6-93)

b. Image Quality Standards/Processor Performance. (11-6-93)

i. Phantom Image Quality. The mammography x-ray system shall be capable of providing an image of a 0.75 millimeter fiber, a 0.32 millimeter speck group, and a 0.75 millimeter mass. This standard will be met when a mammographic image of an RMI 156 breast phantom demonstrates 4 fibers, 3 speck groups and 3 masses. (11-6-93)

ii. Mid-density (MD) Density difference (DD). Deviations from established operating levels for measured values of mid-density (MD) and density difference (DD) on sensitometric control charts shall not exceed 0.10 Optical Density Units. (11-6-93)

iii. Base + Fog (B + F). The base + fog shall not exceed the established operating level by more than

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0.03 Optical Density Units. (11-6-93)

iv. Darkroom Fog. Darkroom fog levels shall not exceed 0.05 Optical Density Units above base + fog. Darkroom fog tests shall be made with film presensitized by exposure to sufficient light from an intensifying screen so that after processing, an Optical Density of 1.2-1.6 is achieved. The presensitized film shall be exposed to darkroom safelight conditions for 2 minutes. (11-6-93)

v. Image Receptor Systems. Image receptor systems and their individual components shall be specifically designed for, and appropriate to mammography imaging. (11-6-93)

vi. Intensifying Screens. Mammography image intensifying screens shall be removed from service and appropriate corrective action implemented if the following standards are not met: (11-6-93)

(a) Screen Speed Uniformity. Intercomparison of the measured optical density in the geometric center of a phantom image obtained with each intensifying screen in use shall be not exceed 0.30 optical density unit between the minimum and maximum density. The technical exposure factors shall be the same for each screen, and the phantom used for these images shall be a 4.0 centimeter thick cassette-sized phantom of acrylic or BR-12, or a breast phantom equivalent in attenuation to the RMI 156. (11-6-93)

(b) Screen-film Contact. Cassettes shall not be used for mammography if one or more large areas (> = 1.0 centimeters) of poor film-screen contact is visualized on an image made with a 40 mesh mammography film-screen contact test tool. (11-6-93)

(c) Screen Identification. Each intensifying screen shall be legibly marked with a unique identification mark for that particular screen, visible on the film outside the area of clinical interest, with a corresponding mark on the outside of the cassette. (11-6-93)

vii. Film Processors. Film processors utilized for mammography shall be adjusted to, and operated at the specifications recommended by the mammographic film manufacturer. Alternative settings which are shown by documented test results to provide equivalent sensitometric performance are acceptable. (11-6-93)

viii. Reject Rate. Corrective action shall be taken if the film reject rate exceeds five percent (5%). The reject rate shall be based upon clinical images which must be repeated. (11-6-93)

c. Quality Assurance Tests/Intervals. The registrant shall ensure that the following quality control tests are performed when applicable equipment or components are initially installed, replaced or repaired, and at least at these specified intervals: (11-6-93)

i. Primary Secondary Barrier Transmission-Upon initial installation and following each significant modification to the mammography system or the primary secondary barriers. (11-6-93)

ii. Processor performance by sensitometric means-daily, or each day of use prior to the first patient exposure. For any mammography registrant using film processors at multiple locations, such as mobile mammography services, each processor shall be subject to this requirement. (11-6-93)

iii. Screen Cleanliness Artifacts-weekly (11-6-93)

iv. Image Quality-monthly for stationary systems and prior to performing mammography at each location for mobile systems. (11-6-93)

v. Reject Rate Analysis-3 months; (11-6-93)

vi. Compression Device-6 months (11-6-93)

vii. Darkroom Integrity (safelight condition, light leaks,)-6 months. (11-6-93)

viii. Screen-film Contact-6 months (11-6-93)

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ix. Beam Alignment and Limitation-12 months (11-6-93)

x. Automatic Exposure Control Reproducibility -12 months (11-6-93)

xi. Collimator alignment-12 months (11-6-93)

xii. Focal Spot Size Resolution-upon initiation installation and at each tube replacement, and at intervals not to exceed 12 months (11-6-93)

xiii. Half-value Layer-12 months (11-6-93)

xiv. kVp Accuracy-12 months (11-6-93)

xv. Radiation Output Reproducibility and linearity-12 months (11-6-93)

d. QA Program Annual Review. In addition to the routine quality assurance testing required in these rules, the registrant shall effect a comprehensive review of the effectiveness of all elements of the quality assurance program for each mammography system at intervals not to exceed 12 months. This review shall: (11-6-93)

i. Address all aspects of quality assurance in these rules for each mammography x-ray system; (11-6-93)

ii. Be documented in writing and the results maintained available for inspection by the agency for 3 years; (11-6-93)

e. Corrective Action. When a mammography x-ray system fails one of the quality assurance tests required in these rules, unless otherwise specified herein, the mammography x-ray system shall be removed from service until appropriate corrective action is completed. The mammography x-ray system shall not be placed back into service until repeat test results verify adequacy of the corrective action. (11-6-93)

212. -- 249. (RESERVED).

250. USE OF SEALED RADIOACTIVE SOURCES IN THE HEALING ARTS.
The provisions of Section 250. apply to all licensees who use sealed sources in the healing arts and are in addition to, and not in substitution for, other applicable provisions of these regulations. (12-31-91)

251. SEALED RADIOACTIVE SOURCES AND INTERSTITIAL, INTRACAVITARY, AND SUPERFICIAL APPLICATIONS.

01. Accountability, Storage and Transit. (7-1-93)

a. Except as otherwise specifically authorized by the Radiation Control Agency, each licensee shall provide accountability of sealed sources and shall keep a record of the issue and return of all sealed sources. A physical inventory must be made at intervals not exceeding every six (6) months. Records must be maintained thereof and include quantities and kinds of radioactive materials, location of sources and date of inventory. (12-1-87)

b. When not in use, sealed sources and applicators containing sealed sources will be kept in a protective enclosure made of such material and of such wall thickness as necessary to assure compliance with the provisions of Subsections 110.01., 110.04. and 110.05. (12-31-91)

c. Each licensee must assure that needles or standard medical applicator cells containing cobalt-60 as wire, radium-226, or cesium-137 are not opened while in the licensee's possession unless specifically authorized by a license issued by the Agency. (12-1-87)

02. Testing Sealed Sources for Leakage and Contamination. (12-1-87)

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a. All sealed sources containing more than one hundred (100) microcuries of radioactive material with a half-life greater than thirty (30) days, or ten (10) microcuries of radium-226, and in any form other than gas must be tested for leakage and/or contamination prior to initial use and at intervals not to exceed six (6) months unless otherwise provided by a special license condition. If there is any reason to suspect that a sealed source might have been damaged or might be leaking, it must be tested for leakage before further use. Each source or device must be so tested prior to its first use unless the supplier furnishes a certificate that the source or device has been so tested within six (6) months prior to the transfer. (12-1-87)

b. Leak tests must be capable of detecting the presence of five one-thousandths (0.005) microcurie of radioactive material on the test sample, or in the case of radium, the escape of radon at the rate of one one-thousandths (0.001) microcurie per twenty-four (24) hours. The test sample must be taken from the source or from the surfaces of the device in which the source is permanently or semipermanently mounted or stored on which one might expect contamination to accumulate. (12-1-87)

c. Any test conducted pursuant to Subsection 251.02.a. which reveals the presence of five one-thousandths (0.005) microcurie or more of removable contamination or, in the case of radium, the escape of radon at the rate of one one-thousandth (0.001) microcurie or more per twenty-four (24) hours will be considered evidence that the sealed source is leaking. The licensee must immediately withdraw the source from use and will cause it to be decontaminated and repaired or to be disposed of in accordance with applications of Section 050. A report must be filed within five (5) days of the test with the Radiation Control Agency, describing the equipment involved, the test results and the corrective action taken. (12-31-91)

d. Leak tests results must be recorded in units of microcuries and maintained for inspection by the Radiation Control Agency. (5-5-81)

03. Radiation Surveys. (12-31-91)

a. The maximum radiation level at a distance of one (1) meter from the patient in whom brachytherapy sources have been inserted must be determined by measurement or calculation, and preferably by both. This radiation level must be entered on the patient's chart and other signs as required under Subsection 251.04. (12-31-91)

b. The radiation levels in the patient's room and the surrounding area must be determined, recorded, and maintained for inspection by the Radiation Control Agency. (5-5-81)

c. The licensee must assure that patients treated with cobalt-60, cesium-137, iridium-192, or radium-226 implants remain hospitalized until a source count and radiation survey of the patient confirm that all implants have been removed. (12-1-87)

04. Signs and Records. (12-31-91)

a. In addition to the requirements of Subsection 120.03., the bed, cubicle, or room of the hospital brachytherapy patient must be marked with a sign indicating the presence of brachytherapy sources. This sign must incorporate the radiation symbol and specify the radionuclide, the activity, date, and the individuals to contact for radiation safety instructions. The sign will not be required when the exception in Subsection 120.04.b. is met. (12-31-91)

b. The following information must be included in the patient's chart: (5-5-81)

i. The radionuclide administered, number of sources, activity in millicuries and time and date of administration; and (5-5-81)

ii. The exposure rate at one (1) meter, the time the determination was made, and by whom; and (5-5-81)

iii. The radiation symbol; and (5-5-81)

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iv. The precautionary instructions necessary to assure that the exposure of individuals does not exceed that permitted under Subsection 110.01. (12-31-91)

252. -- 269. (RESERVED).

270. TELETHERAPY.
Section 270. establishes requirements for teletherapy which must be adhered to, in addition to, and not in substitution for other applicable provisions of these regulations. (12-31-91)

01. Equipment. (7-1-93)

a. The housing must be so constructed that, at one (1) meter from the source, the maximum exposure rate does not exceed ten (10) milliroentgens per hour when the beam control mechanism is in the "off" position. The average exposure rate measured at a representative number of points about the housing, each one (1) meter from the source, must not exceed two (2) milliroentgens per hour. (5-5-81)

b. The leakage radiation measured at one (1) meter from the source when the beam control mechanism is in the "on" position must not exceed one (1) roentgen per hour or one-tenth percent (0.1%) of the useful beam exposure rate. (12-1-87)

c. Adjustable or removable beam-defining diaphragms must allow transmission of not more than five percent (5%) of the useful beam exposure rate. (5-5-81)

d. The beam control mechanism must be of a positive design capable of acting in any orientation of the housing for which it is designed to be used. In addition to an automatic closing device, the mechanism must be designed so that it can be manually returned to the "off" position with a minimum risk exposure. (5-5-81)

e. The closing device must be so designed as to return automatically to the "off" position in the event of any breakdown or interruption of the activating force and must stay in the "off" position until activated from the control panel. (5-5-81)

f. When any door to the treatment room is opened, the beam control mechanism must automatically and rapidly restore the unit to the "off" position and cause it to remain there until the unit is reactivated from the control panel. (5-5-81)

g. The equipment must be provided with a locking device to prevent unauthorized use. (5-5-81)

h. The control panel must be provided with a locking device to prevent unauthorized use. (5-5-81)

i. The control panel must be provided with a timer that automatically terminates the exposure after a preset time. (5-5-81)

j. There must be at the housing and at the control panel a warning device that plainly indicates whether the beam is on or off. (5-5-81)

k. The entry door to the room where the teletherapy equipment is located must be locked so as to prevent unauthorized entry when not in use. (5-5-81)

l. Provision must be made to permit continuous observation of the patient during irradiation. (12-1-87)

02. Shielding. (5-5-81)

a. Primary protective barriers must be provided for any area that the useful beam may strike when using the largest possible diaphragm opening. Such barriers should extend at least one (1) foot beyond the useful beam for any possible orientation. (5-5-81)

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b. Secondary protective barriers must be provided for all occupied areas exposed to leakage and scattered radiation. (5-5-81)

03. Operation. No individual shall be in the treatment room during irradiation unless that individual is the patient. Mechanical restraining or supporting devices shall be used for positioning the patient, if necessary. (12-1-87)

04. Testing for Leakage and Contamination. Teletherapy sources must be tested for leakage and contamination in accordance with the procedures described in Subsection 251.02. except that the leak test must be capable of detecting five one-hundredths (0.05) microcuries or more of removable contamination. Tests of leakage can be made by wiping accessible surfaces of the housing port or collimator while the source is in the "off" position and measuring these wipes for transferred contamination. (12-31-91)

05. Calibration. Each teletherapy installation must have full calibration measurements as described in Subsection 270.06. Calibrations must be performed: (12-31-91)

a. Prior to first use for treating humans; and (12-1-87)

b. Prior to treating humans: (12-1-87)

i. Whenever the radiation meter or other device related to radiation output shows a continued significant change in its normal reading; and (5-5-81)

ii. Following replacement of the radiation source or following reinstallation of the unit in a new location and prior to the use of the unit for treating humans; and (5-5-81)

iii. Whenever spot-check measurements indicate that the output value differs by more than five percent (5%) from the value obtained at the last full calibration corrected mathematically for physical decay. (12-1-87)

c. At intervals not exceeding one (1) year. (5-5-81)

06. Calibration Measurements. (12-1-87)

a. Calibration must include determination of: (12-1-87)

i. The exposure rate or dose rate within three percent (3%) for the range of field sizes and for each treatment distance or for the axis distance used for radiation therapy; and (12-1-87)

ii. The congruence between the radiation field and the field indicated by the localizing device when localizing devices are used; and (5-5-81)

iii. The uniformity of the radiation field and its dependence upon the direction of the useful beam; and (5-5-81)

iv. Timer accuracy. (5-5-81)

v. The accuracy of all distance measuring devices used for treating humans. (12-1-87)

b. The exposure rate or dose rate values must be corrected mathematically for physical decay at intervals not exceeding one (1) month. (12-1-87)

07. Special Requirement. Each teletherapy machine must be fully inspected and serviced by a qualified expert as specified in Subsection 270.10. during source replacement or at intervals not to exceed five (5) years, whichever comes first, to assure proper functioning of the source mechanism. (12-31-91)

08. Spot-Check Measurements. (12-1-87)

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a. Spot-check measurements must be performed on each teletherapy unit at intervals not exceeding one (1) month. (12-1-87)

b. Spot-check measurements shall include determination of: (12-1-87)

i. Timer accuracy; (12-1-87)

ii. The congruence between the radiation field and the field indicated by the light beam localizing device; (12-1-87)

iii. The accuracy of all distance measuring devices used for treating humans; (12-1-87)

iv. The exposure rate, dose rate, or a quantity related in a known manner to these rates for one (1) typical set of operating conditions and the difference between the measurement made above and the anticipated output expressed as a percentage of the anticipated output. The anticipated output is the value obtained at the last calibration corrected mathematically for physical decay. (12-1-87)

c. Spot-check measurements must be performed in accordance with procedures established by an expert qualified by training and experience in accordance with Subsection 270.10. A qualified expert need not actually perform the spot-check measurements. If a qualified expert does not perform the spot-check measurements, the results of the spot-check measurements must be reviewed by a qualified expert within fifteen (15) days. (12-31-91)

09. Dosimetry System Calibration. (12-1-87)

a. Calibration measurements must be performed using a dosimetry system that has been calibrated by the National Bureau of Standards or by a Regional Calibration Laboratory accredited by the American Association of Physicists in Medicine. The dosimetry system must have been calibrated within the previous two (2) years and after any servicing that may have affected system calibration. (12-1-87)

b. Spot-check measurements must be performed using a dosimetry system that has been calibrated in accordance with Subsection 270.09.a. Alternatively, a dosimetry system used solely for spot-check measurements may be calibrated by direct intercomparison with a system that has been calibrated in accordance with Subsection 270.09.a. This alternative calibration method must have been performed within the previous one (1) year and after each servicing that may have affected the system calibration. Dosimetry systems calibrated by the alternative method must not be used for teletherapy calibration measurements. (12-31-91)

10. Qualified Expert. (12-1-87)

a. The licensee must determine if an individual is an expert qualified by training and experience to calibrate a teletherapy unit and establish procedures for, and review the results of, spot-check measurements. The licensee must determine that the expert: (12-1-87)

i. Is certified by the American Board of Radiology in Therapeutic Radiological Physics, Radiological Physics, Roentgen-Ray and Gamma-Ray Physics, or X-Ray and Radium Physics; or (12-1-87)

ii. Has the following minimum training and experience: (12-1-87)

(a) A master's or doctorate degree in physics, biophysics, radiological physics, or health physics from an accredited university; (12-1-87)

(b) One (1) year of full-time training in therapeutic radiological physics; and (12-1-87)

(c) One (1) year of full-time experience in radiotherapy facility including personally conducting a calibration and spot-check of at least one (1) teletherapy unit. (12-1-87)

b. Licensees that have their teletherapy units calibrated by individuals who do not meet these criteria

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for minimum training and experience may request a license amendment excepting them from Subsection 270.10.a. The request should include the name of the proposed expert, a description of the individual's training and experience including information similar to that specified in Subsection 270.10.a.ii., reports of at least one (1) calibration and spot-check program based on measurements personally made by the proposed expert within the last ten (10) years, and written endorsement of the technical qualifications of the proposed expert from personal knowledge by a physicist certified by the American Board of Radiology in one (1) of the specialties listed in Subsection 270.10.a.i. (12-31-91)

11. Records. The licensee must maintain, for inspection by the Agency, records of the measurements, tests, corrective actions, inspection and servicing of the teletherapy unit, and instrument calibrations made under Subsections 270.06. and 270.08. and records of the licensee's evaluation of the expert's training and experience made under Subsection 270.10. (12-31-91)

a. Records of teletherapy calibration measurements, calibration of the instruments used to make these measurements, and inspection and service must be preserved for five (5) years after completion of the teletherapy calibration. (12-1-87)

b. Records of spot-check measurements, corrective actions and calibration of instruments used to make spot-check measurements must be preserved for two (2) years after completion of the spot-check measurements and corrective actions. (12-1-87)

c. Records of the licensee's evaluation of the qualified expert's training and experience must be preserved for five (5) years after the qualified expert's last performance of a calibration of the licensee's teletherapy unit. (12-1-87)

12. Requirements to Install a Permanent Radiation Monitor in Teletherapy Rooms and to Use Portable Survey Instruments or Audible Alarm Dosimeters. (12-31-91)

a. Each licensee authorized to use teletherapy units for treating humans must install a permanent radiation monitor in each teletherapy room for continuous monitoring of beam status. (12-1-87)

b. Each radiation monitor must be capable of providing visible notice of a teletherapy unit malfunction that may result in an exposed or partially exposed source. The visible indicator of high radiation levels must be located so as to be observable by a person entering the treatment room. (12-1-87)

c. Each radiation monitor must be equipped with an emergency power supply separate from the power supply to the teletherapy unit. This emergency power supply may be a battery system. (12-1-87)

d. Each radiation monitor must be tested for proper operation each day before the teletherapy unit is used for treatment of patients. (12-1-87)

e. If a radiation monitor is inoperable for any reason, any person entering the teletherapy room must use a properly operating portable survey instrument or audible alarm personal dosimeter to monitor for any malfunction of the source exposure mechanism that may have resulted in an exposed or partially exposed source. Survey instruments or dosimeters must be tested daily before use. (12-1-87)

271. -- 299. (RESERVED).

300. RADIATION SAFETY REQUIREMENTS FOR ANALYTICAL X-RAY OPERATIONS.
The regulations in Section 300. establish requirements for the use of analytical x-ray machines, as defined in Subsection 002.10. and 002.11. by persons registering such machines under the provisions of Section 090. The provisions of Section 300. are in addition to, and not in substitution for, other applicable provisions of these regulations. (12-31-91)

301. -- 319. (RESERVED).

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320. EQUIPMENT.

01. Labels. A label bearing essentially the words **"CAUTION RADIATION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED"** must be placed near any switch which energizes a tube. All labels must use the conventional colors (magenta or purple on yellow background) and bear the conventional radiation symbol. (5-5-81)

02. Signs. A sign bearing the words **"CAUTION - HIGH INTENSITY X-RAY BEAM"** must be placed in the area immediately adjacent to each tube housing. The sign must be so located that it is clearly visible to any person operating, aligning, or adjusting the unit or handling or changing a sample (5-5-81)

03. Beam Alignment Apparatus. Any apparatus utilized in beam alignment procedures must be designed in such a way that excessive radiation will not strike the operator. Particular attention must be given to viewing devices, in order to ascertain that lenses and other transparent components attenuate the beam to an acceptable level. (5-5-81)

04. Warning Lights. (12-1-87)

a. An easily visible warning light labeled with the words **"X-RAY ON"**, or words having a similar intent, must be located: (12-1-87)

i. Near any switch that energizes an x-ray tube and must be illuminated only when the tube is energized; or (12-1-87)

ii. In the case of a radioactive source, near any switch that opens a housing shutter and must be illuminated only when the shutter is open. (12-1-87)

b. On equipment installed after the effective date of these regulations, warning lights must have fail-safe characteristics. (12-1-87)

05. Safety Devices. A device which prevents the entry of any portion of an individual's body into the primary x-ray beam path or which causes the beam to be shut off upon entry into its path must be provided on all open-beam configurations. A registrant or licensee can apply to the Radiation Control Agency for an exemption from the requirement of a safety device. Such application will include: (5-5-81)

a. A description of the various safety devices that have been evaluated; and (5-5-81)

b. The reason each of these devices cannot be used; and (5-5-81)

c. A description of the alternative methods that will be employed to minimize the possibility of an accidental exposure, including procedures to assure that operators and others in the area will be informed of the absence of safety devices. (5-5-81)

06. Shutter Mechanisms. If a shutter mechanism is used to control the primary beam, a shutter status (open or closed) indication must be provided in the area adjacent to the tube head so that the position of the shutter is readily discernible. (5-9-68)

07. Control Panel Interlock. If an interlock device turns off the x-ray beam, it must not be possible to resume operation without resetting the beam "ON" switch at the control panel. (5-5-81)

08. Leakage and Monitoring. The tube housing leakage radiation at any accessible point five (5) cm from the surface of the tube housing must not exceed two and one-half (2.5) mR per hour at each maximum specified tube rating. This measurement must be made with a monitoring instrument appropriate for the energy range generated by the x-ray equipment, and must be made with beam ports blocked off. (5-5-81)

09. Generator Cabinet. Each x-ray generator must be supplied with a protective cabinet which limits leakage radiation measured at a distance of five (5) cm from its surface such that it is not capable of producing a dose

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in excess of twenty-five hundredths (0.25) mrem in one (1) hour. (5-5-81)

321. -- 329. (RESERVED).

330. ADMINISTRATIVE RESPONSIBILITIES.

01. Radiation Safety Officer. An individual at each facility must be designated to be responsible for maintaining radiation safety. This individual, designated the Radiation Protection Supervisor or Radiation Safety Officer, will be responsible for the following: (5-5-81)

a. Establishing and maintaining operational procedures so that the radiation exposure of each worker is kept as far below the maximum permissible dose as is practical; and (5-9-68)

b. Instructing all personnel who work with or near radiation producing machines in safety practices; and (5-9-68)

c. Maintaining a system of personnel monitoring; and (5-9-68)

d. Arranging for establishment of radiation control areas, including placement of appropriate radiation warning signs and/or devices; and (5-9-68)

e. Providing for radiation safety inspection of radiation producing machines on a routine basis; and (5-9-68)

f. Reviewing modifications to x-ray apparatus, including x-ray tube housing, cameras, diffractometers, shielding, and safety interlocks; and (5-9-68)

g. Investigating and reporting to proper authorities any case of excessive exposure to personnel and taking remedial action; and (5-9-68)

h. Being familiar with all applicable regulations for control of ionizing radiation. (5-9-68)

02. Operator Qualifications. No individual will be permitted to act as an operator of a particular machine until such individual has received an acceptable amount of training in radiation safety as it applies to that machine and is approved by the Radiation Protection Supervisor or Radiation Safety Officer. Operators will be responsible for: (5-5-81)

a. Keeping radiation exposure to himself and to others as low as is practical; and (5-9-68)

b. Being familiar with safety procedures as they apply to each machine; and (5-9-68)

c. Wearing of personnel monitoring devices, if applicable; and (5-9-68)

d. Notifying the Radiation Protection Supervisor or Radiation Safety Officer of known or suspected excessive radiation exposures to himself or others. (5-9-68)

331. AREA REQUIREMENTS.

01. Radiation Levels. The local components of an analytical x-ray system must be located and arranged and must include sufficient shielding or access control such that no radiation levels exist in any area surrounding the local component group which could result in a dose to an individual present therein in excess of the dose limits given in Subsection 110.01. For systems utilizing x-ray tubes, these levels will be met at any specified tube rating. (12-31-91)

02. Surveys. Radiation surveys, as required by Subsection 120.01., of all analytical x-ray systems sufficient to show compliance with Subsection 331.01. must be performed: (12-31-91)

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a. Upon installation of the equipment; and (5-5-81)

b. Following any change in the initial arrangement, number, or type of local components in the system; and (5-5-81)

c. Following any maintenance requiring the disassembly or removal of a local component in the system; and (5-5-81)

d. During the performance of maintenance and alignment procedures if the procedures require the presence of a primary x-ray beam when any local component in the system is disassembled or removed; and (5-5-81)

e. Any time a visual inspection of the local components in the system reveals an abnormal condition; and (5-5-81)

f. Whenever personnel monitoring devices show a significant increase over the previous monitoring period or the readings are approaching the Radiation Protection Guides, radiation dose limits, as set forth in Section 110. (12-31-91)

03. Exceptions to Surveying. Radiation survey measurements will not be required if a registrant or licensee can demonstrate compliance by some other means to the satisfaction of the Radiation Control Agency with Subsection 331.01. (12-31-91)

04. Posting. Each area or room containing analytical x-ray equipment must be conspicuously posted with a sign or signs bearing the radiation symbol and the words **"CAUTION - X-RAY EQUIPMENT"** or words having a substantially similar intent. (5-5-81)

332. -- 339. (RESERVED).

340. OPERATING PROCEDURES.

01. Normal Operating Procedures. Normal operating procedures must be written and available to all analytical x-ray equipment workers. No person will be permitted to operate analytical x-ray equipment in any manner other than that specified in the procedures unless such person has obtained written approval of the Radiation Safety Officer. (5-5-81)

02. Emergency Procedures. Written emergency procedures pertaining to radiation safety must be established for each x-ray producing apparatus by the Radiation Protection Supervisor, and posted in a conspicuous location. These must list the telephone numbers of the Radiation Protection Supervisor and must include the following actions to be taken in case of a known, or suspected, accident involving radiation exposure: (5-5-81)

a. Notify Radiation Protection Supervisor; and (5-9-68)

b. Arrange for medical examination. Additionally, the examining physician must be notified that exposure to low energy x-rays may have occurred. (5-9-68)

03. Exposure. Personnel must not expose any part of their body to the primary beam. (5-5-81)

04. Installation, Repair, and Modification. Only properly trained maintenance personnel can be permitted to install, repair, or make other than routine modifications to the x-ray generating apparatus and the tube housing apparatus complex. (5-5-81)

05. X-ray Diffraction and Spectrographic Equipment. Whenever possible, x-ray diffraction and spectrographic equipment must be placed in a room separate from other work areas. (5-9-68)

06. Alterations. If, for any reason, it is necessary to temporarily intentionally alter safety devices, such as bypassing interlocks or removing shielding, such action must be: (5-5-81)

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a. Specified in writing and posted near the x-ray tube housing so that other persons will know the existing status of the machine; and (5-9-68)

b. Terminated as soon as possible. (5-9-68)

07. Unused Tube Head Ports. Tube head ports must be secured in the closed position in a manner which will prevent casual opening; these must be checked prior to use when the machine has been left unattended. (12-1-87)

08. Personnel Monitoring. Finger or wrist dosimetric devices must be provided to and must be used by: (5-5-81)

a. Analytical x-ray equipment workers using systems having an open-beam configuration and not equipped with a safety device; and (5-5-81)

b. Personnel maintaining analytical x-ray equipment, if the maintenance procedures require the presence of a primary x-ray beam when any local component in the analytical x-ray system is disassembled or removed. (5-5-81)

09. Unattended Equipment. Analytical x-ray equipment must not be left unattended while the tube is energized unless: (5-5-81)

a. An interlock device is provided to prevent accidental entry into the primary beam; and (5-9-68)

b. The stray radiation at any accessible point at a distance of ten (10) inches, twenty-five (25) centimeters, from the tube housing or its containment, as measured with a monitoring instrument appropriate for the energy range generated, is no greater than two (2) mR per hour. (5-5-81)

10. Safety Devices. Safety devices should be tested at least once per week, and must be tested at intervals not to exceed one (1) month. (12-1-87)

11. Records. Records of personnel monitoring results and safety device tests must be maintained for inspection by the Radiation Control Agency. (5-5-81)

341. -- 349. (RESERVED).

350. RADIATION SAFETY REQUIREMENTS FOR PARTICLE ACCELERATOR OPERATIONS.
The regulations that follow comprise basic or minimum safety procedures for all accelerator facilities. The regulations in Section 350. establish requirements for the use of particle accelerators by persons registering such machines under the provisions of Section 090. The provisions of Sections 350. through 399. are in addition to, and not in substitution for, other applicable provisions of these regulations. (12-31-91)

351. -- 352. (RESERVED).

353. REGISTRATION OR LICENSURE PROCEDURE.

01. Registration Requirements. Persons must not receive, possess, use, transfer, own, or acquire a particle accelerator except as authorized in a registration issued pursuant to or otherwise provided for in these regulations. The general procedures for registration of particle accelerator facilities are included in Section 090. (12-31-91)

02. General Requirements for the Issuance of a Registration for Particle Accelerators. In addition to the requirements of Section 090. a registration application for use of a particle accelerator will be approved only if the Radiation Control Agency determines that: (12-31-91)

a. The applicant is qualified by reason of training and experience to use the accelerator in question for

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the purpose requested in accordance with Sections 353., 100. and 450. in such a manner as to minimize danger to public health and safety and/or property; and (12-31-91)

b. The applicant's proposed equipment, facilities, operating and emergency procedures are adequate to protect health and minimize danger to public health and safety and/or property; and (5-5-81)

c. The issuance of the registration will not be harmful or adverse to the health and/or safety of the public, and the applicant satisfies any applicable special requirement in Subsection 353.03.; and (12-31-91)

d. The applicant has appointed a Radiation Safety Officer; and (5-5-81)

e. The applicant and/or his staff has substantial experience in the use of particle accelerators for the intended uses; and (5-5-81)

f. The applicant has established a radiation safety committee to approve, in advance, proposals for uses of particle accelerators, whenever deemed necessary by the Radiation Control Agency; and (5-5-81)

g. The applicant has an adequate training program for particle accelerator operators. (5-5-81)

03. Human Use of Particle Accelerators. In addition to the requirements set forth in Section 090. a registration for use of a particle accelerator in the healing arts will be issued only if: (12-31-91)

a. Whenever deemed necessary by the Radiation Control Agency, the applicant has appointed a medical committee of at least three (3) members to evaluate all proposals for research, diagnostic, and therapeutic use of a particle accelerator. (Membership of the committee should include physicians expert in internal medicine, hematology, therapeutic radiology, and a person experienced in depth dose calculations and protection against radiation); and (5-5-81)

b. The individuals designated on the application as the users have substantial training and experience in deep therapy techniques or in the use of particle accelerators to treat humans; and (5-5-81)

c. The individual designated on the application as the user is a physician. (12-1-87)

354. RADIATION SAFETY REQUIREMENTS FOR THE USE OF PARTICLE ACCELERATORS.
Section 354, establishes radiation safety requirements for the use of particle accelerators. The provisions are in addition to, and not in substitution for, other applicable provisions of these regulations. The registrant or licensee will be responsible for assuring that all requirements of Section 350. are met. (12-31-91)

01. Limitations. (7-1-93)

a. No registrant will permit any person to act as a particle accelerator operator until such person: (5-5-81)

i. Has been instructed in radiation safety and has demonstrated an understanding thereof; and (5-5-81)

ii. Has received copies of and instruction in Section 350. and the applicable requirements of Sections 100. and 450. pertinent registration conditions and the registrant's operating and emergency procedures, and has demonstrated understanding thereof; and (12-31-91)

iii. Has demonstrated competence to use the particle accelerator, related equipment, and survey instruments which will be employed in that person's assignment. (12-1-87)

b. Either the radiation safety committee or the Radiation Safety Officer will have the authority to terminate the operations at a particle accelerator facility if such action is deemed necessary to protect health and/or minimize danger to public health and safety and/or property. (5-5-81)

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02. Shielding and Safety Design Requirements. (5-5-81)

a. A qualified expert, acceptable to the Radiation Control Agency, must be consulted in the design of a particle accelerator installation and called upon to perform a radiation survey when the accelerator is first capable of producing radiation. (12-1-87)

b. Each particle accelerator installation must be provided with such primary and/or secondary barriers as are necessary to assure compliance with Subsections 110.01. and 110.05. (12-31-91)

03. Particle Accelerator Control and Interlock Systems. (5-5-81)

a. Instrumentation, readouts and controls on the particle accelerator control console must be clearly identified and easily discernible. (5-5-81)

b. All entrances into a target room or other high radiation area must be provided with interlocks that shut down the machine under conditions of barrier penetration. (5-5-81)

c. When an interlock system has been tripped, it must only be possible to resume operation of the accelerator by manually resetting controls at the position where the interlock has been tripped, and then at the main control console. (5-5-81)

d. Each safety interlock must be on a circuit which will allow its operation independently of all other safety interlocks. (5-5-81)

e. All safety interlocks must be designed so that any defect or component failure in the interlock system prevents operation of the accelerator. (12-1-87)

f. A scram button or other emergency power cutoff switch must be located and easily identifiable in all high radiation areas. This button or cutoff switch must include a manual reset so that the accelerator cannot be restarted from the accelerator control console without resetting the cutoff switch (5-5-81)

04. Warning Devices. (5-5-81)

a. All locations designated as high radiation areas, and entrances to such locations must be equipped with easily observable flashing or rotating warning lights that operate when, and only when, radiation is being produced. (5-5-81)

b. Except in facilities designed for human exposure, each high radiation area must have an audible warning device which will be activated for fifteen (15) seconds prior to the possible creation of such high radiation area. Such warning device will be clearly discernible in all high radiation areas and all radiation areas. (5-5-81)

c. Barriers, temporary or otherwise, and pathways leading to high radiation areas must be identified in accordance with Subsection 120.03. (12-31-91)

05. Operating Procedures. (5-5-81)

a. Particle accelerators, when not in operation, must be secured to prevent unauthorized used. (5-5-81)

b. Only a switch on the accelerator control console must be routinely used to turn the accelerator beam on and off. The safety interlock system will not be used to turn off the accelerator beam except in an emergency. (5-5-81)

c. All safety and warning devices, including interlocks, must be checked for proper operability at intervals not to exceed three (3) months. Results of such tests will be maintained for inspection at the accelerator facility. (5-5-81)

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d. Electrical circuit diagrams of the accelerator and the associated interlock systems must be kept current and maintained for inspection by the Radiation Control Agency and available to the operator at each accelerator facility. (5-5-81)

e. If, for any reason, it is necessary to intentionally bypass a safety interlock or interlocks, such action will be: (5-5-81)

i. Authorized by the radiation safety committee and/or radiation safety officer; and (5-5-81)

ii. Recorded in a permanent log and a notice posted at the accelerator control console; and (5-5-81)

iii. Terminated as soon as possible. (5-5-81)

f. A copy of the current operating and the emergency procedures must be maintained at the accelerator control panel. (5-5-81)

g. Accelerators must not be left unattended while energized. (5-5-81)

06. Radiation Monitoring Requirements. (12-1-87)

a. There must be available at each particle accelerator facility, appropriate portable monitoring equipment which is operable and appropriately calibrated for the radiations being produced at the facility. This equipment must be tested for proper operation daily and calibrated at intervals not to exceed one (1) year, and after each servicing and repair. (12-1-87)

b. A radiation protection survey must be performed and documented by a qualified expert acceptable to the Radiation Control Agency when changes have been made in shielding, operation, equipment, or occupancy of adjacent areas. (12-1-87)

c. Radiation levels in all high radiation areas must be continuously monitored. The monitoring devices must be electrically independent of the accelerator control and interlock systems and capable of providing local readout at both the control panel and at entrance to high radiation areas, and other appropriate locations, so that people entering or present become aware of the existence of the hazard. (12-1-87)

d. All area monitors will be calibrated at intervals not to exceed one (1) year and after each servicing and repair. (12-1-87)

e. Whenever applicable, periodic surveys must be made to determine the amount of airborne particulate radioactivity present in areas of airborne hazards. (5-5-81)

f. Whenever applicable, periodic smear surveys must be made to determine the degree of contamination in target and other pertinent areas. (5-5-81)

g. All area surveys must be made in accordance with the written procedures established by a qualified expert, or the Radiation Safety Officer of the particle accelerator facility. (5-5-81)

h. Records of all radiation protection surveys, calibration results, instrumentation tests, and smear results must be kept current and on file at each accelerator facility. (5-5-81)

07. Ventilation Systems. (5-5-81)

a. Ventilation systems must be provided to ensure that personnel entering any areas where airborne radioactivity may be produced will not be exposed to airborne radioactive material in excess of those limits specified in Subsection 110.03. (12-31-91)

b. A registrant or licensee, as required by Subsection 110.06., must not vent, release or otherwise discharge airborne radioactive material to an uncontrolled area which exceeds the limits specified in Subsection

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110.03.a., except as authorized pursuant to Subsection 130.02. or 110.06.b. For purposes of Subsection 354.07., concentrations can be averaged over a period not greater than one (1) year. Every reasonable effort must be made to maintain releases of radioactive material to uncontrolled areas, as far below the limits of Subsection 110.03.a. as practicable. (12-31-91)

355. -- 399. (RESERVED).

400. RADIATION SAFETY REQUIREMENTS FOR RADIOACTIVE MINERAL TAILINGS AND INDUSTRIAL BY-PRODUCT PILES.
The regulations in Section 400. establish requirements for radioactive mineral tailing piles and ponds associated with active mills, inactive mills, and closed or abandoned mills. The provisions of Section 400. are in addition to, and not in substitution for, other applicable provisions of both these regulations, and any specific license issued to a mill operator, pursuant to regulations subsequent to the effective date of Section 400. (12-31-91)

401. -- 409. (RESERVED).

410. MAINTENANCE OF TAILINGS, PILES, AND PONDS.

01. High Water Erosion. If these areas are adjacent to a river, creek gulch or other watercourse that might reasonably be expected to erode the edges during periods of high water, the exposed slopes must be stabilized and the edges must be diked and riprapped sufficiently to prevent erosion. (5-5-81)

02. Drainage Ditches. Drainage ditches must be provided sufficient to prevent erosion from surface runoff water from neighboring land. (5-5-81)

03. Controlled Access. Access to the tailings, pile and pond areas must be controlled by the operator or owner and properly posted. (5-5-81)

04. Site Maintenance. The site must be maintained in such a manner that excessive erosion of, or environmental hazard from, radioactive materials does not occur. (5-5-81)

05. Transfer of Site Possession. The owner must give the Radiation Control Agency written notice thirty (30) days in advance of any contemplated transfer of right, title or interest in the site by deed, lease, or other conveyance. The written notice must contain the name and address of the proposed purchaser or transferee. Prior written approval of the Radiation Control Agency must be obtained before the surface area of the land can be put to use. (5-5-81)

06. Material Removal. With the exception of reprocessing at the site, prior written approval of the Radiation Control Agency must be obtained before any material is removed from any active or inactive site. (5-5-81)

07. Waivers. The Radiation Control Agency can waive or modify individual requirements in regard to stabilization or utilization of tailing material if it can be shown that they are unnecessary or impracticable in specific cases. (5-9-68)

411. -- 419. (RESERVED).

420. REQUIREMENTS FOR INACTIVE SITES.

01. Abandonment, Sale or Transfer of Site. Before abandonment, sale, or transfer, of any kind or manner, of a site, the operator must determine that all requirements of Section 410. are fulfilled at the site. If the requirements of Section 410. are not fulfilled at such time, the operator who abandons, sells, or transfers the site must fulfill the requirements of 410., and must return to the site any material which has been removed by natural forces. (12-31-91)

02. Additional Requirements for Abandonment, Sale or Transfer of Site. Before abandonment, sale, or transfer, of any kind or manner, of a site, the operator must determine that the following requirements are fulfilled: (5-5-81)

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a. Ponds must be drained and covered with materials that prevent blowing of dust. Water drained from the ponds must be disposed of in a manner approved by the Radiation Control Agency; and (5-5-81)

b. Taking into consideration the types of materials at each site, piles must be leveled and graded so that there is, insofar as possible, a gradual slope to ensure that there will no low places on the pile where water might collect. Side slopes must be stabilized by riprap, dikes, reduction or grades, vegetation, or any other method or combination of methods that will ensure stabilization; and (5-5-81)

c. The pile must be stabilized against wind and water erosion. The method of stabilization can consist of vegetation or a cover of soil, soil containing rock or stone, cement or concrete products, petroleum products, or any other soil stabilization material presently recognized or which can be recognized in the future, or any combination of the foregoing as necessary for proper protection from wind, or water erosion; and (5-5-81)

d. Detailed plans for stabilizing piles must be submitted to the Radiation Control Agency for review and approval prior to undertaking stabilization of the pile; and (5-5-81)

e. If the requirements of Subsection 420.02. are not fulfilled before the abandonment, sale, or transfer of a site, the operator who abandons, sells or transfers such site must fulfill the requirements of Subsection 420.02. and must, in addition, return to the site any material which has been removed by natural forces. (12-31-91)

421. -- 429. (RESERVED).

430. WAIVER.
The Radiation Control Agency can waive the requirements of Section 420. for a sale or transfer of a site to a person who plans to continue operating the site for the same purpose. Such waiver must not be granted until the new operator has obtained a license from the Radiation Control Agency issued pursuant to Subsection 081.11. (12-31-91)

431. -- 439. (RESERVED).

440. PUBLIC AND CONFIDENTIAL INFORMATION.

01. Accessibility. Except as provided in this section or other applicable law, information obtained or submitted pursuant to these regulations will be available to the public for inspection and copying during normal working hours. Anyone requesting Radiation Control Agency assistance in collecting, copying or mailing public information must tender, in advance, the reasonable cost of those services. (12-1-87)

02. Confidentiality. Information concerning radiation sources submitted to the Radiation Control Agency pursuant to these regulations which, as certified by the owner or operator of such source, relates to production or sales figures or to processed or production unique to the owner or operator, or tends to adversely affect the competitive position of such owner or operator, may be disclosed only to the Board, the Radiation Control Agency or a hearing officer unless: (12-1-87)

a. The Board, after a hearing, determines that a claim of uniqueness or adverse effect is unwarranted; (12-1-87)

b. The owner or operator expressly consents to disclosure; or (12-1-87)

c. Disclosure is required for criminal prosecution of a violation of the Idaho Environmental Protection and Health Act. (12-1-87)

03. Department Discretion. The Radiation Control Agency may decline to release to the public: (12-1-87)

a. Inconclusive preliminary data or reports generated as part of ongoing studies; and (12-1-87)

b. Information obtained as part of ongoing investigations when release would: (12-1-87)

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i. Interfere with enforcement proceedings; (12-1-87)

ii. Deprive a person of a fair or impartial adjudication; (12-1-87)

iii. Discourage informants from disclosing information to the Radiation Control Agency; (12-1-87)

iv. Disclose investigative techniques or proceedings; or (12-1-87)

v. Endanger the safety of Radiation Control Agency personnel. (12-1-87)

441. -- 449. (RESERVED).

450. NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS -- INSPECTIONS.

01. Purpose and Scope. Section 450. establishes requirements for notices, instructions and reports by licensees or registrants to individuals engaged in work under a license or registration and options available to such individuals in connection with the Radiation Control Agency compliance inspections of licensees or registrants regarding radiological working conditions. The regulations in Section 450. apply to all persons who receive, possess, use, own or transfer material licensed by or registered with the Radiation Control Agency pursuant to the regulations in Sections 050. and 090. (12-31-91)

02. Posting of Notices to Workers. (5-5-81)

a. Each licensee or registrant must post current copies of the following documents: (5-5-81)

i. The regulations in Sections 450. and 100.; and (12-31-91)

ii. The license, certificate of registration, conditions or documents incorporated into the license by reference and amendments thereto; and (5-5-81)

iii. The operating procedures applicable to work under the license or registration; and (5-5-81)

iv. Any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or order issued pursuant to Section 000.and any response from the licensee or registrant. (12-31-91)

b. If posting of a document specified in Subsections 450.02.a.i., 450.02.a.ii., or 450.02.a.iii. is not practicable, the licensee or registrant can post a notice which describes the document and states where it can be examined. (12-31-91)

c. Agency form "Notice to Employees" must be posted by each licensee or registrant wherever individuals work in or frequent any portion of a restricted area. This form must include the following wording:

"NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION
in Idaho Radiation Control Regulations, the Idaho State Board of Health has established standards for your protection against radiation hazards.

YOUR EMPLOYER'S RESPONSIBILITY
Your employer is required to....
1. Apply these regulations to work involving sources of radiation.

2. Post or otherwise make available to you a copy of the Idaho Department of Health and Welfare Regulations, licenses, and operating procedures which apply to work you are engaged in, and explain their provisions to you.

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YOUR RESPONSIBILITY AS A WORKER

You should familiarize yourself with those provisions of the Idaho Department of Health and Welfare Rules, and the operating procedures which apply to the work you are engaged in. You should observe its provisions for your own protection and protection of your co-workers.

WHAT IS COVERED BY THESE REGULATIONS

1. Limits on exposure to radiation and radioactive material in restricted and unrestricted areas;
2. Measures to be taken after accidental exposure;
3. Personnel monitoring, surveys and equipment;
4. Caution signs, labels, and safety interlock equipment;
5. Exposure records and reports; and
6. Related matters.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY

1. The Idaho Department of Health and Welfare Regulations require that your employer give you a written report if you receive an exposure in excess of any applicable limit as set forth in the regulations or in the license. The basic limits for exposure to employees are set forth in Section 100. This section specifies limits on exposure to radiation and exposure to concentrations of radioactive material in air and water.

2. If you work where personnel monitoring is required, and if you request information on your radiation exposures,

a. Your employer must give you a written report, upon termination of your employment, of your radiation exposures, and

b. Your employer must advise you annually of your exposure to radiation.

INSPECTIONS

All licensed or registered activities are subject to inspection by representatives of the Idaho Department of Health and Welfare.

INQUIRIES

Inquiries dealing with the matters outlined above can be sent to the Radiation Control Section, Idaho Department of Health and Welfare, Statehouse, Boise, Idaho, 83720, having inspection responsibility over your installation.

POSTING REQUIREMENT

COPIES OF THIS NOTICE MUST BE POSTED IN A SUFFICIENT NUMBER OF PLACES IN EVERY ESTABLISHMENT WHERE EMPLOYEES ARE EMPLOYED IN ACTIVITIES LICENSED OR REGISTERED, PURSUANT TO IDAHO DEPARTMENT OF HEALTH AND WELFARE RULES AND REGULATIONS, TITLE 1, CHAPTER 9, SECTION 050, BY THE IDAHO DEPARTMENT OF HEALTH AND WELFARE, TO PERMIT EMPLOYEES WORKING IN OR REQUENTING ANY PORTION OF A RESTRICTED AREA TO OBSERVE A COPY ON THE WAY TO OR FROM THEIR PLACE OF EMPLOYMENT." (12-1-87)

d. Documents, notices or forms posted pursuant to this section must appear in a sufficient number of places to permit individuals engaged in work under the license or registration to observe them on the way to or from any particular work location to which the document applies, must be conspicuous, and must be replaced if defaced or altered. (5-5-81)

e. Radiation Control Agency documents posted pursuant to Subsection 450.02.a.iv. must be posted within five (5) working days after receipt of the documents from the Radiation Control Agency; the licensee's or registrant's response, if any, must be posted within five (5) working days after dispatch from the licensee or registrant. These documents must remain posted for a minimum of five (5) working days or until action correcting the violations has been completed, whichever is later. (12-31-91)

03. Instructions to Workers. All individuals working in or frequenting any portion of a restricted area must: (12-1-87)

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a. Be kept informed of the storage, transfer, or use of radioactive material or of radiation in such portions of the restricted area; (12-1-87)

b. Be instructed in the health protection problems associated with exposure to such radioactive material or radiation, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed; (12-1-87)

c. Be instructed in and directed to observe, to the extent within the worker's control, the applicable provisions of Radiation Control Agency regulations and licenses for the protection of personnel from exposures to radiation or radioactive material occurring in such areas; (12-1-87)

d. Be instructed of their responsibility to report promptly to the licensee or registrant any condition which can lead to or cause a violation of Radiation Control Agency regulations and licenses or unnecessary exposure to radiation or radioactive material; (12-1-87)

e. Be instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction which might involve exposure to radiation or radioactive material; and (12-1-87)

f. Be advised as to the radiation exposure reports which workers can request pursuant to Subsection 450.04. The extent of these instructions must be commensurate with potential radiological health protection problems in the restricted area. (12-31-91)

04. Notifications and Reports to Individuals. (5-5-81)

a. Radiation exposure data for an individual and the results of any measurements, analyses, and calculations of radioactive material deposited or retained in the body of an individual must be reported to the individual as specified in Section 450. The information reported will include data and results obtained pursuant to Radiation Control Agency regulations, orders, or license conditions, as shown in records maintained by the licensee or registrant pursuant to Radiation Control Agency Regulations. Each notification and report will: be in writing; include appropriate identifying data such as the name of the licensee or registrant, the name of the individual, and the individual's social security number; include the individual's exposure information; and contain the following statement: (12-31-91)

"This report is furnished to you under the provisions of (cite appropriate Radiation Control Agency regulations) Section 450. You should preserve this report for further reference." (12-31-91)

b. Each licensee or registrant must advise workers annually of their exposure to radiation or radioactive material as shown in records maintained by the licensee or registrant pursuant to Subsections 140.01.a. and 140.01.c. (12-31-91)

c. Each licensee or registrant must furnish to the workers a report of their exposure to radiation or radioactive material. Such report: must be furnished within thirty (30) days from the time the request is made, or within thirty (30) days after the exposure of the individual has been determined by the licensee or registrant, whichever is later; must cover, within the period of time specified in the request, each calendar quarter in which the worker's activities involved exposure to radiation from radioactive material licensed by, or radiation machines registered with the Radiation Control Agency; and must include the dates and locations of work under the license or registration in which the worker participated during this period. (12-1-87)

d. When a licensee or registrant is required pursuant to Subsection 140.04. to report to the Radiation Control Agency any exposure of an individual to radiation or radioactive material, the licensee or the registrant must also provide the individual a report on his exposure data included therein. Such reports will be transmitted at a time not later than the transmittal to the Radiation Control Agency. (12-31-91)

e. At the request of a worker who is terminating employment in a given calendar quarter with the licensee or registrant in work involving radiation dose, or of a worker who, while employed by another person, is terminating assignment to work involving radiation dose in the licensee's or registrant's facility in that calendar

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quarter, each licensee or registrant must provide to each such worker, or to the worker's designee, at termination, a written report regarding the radiation dose received by that worker from operations of the licensee or registrant during that specific identified calendar quarter or fraction thereof, or provide a written estimate of that dose if the finally determined personnel monitoring results are not available at that time. Estimated doses must be clearly indicated as such. (12-1-87)

05. Presence of Representatives of Licensees or Registrants and Workers During Inspection. (5-5-81)

a. Each licensee or registrant must afford to the Radiation Control Agency at all reasonable times opportunity to inspect materials, machines, activities, facilities premises, and records pursuant to these regulations. (5-5-81)

b. During an inspection, Radiation Control Agency inspectors can consult privately with workers as specified in Subsection 450.06. The licensee or registrant can accompany Radiation Control Agency inspectors during other phases of an inspection. (12-31-91)

c. If, at the time of inspection, an individual has been authorized by the workers to represent them during Radiation Control Agency inspections, the licensee or registrant must notify the inspectors of such authorization and give the workers' representative an opportunity to accompany the inspectors during the inspection of physical working conditions. (5-5-81)

d. Each workers' representative must be routinely engaged in work under control of the licensee or registrant and have received instructions as specified in Subsection 450.03. (12-31-91)

e. Different representatives of licensees or registrants and workers can accompany the inspectors during different phases of an inspection if there is no resulting interference with the conduct of the inspection. However, only one (1) worker's representative at a time can accompany the inspectors. (5-5-81)

f. With the approval of the licensee or registrant and the workers' representative, an individual who is not routinely engaged in work under control of the licensee or registrant, for example, a consultant to the licensee or registrant or to the workers' representative, must be afforded the opportunity to accompany Radiation Control Agency inspectors during the inspection of physical working conditions. (5-5-81)

g. Notwithstanding the other provisions of this section, Radiation Control Agency inspectors are authorized to refuse to permit accompaniment by any individual who deliberately interferes with a fair and orderly inspection. With regard to any area containing proprietary information, the workers' representative for that area will be an individual previously authorized by the licensee or registrant to enter that area. With regard to areas containing information classified by an agency of the U.S. Government in the interest of national security, an individual who accompanies an inspector may have access to such information only if authorized to do so. (12-1-87)

06. Consultation with Workers During Inspections. (5-5-81)

a. Radiation Control Agency inspectors can consult privately with workers concerning matters of occupational radiation protection and other matters related to applicable provisions of Radiation Control Agency Regulations and licenses to the extent the inspectors deem necessary for the conduct of an effective and thorough inspection. (5-5-81)

b. During the course of an inspection any worker can bring privately to the attention of the inspectors, either orally or in writing, any past or present condition which he has reason to believe could have contributed to or caused any violations of the Act, these regulations, or license condition, or any unnecessary exposure of an individual to radiation from licensed radioactive material or a registered radiation machine under the licensee's or registrant's control. Any such notice in writing must comply with the requirements of Subsection 450.07.a. (12-31-91)

c. The provisions of Subsection 450.06. must not be interpreted as authorization to disregard instructions pursuant to Subsection 450.03. (12-31-91)

07. Requests by Workers for Inspections. (5-5-81)

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a. Any worker or representative of workers who believes that a violation of the Act, these regulations or license conditions exists or has occurred in work under a license or registration with regard to radiological working conditions in which the worker is engaged, can request an inspection by giving notice of the alleged violation to the Idaho Radiation Control Agency. Any such notice must be in writing, must set forth the specific grounds for the notice, and must be signed by the worker or representative of the workers. A copy must be provided to the licensee or registrant by the Radiation Control Agency no later than at the time of inspection except that, upon the request of the worker giving such notice, his name and the name of individuals referred to therein will not appear in such copy or on any record published, released, or made available by the Radiation Control Agency, except for good cause shown. (5-5-81)

b. If upon receipt of such notice, the state official determines that the complaint meets the requirements set forth in Subsection 450.07. and that there are reasonable grounds to believe that the alleged violation exists or has occurred, he must cause an inspection to be made, as soon as practicable, to determine if such alleged violation exists or has occurred. Inspections pursuant to this section need not be limited to matters referred to in the complaint. (12-31-91)

c. No licensee or registrant can discharge or in any manner discriminate against any worker because such worker has filed any complaint or instituted or caused to be instituted any proceeding under these regulations or has testified or is about to testify in any such proceeding or because of the exercise by such worker on behalf of himself or others of any option afforded by Section 450. (12-31-91)

08. Inspection Not Warranted - Informal Review. (5-5-81)

a. If the Radiation Control Agency determines, with respect to a complaint under Subsection 450.07. that an inspection is not warranted because there are no reasonable grounds to believe that a violation exists or has occurred, the Radiation Control Agency must notify the complainant in writing of such determination. The complainant can obtain review of such determination by submitting a written statement of position with the Board of Health and Welfare who will provide the licensee or registrant with a copy of such statement by certified mail, excluding, at the request of the complainant, the name of the complainant. The licensee or registrant can submit an opposing written statement of position with the Board of Health and Welfare who will provide the complainant with a copy of such statement by certified mail. Upon the request of the complainant, the Board of Health and Welfare can hold an informal conference in which the complainant and the licensee or registrant can orally present their views. An informal conference can also be held at the request of the licensee or registrant, but disclosure of the identity of the complainant will be made only following receipt of written authorization from the complainant. After considering all written or oral views presented, the Board of Health and Welfare must affirm, modify, or reverse the determination of the Radiation Control Agency and furnish the complainant and the licensee or registrant a written notification of its decision and the reason therefor. (5-5-81)

b. If the Radiation Control Agency determines that an inspection is not warranted because the requirements of Subsection 450.07.a. have not been met, they must notify the complainant in writing of such determination. Such determination will be without prejudice to the filing of a new complaint meeting the requirements of Subsection 450.07.a. (12-31-91)

451. -- 499. (RESERVED).

500. TRANSPORTATION.
The provisions of this section apply to packaging, preparation for shipment and transportation of radioactive material, and apply to delivery of radioactive material to a carrier for transportation. (12-1-87)

501. TRANSPORTATION OF RADIOACTIVE MATERIALS.
No licensee shall transport any radioactive material outside of the confines of his plant or other authorized location of use, or deliver any radioactive material to a carrier for transportation except as authorized in a general or specific license issued by the Radiation Control Agency or as exempted in Subsection 501.01. (12-31-91)

01. Exemptions. The following are exempted from the requirements of Section 500: (12-31-91)

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a. Common and contract carriers, freight forwarders, and warehousemen who are subject to the requirements of the U.S. Department of Transportation in 49 CFR 170 through 189 or the U.S. Postal Service in the Postal Service Manual (Domestic Mail Manual), Section 124.3, incorporated by reference, 39 CFR 111.11 (1974), to the extent that they transport or store radioactive material in the regular course of their carriage for another or storage incident thereto. Common and contract carriers who are not subject to the requirements of the U.S. Department of Transportation or U.S. Postal Service are subject to Section 500. and other applicable sections of these regulations. (12-31-91)

b. A licensee, to the extent that delivery of a package is to a carrier for transport, when each package contains no licensed material having a specific activity in excess of two-thousandths (.002) microcurie per gram; and (12-1-87)

c. A licensee whose packages contain no more than A or A quantities of non-fissile radioactive material or only americium or plutonium in special form with an aggregate radioactivity not to exceed twenty (20) curies. However, the licensee must follow requirements under Subsection 053.02. (12-31-91)

02. Transporting Radioactive Material by a Licensee or Transfer to a Carrier. Each licensee who transports licensed material outside of the confines of the licensee's plant or other place of use, or who delivers licensed material to a carrier for transport shall: (12-1-87)

a. Comply with the applicable requirements, appropriate to the mode of transport, of the regulations of the U.S. Department of Transportation; (12-1-87)

b. Assure that any special instructions needed to safely open the package are sent to or have been made available to the consignee. (12-1-87)

03. General Licenses for Carriers. (5-5-81)

a. A general license shall be issued to any common or contract carrier not exempt under Section 006. to receive, possess, transport, and store radioactive material in the regular course of their carriage for another or storage incident thereto, provided the transportation and storage is in accordance with the applicable requirements, appropriate to the mode of transport, of the U.S. Department of Transportation insofar as such requirements relate to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting. (12-31-91)

b. A general license is hereby issued to any private carrier to transport radioactive material, provided the transportation is in accordance with the applicable requirements, appropriate to the mode of transport, of the U.S. Department of Transportation insofar as such requirements relate to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting. (12-1-87)

c. Persons who transport radioactive material pursuant to the general licenses in Subsections 501.03.a. and b. are exempt from the requirements of Sections 100. and 450. to the extent that they transport radioactive material. (12-31-91)

d. Any notification of incidents referred to in U.S. Department of Transportation requirements shall be filed with, or made to, the Radiation Control Agency. (12-1-87)

04. General License - Nuclear Regulatory Commission Approved Packages. (5-5-81)

a. A general license is hereby issued to any licensee of the Agency to transport, or to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance, or other approval has been issued by the U.S. Nuclear Regulatory Commission. (12-1-87)

b. This general license applies only to a licensee who: (5-5-81)

i. Has a copy of the specific license, 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 prior to shipment; (12-1-87)

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ii. Complies with the terms and conditions of the license, certificate, or other approval, as applicable, and the applicable requirements of this section; (12-1-87)

iii. Prior to the licensee's first use of the package, has registered with the U.S. Nuclear Regulatory Commission; and (12-1-87)

iv. Has a quality assurance program as required by Subsection 501.17., approved by the Agency. (12-31-91)

c. The general license in Subsection 501.04.a., applies only when the package approval authorizes use of the package under this general license. (12-31-91)

d. For previously approved Type B packages which are not designated as either B(U) or B(M) in the U.S. Nuclear Regulatory Commission Certificate of Compliance, this general license is subject to additional restrictions of Subsection 501.05. (12-31-91)

05. Previously Approved Type B Packages. A Type B package previously approved by the U.S. Nuclear Regulatory Commission, but not designated as B(U) or B(M) in the U.S. Nuclear Regulatory Commission Certificate of Compliance, may be used under the general license of Subsection 501.04. with the following additional limitations: (12-31-91)

a. Fabrication of the packaging was satisfactorily completed before August 31, 1986, as demonstrated by application of its model number in accordance with U.S. Nuclear Regulatory Commission regulations; and (12-1-87)

b. The package may not be used for a shipment to a location outside the United States after August 31, 1986, except under special arrangement approved by the U.S. Department of Transportation in accordance with 49 CFR 173.471. (12-1-87)

06. General License - Department of Transportation Specification Container. (5-5-81)

a. A general license is hereby issued to any licensee of the Agency to transport or to deliver to a carrier for transport licensed material in a specification container for a Type B quantity of radioactive material as specified in the regulations of U.S. Department of Transportation in 49 CFR Parts 173 and 178. (12-1-87)

b. This general license applies only to a licensee who has a quality assurance program approved by the Agency as satisfying the provisions of Subsection 501.17. (12-31-91)

c. This general license applies only to a licensee who: (12-1-87)

i. Has a copy of the specification; and (12-1-87)

ii. Complies with the terms and conditions of the specification and the applicable requirements of this section. (12-1-87)

d. The general license in Subsection 501.06. is subject to the limitation that the specification container may not be used for a shipment to a location outside the United States after August 31, 1986, except under special arrangements approved by U.S. Department of Transportation in accordance with 49 CFR 173.472. (12-31-91)

07. General License - Use of Foreign Approved Package. (5-5-81)

a. A general license is hereby issued to any licensee of the Agency 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 which has been revalidated by the U.S. Department of Transportation as meeting the applicable requirements of 49 CFR 171.12. (12-1-87)

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b. This general license applies only to shipments made to or from locations outside the United States. (12-1-87)

c. This general license applies only to a licensee who: (12-1-87)

i. 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 prior to shipment; and (12-1-87)

ii. Complies with the terms and conditions of the certificate and revalidation and with the applicable requirements of this section. (12-1-87)

08. General License - Type A, Fissile Class II Packages. (12-1-87)

a. A general license is hereby issued to any licensee to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped as a Fissile Class II package. (12-1-87)

b. This general license applies only when a package contains no more than a Type A quantity of radioactive material, including only one (1) of the following: (12-1-87)

i. Up to forty (40) grams of uranium-235; or (12-1-87)

ii. Up to thirty (30) grams of uranium-233; or (12-1-87)

iii. Up to twenty-five (25) grams of the fissile radionuclides of plutonium, except that for encapsulated plutonium-beryllium neutron sources in special form, an A quantity of plutonium may be present; or (12-1-87)

iv. A combination of fissile radionuclides in which the sum of the ratios of the amount of each radionuclide to the corresponding maximum amounts in Subsections 501.08. i. and 501.08.iii. does not exceed unity. (12-31-91)

c. This general license applies only when, except as specified below for encapsulated plutonium-beryllium sources, a package containing more than fifteen (15) grams of fissile radionuclides is labeled with a transport index of not less than the number given by the following equation, where the package contains x grams of uranium-235, y grams of uranium-233, and z grams of the fissile radionuclides of plutonium:

15
minimum transport index = (.04x Plus 0.67y Plus z) (1-) x Plus y Plus z

For a package in which the only fissile material is in the form of encapsulated plutonium-beryllium neutron sources in special form, the transport index based on criticality considerations may be taken as 0.026 times the number of grams of the fissile radionuclides of plutonium in excess of fifteen (15) grams. In all cases, the transport index must be rounded up to one (1) decimal place, and may not exceed ten (10). (12-1-87)

09. General License - Restricted, Fissile Class II Package. (12-1-87)

a. A general license is hereby issued to any licensee to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped as a Fissile Class II package. (12-1-87)

b. This general license applies only when: (12-1-87)

i. The package contains no more than a Type A quantity of radioactive material; and (12-1-87)

ii. Neither beryllium nor hydrogenous material enriched in deuterium is present; and (12-1-87)

iii. The total mass of graphite present does not exceed one-hundred fifty (150) times the total mass of uranium-235 plus plutonium; and (12-1-87)

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iv. Substances having a higher hydrogen density than water, e.g., certain hyrdrocarbon oils are not present, except that polyethylene may be used for packing or wrapping; and (12-1-87)

v. Uranium-233 is not present and the amount of plutonium does not exceed one percent (1%) of the amount of uranium-235; and (12-1-87)

vi. The amount of uranium-235 is limited as follows: (12-1-87)

(a) If the fissile radionuclides are not uniformly distributed, the maximum amount of uranium-235 per package may not exceed the value given in the following table:

Uranium enrichment in weight percent of uranium-235 not exceeding	Permissible maximum grams of uranium-235 per package
24	40
20	42
15	45
11	48
10	51
9.5	52
9	54
8.5	55
8	57
7.5	59
7	60
6.5	62
6	65
5.5	68
5	72
4.5	76
4	80
3.5	88
3	100
2.5	120
2	164
1.5	272
1.35	320
1	680*

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Uranium enrichment in weight percent of uranium-235 not exceeding	Permissible maximum grams of uranium-235 per package
0.92	1200*

* Pursuant to its agreement with the U.S. Nuclear Regulatory Commission, Agency jurisdiction extends only to three hundred and fifty (350) grams of uranium-235. (12-1-87)

(b) If the fissile radionuclides are distributed uniformly, i.e., cannot form a lattice arrangement within the packaging, the maximum amount of uranium-235 per package may not exceed the value given to the following table:

Table II

Uranium enrichment in weight percent of uranium-235 not exceeding	Permissible maximum grams of uranium-235 per package
4	84
3.5	92
3	112
2.5	148
2	240
1.5	560
1.35	800

(12-1-87)

vii. The transport index of each package based on criticality considerations is taken as ten (10) times the number of grams of uranium-235 in the package divided by the maximum allowable number of grams per package in accordance with Table I or II in this section, as applicable. (12-1-87)

10. Fissile Material - Assumptions as to Unknown Properties. 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 nuclear reactivity. (12-1-87)

11. Preliminary Determinations. Prior to the first use of any packaging for the shipment of radioactive material; (12-1-87)

a. The licensee must ascertain that there are no defects which could significantly reduce the effectiveness of the packaging; (12-1-87)

b. Where the maximum normal operating pressure will exceed thirty four and three-tenths 34.3 kilopascal (5 psi) gauge, the licensee must test the containment system at an internal pressure at least fifty percent (50%) higher than the maximum normal operating pressure to verify the capability of that system to maintain its structural integrity at that pressure; (12-31-91)

c. The licensee must conspicuously and durably mark the packaging with its model number, gross

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weight, and a package identification number assigned by the U.S. Nuclear Regulatory Commission. Prior to applying the model number, the licensee must determine that the packaging has been fabricated in accordance with the design approved by the U.S. Nuclear Regulatory Commission. (12-1-87)

12. Routine Determination. Prior to 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 must determine that: (12-1-87)

a. The package is proper for the contents to be shipped; (12-1-87)

b. The package is in unimpaired physical condition except for superficial defects such as marks or dents; (12-1-87)

c. Each closure device of the packaging, including any required gasket, is properly installed and secured and free of defects; (12-1-87)

d. Any system for containing liquid is adequately sealed and has adequate space or other specified provision for expansion of the liquid; (12-1-87)

e. Any pressure relief device is operable and set in accordance with written procedures; (12-1-87)

f. The package has been loaded and closed in accordance with written procedures; (12-1-87)

g. Any structural part of the package which could be used to lift or tie down the package during transport is rendered inoperable for that purpose unless it satisfies design requirements specified by the U.S. Nuclear Regulatory Commission. (12-1-87)

h. The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for shipment is as low as reasonably achievable. The level of non-fixed radioactive contamination may be determined by wiping an area of three hundred (300) square centimeters of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. (12-1-87)

i. Except as provided under Subsection 005.h.ii., the amount of radioactivity measured on any single wiping material when averaged over the surface wiped, must not exceed the limits given in Table V of this section at any time during transport. Other methods of assessment of equal or greater efficiency may be used. When other methods are used, the detection efficiency of the method used must be taken into account and in no case may the non-fixed contamination on the external surfaces of the package exceed ten (10) times the limits listed in the following Table V.

REMOVABLE EXTERNAL RADIOACTIVE CONTAMINATION WIPE LIMITS		
Maximum Permissible Limits		
Contaminant	**uCi/cm^2**	**dpm/cm**
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than 10 days; natural uranium; natural thorium; uranium-235; uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical concentrates	$1X10^{-5}$	22
All other alpha emitting radionuclides	$1X10^{-6}$	2.2

(12-1-87)

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ii. In the case of packages transported as exclusive use shipments by rail or highway only, the non-fixed radioactive contamination at any time during transport must not exceed ten (10) times the levels prescribed in Subsection 501.01.h.i. The levels at the beginning of transport must not exceed the levels prescribed in Subsection 501.01.h.i. (12-31-91)

i. External radiation levels around the package and around the vehicle, if applicable, will not exceed two hundred (200) millirem per hour at any point on the external surface of the package at any time during transportation. The transport index shall not exceed ten (10). (12-1-87)

j. For a package transported as exclusive use by rail, highway or water, radiation levels external to the package may exceed the limits specified in Subsection 5.i., but must not exceed any of the following: (12-31-91)

i. Two hundred (200) millirem/hour on the accessible external surface of the package unless the following conditions are met, in which case the limit is one thousand (1,000) millirem per hour; (12-1-87)

(a) The shipment is made in a closed transport vehicle; (12-1-87)

(b) Provisions are made to secure the package so that its position within the vehicle remains fixed during transportation; and (12-1-87)

(c) There are no loading or unloading operations between the beginning and end of the transportation; (12-1-87)

ii. Two hundred (200) millirem/hour at any point on the outer surface of the vehicle, including the upper and lower surfaces, or in the case of an open vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle; (12-1-87)

iii. Ten (10) millirem/hour at any point two (2) meters from the vertical planes represented by the outer lateral surfaces of the vehicle, or in the case of an open vehicle, at any point two (2) meters from the vertical planes projected from the outer edges of the vehicle; and (12-1-87)

iv. Two (2) millirem/hour in any normally occupied positions of the vehicle, except that this provision does not apply to private motor carriers when persons occupying these positions are provided with special health supervision, personnel radiation exposure monitoring devices, and training in accordance with Subsection 450.03. (12-31-91)

k. A package must be prepared for transport so that in still air at 100F (30C) and in shade, no accessible surface of a package would have a temperature exceeding 122F (50C) in a nonexclusive use shipment or 180F (82C) in an exclusive use shipment. Accessible package surface temperatures must not exceed these limits at any time during transportation. (12-1-87)

13. Air Transport of Plutonium. Notwithstanding the provisions of any general licenses and notwithstanding any exemptions stated directly in this part or included indirectly by citation of U.S. Department of Transportation regulations, as may be applicable, the licensee shall assure that plutonium in any form is not transported by air or delivered to a carrier for air transport unless: (12-1-87)

a. The plutonium is contained in a medical device designed for individual human application; or (12-1-87)

b. The plutonium is contained in a material in which the specific activity is not greater than two one-thousandths 0.002 microcuries per gram of material and in which the radioactivity is essentially uniformly distributed; or (12-31-91)

c. The plutonium is shipped in a single package containing no more than an A quantity of plutonium in any isotope or form and is shipped in accordance with Subsection 501.02; or (12-31-91)

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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 U.S. Nuclear Regulatory Commission. (12-1-87)

14. Records. (12-1-87)

a. Each licensee must maintain for a period of two (2) years after shipment a record of each shipment of licensed material not exempt under Subsection 501.01. showing, where applicable: (12-31-91)

i. Identification of the packaging by model number; (12-1-87)

ii. Verification that there are no significant defects in the packaging, as shipped; (12-1-87)

iii. Volume and identification of coolant; (12-1-87)

iv. Type and quantity of licensed material in each package and the total quantity of each shipment; (12-1-87)

v. Date of the shipment: (12-1-87)

vi. Name and address of the transferee; (12-1-87)

vii. Address to which the shipment was made; and (12-1-87)

viii. Results of the determinations required by Subsection 501.10. (12-31-91)

b. The licensee must make available to the Agency for inspection, upon reasonable notice, all records required in this section. (12-1-87)

15. Reports. The licensee must report to the Agency within thirty (30) days: (12-1-87)

a. Any instance in which there is significant reduction in the effectiveness of any authorized packaging during use; and (12-1-87)

b. Details of any defects with safety significance in the packaging after first use, with the means employed to repair the defects and prevent their recurrence. (12-1-87)

16. Advance Notification of Transport of Nuclear Waste. (12-1-87)

a. Prior to the transport of any nuclear waste outside of the confines of the licensee's facility or other place of use or storage, or prior to the delivery of any nuclear waste to a carrier for transport, each licensee must provide advance notification of such transport to the governor, or governor's designee, and the agency of each state through which the waste will be transported. For the purpose of Subsection 501.04., "nuclear waste" means any large quantity of source, byproduct, or special nuclear material required to be in Type B packaging while transported to, through, or across state boundaries to a disposal site, or to a collection point for transport to a disposal site. (12-31-91)

b. Advance notification is required only when: (12-1-87)

i. The nuclear waste is required to be in Type B packaging for transportation; (12-1-87)

ii. The nuclear waste is being transported to, through, or across state boundaries to a disposal site or to a collection point for transport to a disposal site; (12-1-87)

iii. The quantity of licensed material in a single package exceeds: (12-1-87)

(a) Five thousand (5,000) curies of special form radionuclides; (12-1-87)

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(b) Five thousand (5,000) curies of uncompressed gases of argon-41, krypton-85m, krypton-87, xenon-131m, or xenon-135; (12-1-87)

(c) Fifty thousand (50,000) curies of argon-37 or of uncompressed gases of krypton-85 or xenon-133, or of hydrogen-3 as a gas, as luminous paint, or absorbed on solid material; (12-1-87)

(d) Twenty (20) curies of other nonspecial form radionuclides for which A_2 is less than or equal to four (4) curies; or (12-1-87)

(e) Two hundred (200) curies of other nonspecial form radionuclides for which A is greater than four (4) curies. (12-1-87)

c. Each advance notification required by Subsection 501.16. must contain the following information: (12-31-91)

i. The name, address, and telephone number of the shipper, carrier, and receiver of the shipment; (12-1-87)

ii. A description of the nuclear waste contained in the shipment as required by the regulations of the U.S. Department of Transportation, 49 CFR 172.202 and 172.203(d); (12-1-87)

iii. The point of origin of the shipment and the seven (7) day period during which departure of the shipment is estimated to occur; (12-1-87)

iv. The seven (7) day period during which arrival of the shipment at state boundaries is estimated to occur; (12-1-87)

v. The destination of the shipment, and the seven (7) day period during which arrival of the shipment is estimated to occur; and (12-1-87)

vi. A point of contact with a telephone number for current shipment information. (12-1-87)

d. The notification required by this section must be made in writing to the office of each appropriate governor or governor's designee and to the Agency. A notification delivered by mail must be postmarked at least seven (7) days before the beginning of the seven (7) day period during which departure of the shipment is estimated to occur. A notification delivered by messenger must reach the Office of the Governor, or governor's designee, at least four (4) days before the beginning of the seven (7) day period during which departure of the shipment is estimated to occur. A copy of the notification must be retained by the licensee for one (1) year. (12-1-87)

e. The licensee must notify each appropriate governor, or governor's designee, and the Agency of any changes to schedule information provided pursuant to Subsection 501.04. Such notification shall be by telephone to a responsible individual in the office of the governor, or governor's designee, of the appropriate state or states. The licensee must maintain for one (1) year a record of the name of the individual contacted. (12-31-91)

f. Each licensee who cancels a nuclear waste shipment, for which advance notification has been sent, must send a cancellation notice to the governor, or governor's designee, of each appropriate state and to the Agency. A copy of the notice shall be retained by the licensee for one (1) year. (12-1-87)

17. Quality Assurance Requirements. (12-1-87)

a. Each licensee must establish, maintain, and execute a quality assurance program to verify, by procedures such as checking, auditing, and inspection, that deficiencies, deviations, and defective material and equipment relating to the shipment of packages containing radioactive materials, are promptly identified and corrected. Prior to the use of any package for the shipment of radioactive material, each licensee must obtain Agency approval of its quality assurance program. (12-1-87)

b. Each licensee shall document the quality assurance program by written procedures or instructions

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and must carry out the program in accordance with those procedures throughout the period during which packaging is used. The licensee must identify the material and components to be covered by the quality assurance program. (12-1-87)

c. The licensee must maintain sufficient written records to demonstrate compliance with the quality assurance program. Records pertaining to the use of a package for shipment of radioactive material must be retained for a period of two (2) years after shipment. (12-1-87)

502. -- 995. (RESERVED).

996. ADMINISTRATIVE PROVISIONS.
Contested case appeals shall be governed by Idaho Department of Health and Welfare Rules, Sections 000., et seq., "Rules Governing Contested Cases and Declaratory Rulings." (12-31-91)

997. CONFIDENTIALITY OF RECORDS.
Any disclosure of information obtained by the Department is subject to the restrictions contained in Idaho Department of Health and Welfare Rules, Title 05, Chapter 01, "Rules Governing the Protection and Disclosure of Department Records." (12-31-91)

998. INCLUSIVE GENDER.
For the purposes of these rules and regulations, words used in the masculine gender include the feminine, or vice versa, where appropriate. (5-5-81)

999. SEVERABILITY.
The rules contained in Idaho Department of Health and Welfare Rules, Title 01, Chapter 09, are severable. If any rule or regulation, or part thereof, or the application of such rule or regulation to any person or circumstance is declared invalid, that invalidity does not affect the validity of any remaining portion of this chapter. (5-5-81)

APPENDIX A

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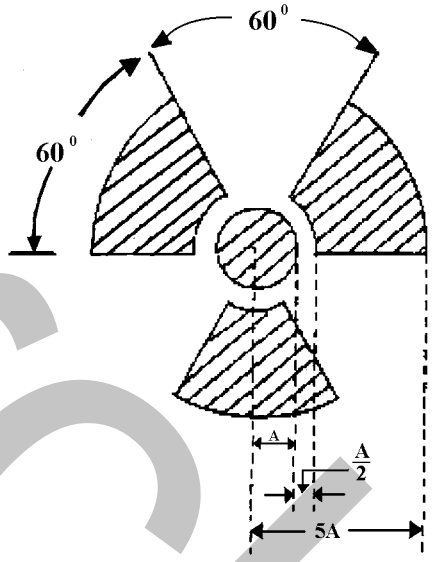

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