

## 902 KAR 100:010. Definitions for 902 KAR Chapter 100.

RELATES TO: KRS 211.840, 211.842-211.852, 211.990(4), 10 C.F.R. 20.1003-20.1005, NCRP Report 141, 42 U.S.C. 2011 et seq.

STATUTORY AUTHORITY: KRS 194A.050, 211.090(3), 211.844, 10 C.F.R. 20.1003-20.1005

NECESSITY, FUNCTION, AND CONFORMITY: KRS 211.844 authorizes the Cabinet for Health and Family Services to provide by administrative regulation for the registration and licensing of the possession or use of sources of ionizing or electronic product radiation and the handling and disposal of radioactive waste. The Nuclear Regulatory Commission (NRC) approves or denies Kentucky's program for regulating radioactive materials after the effective date of administrative regulations within 902 KAR Chapter 100. The federal guidance manual, Compatibility Categories and Health and Safety Identification for NRC Regulations and Other Program Elements - SA - 200, issued June 5, 2009, provides parameters states shall follow in order for approval. The parameters include the provision that definitions shall be identical to NRC definitions. This administrative regulation establishes definitions for 902 KAR Chapter 100.

### Section 1. Definitions.

#### (1) "A<sub>1</sub>" and "A<sub>2</sub>":

- (a) "A<sub>1</sub>" means the maximum activity of special form radioactive material permitted in a Type A package;
- (b) "A<sub>2</sub>" means the maximum activity of radioactive material, other than special form radioactive material, LSA, and SCO material, permitted in a Type A package;
- (c) These values are listed in 10 C.F.R. 71, Appendix A, or may be derived under the procedure prescribed in 10 C.F.R. 71 Appendix A.

(2) "Absorbed dose" means the energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the rad and the gray (Gy).

(3) "Accelerator" means a machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of one (1) MeV, such as the cyclotron, synchrotron, synchrocyclotron, betatron, linear accelerator, and Van de Graaff electrostatic generator.

(4) "Accessible surface" means the external surface of the enclosure or housing provided by the manufacturer.

(5) "Act" means the "Kentucky Radiation Control Act of 1978", as established in KRS 211.840.

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

(7) "Address of use" means the building or buildings that are identified on the license and where radioactive material may be received, used or stored.

(8) "Adult" means an individual eighteen (18) or more years of age.

(9) "Agreement state" means a state with which the United States Nuclear Regulatory Commission or the United States Atomic Energy Commission has entered into an effective agreement under subsection 274 b. of the Atomic Energy Act of 1954, 42 U.S.C. 200 et seq., as amended (73 Stat. 689).

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

(11) "Airborne radioactivity area" means a room, enclosure, or area in which airborne radioactive material, composed wholly or partly of radioactive material, exists in concentrations:

- (a) In excess of the derived air concentrations specified in 10 C.F.R. 20 Appendix B; or
- (b) That an individual present in the area without respiratory protective equipment may exceed an intake of six-tenths (0.6) percent of the annual limit on intake or twelve (12) DAC hours.

(12) "Air kerma (K)" means the kinetic energy released in air by ionizing radiation. Kerma is determined as the quotient of dE by dM, where dE is the sum of the initial kinetic energies of all the charged ionizing particles liberated by uncharged ionizing particles in air of mass dM. The SI unit of air kerma is joule per kilogram and the special name for the unit of kerma is the gray (Gy).

(13) "Air-purifying respirator" means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

(14) "Alert" means the notice given when an event may occur, is in progress, or has occurred that may lead to a release of radioactive material, but the release is not expected to require a response by an off-site response organization in order to protect persons offsite.

(15) "Aluminum equivalent" means the thickness of type 1100 aluminum, which is composed of at least ninety-nine (99.0) percent aluminum, 0.12 percent copper, affording the same attenuation, under specified conditions, as the material for which it is substituted.

(16) "Analytical x-ray system" means a system which utilizes x-rays for the examination of the structure of materials, such as x-ray diffraction and spectrographic equipment.

(17) "Annual limit on intake" or "ALI" means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of annual intake of a given radionuclide by the reference man that would result in:

- (a) A committed effective dose equivalent of five (5) rems, or 0.05 Sv; or
- (b) A committed dose equivalent of fifty (50) rems, or five-tenths (0.5) Sv, to an individual organ or tissue. ALI values for intake by ingestion and by inhalation of selected radionuclides are established in 10 C.F.R. 20 Appendix B.

(18) "Area of use" means a portion of a physical structure that has been set aside for the purpose of receiving, using or storing radioactive material.

(19) "As low as reasonably achievable" or "ALARA" means making every reasonable effort to maintain exposures to radiation as far below the dose limits established in 902 KAR 100:019 as practical, consistent with the purpose for which the licensed activity is undertaken. ALARA shall take into account the state of technology, the economics of improvement

in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, in relation to the utilization of nuclear energy and radioactive materials in the public interest.

(20) "Assigned protection factor" or "APF" means the expected workplace level of respirator protection that would be provided by a properly functioning respirator or a class of respirators to properly fitted and trained users. Operationally, the inhaled concentration may be estimated by dividing the ambient airborne concentration by the APF.

(21) "Atmosphere-supplying respirator" means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

(22) "Attenuation" means the reduction of exposure rate upon passage of radiation through matter.

(23) "Attenuation block" means 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.

(24) "Authorized medical physicist" means an individual who:

- (a) Meets the requirements in 902 KAR 100:072, Sections (63) and 65(1); or
- (b) Is identified as an authorized medical physicist or teletherapy physicist on:
  - 1. A specific medical use licensee issued by the cabinet, U.S. Nuclear Regulatory Commission, or an agreement state;
  - 2. A medical use permit issued by a U.S. Nuclear Regulatory Commission master material licensee;
  - 3. A permit issued by the cabinet, U.S. Nuclear Regulatory Commission, or an agreement state broad scope medical use licensee; or
  - 4. A permit issued by the U.S. Nuclear Regulatory Commission master material license broad scope medical use permittee.

(25) "Authorized nuclear pharmacist" means a pharmacist who:

- (a) Meets the requirements in 902 KAR 100:072, Sections 63 and 66(1);
- (b) Is identified as an authorized nuclear pharmacist on a:
  - 1. Specific license issued by the cabinet, state, or U.S. Nuclear Regulatory Commission that authorizes the medical use or the practice of nuclear pharmacy;
  - 2. Permit issued by a U.S. Nuclear Regulatory Commission master material licensee that authorizes medical use or the practice of nuclear pharmacy;
  - 3. Permit issued by the cabinet, U.S. Nuclear Regulatory Commission, or agreement state broad scope medical use licensee that authorizes medical use or the practice of nuclear pharmacy; or
  - 4. Permit issued by a U.S. Nuclear Regulatory Commission master material license broad scope medical use permittee that authorizes medical use or the practice of nuclear pharmacy;
- (c) Is identified as an authorized nuclear pharmacist by a commercial nuclear pharmacy that has been authorized to identify authorized nuclear pharmacists; or
- (d) Is designated as an authorized nuclear pharmacist under 902 KAR 100:058, Section 9(2)(c).

(26) "Authorized user" means a physician, dentist, or podiatrist who:

- (a) Meets the requirements in 902 KAR 100:072, Sections 63 and 68(1), 69(1), 70(1), 71(1), 72(1), 74(1), 76(1), or 77(1); or
- (b) Is identified as an authorized user on:
  - 1. The cabinet's, U.S. Nuclear Regulatory Commission's, or an agreement state's license that authorizes the medical use of radioactive material;
  - 2. A permit issued by a U.S. Nuclear Regulatory Commission master material licensee that is authorized to permit the medical use of radioactive material;
  - 3. A permit issued by the cabinet, U.S. Nuclear Regulatory Commission, or agreement state licensee of broad scope that is authorized to permit the medical use of radioactive material; or
  - 4. A permit issued by a U.S. Nuclear Regulatory Commission master material license broad scope permittee that is authorized to permit the medical use of radioactive material.

(27) "Automatic exposure control" means a device that automatically controls one (1) or more technique factors in order to obtain, at a preselected location, a required quantity of radiation.

(28) "Background radiation" means radiation not under the control of the licensee, including:

- (a) From cosmic sources;
- (b) Naturally occurring radioactive materials;
- (c) Radon that is not a decay product of source or special nuclear material; and
- (d) Global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents. Background radiation shall not include radiation from radioactive materials regulated by the Cabinet for Health and Family Services.

(29) "Beam axis" means the axis of rotation of the beam limiting device.

(30) "Beam limiting device" or "collimator" means a device that provides a means to restrict the dimensions of the x-ray field.

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

(32) "Beam scattering foil" means a thin piece of material (usually metallic) placed in the beam to scatter a beam of electrons in order to provide a more uniform electron distribution in the useful beam.

(33) "Becquerel" means a unit, in the International System of Units (SI), of measurement of radioactivity equal to one (1) transformation per second.

(34) "Bioassay" or "radiobioassay" means the determination of kinds, quantities or concentrations, and, in some cases, the locations of radioactive material in the human body, by direct measurement (in vivo counting) or by analysis and evaluation of materials excreted or removed from the human body.

(35) "Brachytherapy" means a method of radiation therapy in which an encapsulated source or group of sources is utilized to deliver radiation at a distance to a few centimeters, by surface, intracavitary, or interstitial application.

(36) "Broker" or "waste broker" means a person who takes possession of low-level waste solely for the purposes of consolidation and shipment.

- (37) "By-product material" means:
- (a) 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; or
  - (b) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations shall not constitute by-product material within this definition.
- (38) "Cabinet" means Cabinet for Health Services, or its duly authorized representatives.
- (39) "Cabinet radiography" means industrial radiography conducted in an enclosure or cabinet shielded so that radiation levels at every location on the exterior meet the limitations specified in 902 KAR 100:019, Section 11.
- (40) "Cabinet x-ray system" means an x-ray system with the x-ray tube installed or used in a permanent enclosure in which the enclosure is intended to contain at least that portion of the material being irradiated, not to include x-ray systems used by licensed practitioners of the healing arts. The enclosure:
- (a) May be the architectural structure or may be independent of the architectural structure;
  - (b) Shall provide attenuation of the radiation to meet the requirements of 902 KAR 100:105; and
  - (c) Shall exclude personnel from its interior during the generation of x-radiation.
- (41) "Calendar quarter" means between twelve (12) and fourteen (14) consecutive weeks.
- (a) The first calendar quarter of each year shall begin in January and subsequent calendar quarters shall be arranged so that no day is included in more than one (1) calendar quarter and no day in a one (1) year period is omitted from inclusion within a calendar quarter.
  - (b) A licensee or registrant shall not change the method observed of determining calendar quarters, except at the beginning of a calendar year.
- (42) "Calibration" means the determination of:
- (a) The response or reading of an instrument relative to a series of known radiation values over the range of the instrument; or
  - (b) The strength of a source of radiation relative to a standard.
- (43) "Carrier" is defined by KRS 174.405(1).
- (44) "Cephalometric device" means a device intended for the radiographic visualization and measurement of the dimensions of the human head.
- (45) "Certificate holder" means a person who has been issued a certificate of compliance or other package approval by the U.S. Nuclear Regulatory Commission.
- (46) "Certificate of Compliance" or "CoC" means the certificate issued by the U.S. Nuclear Regulatory Commission under 10 C.F.R. Part 71, which approves the design of a package for the transportation of radioactive material.
- (47) "Certified cabinet x-ray system" means an x-ray system that has been certified pursuant to 21 C.F.R. 1010.2 as being manufactured and assembled according to the provisions of 21 C.F.R. 1020.40.
- (48) "Certified component" means a component of an x-ray system subject to 21 C.F.R. Subchapter J.
- (49) "Certified system" means an x-ray system that has one (1) or more certified component.
- (50) "C.F.R." means Code of Federal Regulations.
- (51) "Changeable filters" means a filter, exclusive of inherent filtration, which can be removed from the useful beam through an electronic, mechanical, or physical process.
- (52) "Chemical description" means a description of the principal chemical characteristics of a low-level radioactive waste.
- (53) "Class" or "lung class" or "inhalation class" means a classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. Materials shall be classified as D, W, or Y, which applies to a range of clearance half-times:
- (a) For Class D (Days) of less than ten (10) days;
  - (b) For Class W (Weeks) from ten (10) to 100 days; and
  - (c) For Class Y (Years) of greater than 100 days.
- (54) "Close reflection by water" means immediate contact by water of sufficient thickness for maximum reflection of neutrons.
- (55) "Collective dose" means the sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.
- (56) "Collimator" means a device used to limit the size, shape, and direction of the primary radiation beam.
- (57) "Commission" means the U.S. Nuclear Regulatory Commission or its duly authorized representatives.
- (58) "Committed dose equivalent ( $H_{T,50}$ )" means the dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by an individual during the fifty (50) year period following the intake.
- (59) "Committed effective dose equivalent ( $H_{E,50}$ )" means the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues ( $H_{E,50} = \sum W_T H_{T,50}$ ).
- (60) "Computer-readable medium" means the cabinet's computer can transfer the information from the medium into its memory.
- (61) "Computed tomography" or "CT" means the production of a tomogram by the acquisition and computer processing of x-ray transmission data.
- (62) "Consignee" means the designated receiver of the shipment of low-level radioactive waste.
- (63) "Consignment" means each shipment of a package or groups of packages or load of radioactive material officered by a shipper for transport.
- (64) "Constraint" or "dose constraint" means a value above which specified licensee actions are required.
- (65) "Contact therapy system" means an x-ray system used for therapy with the x-ray tube port placed in contact with or within five (5) centimeters of the surface being treated.

- (66) "Containment system" means the assembly of components of the package intended to retain the radioactive material during transport.
- (67) "Controlled area" means an area, outside of a restricted area but inside the site boundary, to which access can be limited by the licensee or registrant for a stated reason.
- (68) "Cooling curve" means the graphical relationship between heat units stored and cooling time.
- (69) "Conveyance" means:
- (a) For transport by public highway or rail, a transport vehicle or large freight container;
  - (b) For transport by water, a vessel or a hold, compartment, or defined deck area of a vessel including a transport vehicle on board the vessel; or
  - (c) Transportation by an aircraft.
- (70) "Critical group" means the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.
- (71) "Criticality Safety Index" or "CSI", means the dimensionless number, rounded up to the next tenth, assigned to and placed on the label of a fissile material package, to designate the degree of control of accumulation of packages containing fissile material during transportation. Determination of the criticality safety index is described in 10 C.F.R. 71.22, 71.23, and 71.59.
- (72) "Curie" means a quantity of radioactivity.
- (a) One (1) curie (Ci) is that quantity of radioactive material that decays at the rate of  $3.7 \times 10^{10}$  disintegrations per second (dps).
  - (b) Commonly used submultiples of the curie are the millicurie and the microcurie.
    - 1. One (1) millicurie (mCi) = 0.001 curie =  $3.7 \times 10^7$  dps.
    - 2. One (1) microcurie (uCi) = 0.000001 curie =  $3.7 \times 10^4$  dps.
- (73) "Dead man switch" means a switch so constructed that a circuit closing contact can be maintained only by continuous pressure on the switch by the operator.
- (74) "Declared pregnant woman" means a woman who has voluntarily informed the licensee, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.
- (75) "Decommission" means the:
- (a) Safe removal from service of a facility or site;
  - (b) Termination of license; and
  - (c) Reduction of residual radioactivity to a level permitting release of the property:
    - 1. For unrestricted use; or
    - 2. Under restricted conditions.
- (76) "Decontamination facility" means a facility operating under the cabinet, U.S. Nuclear Regulatory Commission, or an agreement state license whose principal purpose is decontamination of equipment or materials to accomplish recycle, reuse, or other waste management objectives, and is not considered to be a consignee for LLW shipments.
- (77) "Dedicated check source" means a radioactive source that is used to assure the constant operation of a radiation detection or measurement device over several months or years. The source may also be used for other purposes.
- (78) "Deep-dose equivalent ( $H_d$ )" which applies to external whole-body exposure, means the dose equivalent at a tissue depth of one (1) centimeter (cm) ( $1000 \text{ mg/cm}^2$ ).
- (79) "Demand respirator" means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.
- (80) "Derived air concentration" or "DAC" means the concentration of a given radionuclide in air which, if breathed by the reference man for a working year of 2,000 hours under conditions of light work, results in an intake of one (1) ALI.
- (a) "Light work" produces an inhalation rate of one and two-tenths (1.2) cubic meters ( $1.2 \text{ m}^3$ ) of air per hour.
  - (b) DAC values are given in 10 C.F.R., 20 Appendix B.
- (81) "Derived air concentration-hour" or "DAC-hour" means the product of the concentration of radioactive material in air, expressed as a fraction or multiple of the derived air concentration for each radionuclide, and the time of exposure to that radionuclide, in hours. A licensee may take 2,000 DAC-hours to represent one (1) ALI, equivalent to a committed effective dose equivalent of five (5) rems (0.05 Sv).
- (82) "Deuterium" means deuterium and any deuterium compounds, including heavy water, in which the ratio of deuterium atoms to hydrogen atoms exceeds 1:5000.
- (83) "Diagnostic clinical procedure manual" means the collection of written procedures, methods, instructions, and precautions by which the licensee performs diagnostic clinical procedures, where each diagnostic clinical procedure:
- (a) Has been approved by the authorized user; and
  - (b) Includes the radiopharmaceutical name, dosage, and route of administration.
- (84) "Diagnostic source assembly" means the tube housing assembly with a beam-limiting device attached.
- (85) "Diagnostic-type protective tube housing" means an x-ray tube housing so constructed that the leakage radiation measured at a distance of one (1) meter from the source cannot exceed 100 milliroentgens in one (1) hour if the tube is operated at its maximum continuous rated current for the maximum tube potential.
- (86) "Diagnostic x-ray system" means an x-ray system designed for irradiation of a part of the human body for the purpose of diagnosis or visualization.
- (87) "Direct scatter radiation" means that scattered radiation that has been deviated in direction only by materials irradiated by the useful beam. (See also "scattered radiation").
- (88) "Disposable container" means a container principally used to confine low-level radioactive waste during disposal operations at a land disposal facility. (See also "high integrity container".) For some shipments, the disposal container may be transport package.
- (89) "Disposable respirator" means a respirator for which maintenance is not intended and that is designed to be discarded after excessive breathing resistance, sorbent exhaustion, physical damage, or end-of-service-life renders it unsuitable for

use. Disposal respirator may include, but not limit to a disposable half-mask respirator or a disposable escape-only self-contained breathing apparatus (SCBA).

(90) "Disposal" means the disposition of waste as authorized by 902 KAR 100:021.

(91) "Distinguishable from background" means that the detectable concentration of a radionuclide is statistically different from the background concentrations of that radionuclide in the vicinity of the site or, in the case of structures, in similar materials using adequate measurements technology, survey, and statistical techniques.

(92) "Dose" or "radiation dose" means:

- (a) Absorbed dose;
- (b) Dose equivalent;
- (c) Effective dose equivalent;
- (d) Committed dose equivalent;
- (e) Committed effective dose equivalent; or
- (f) Total effective dose equivalent.

(93) "Dose commitment" means the total radiation dose to a part of the body that results from retention in the body of radioactive material. Estimation assumes the period of exposure to retained material to be less than fifty (50) years.

(94) "Dose equivalent ( $H_T$ )" means the product of the absorbed dose in tissue, the quality factor, and other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and sievert (Sv).

(95) "Dose monitor unit (DMU)" means a unit response from the beam monitoring system from which the absorbed dose can be calculated.

(96) "Dosimetry processor" means an individual or an organization that processes and evaluates individual monitoring equipment in order to determine the radiation dose delivered to the equipment.

(97) "DOT" means the U.S. Department of Transportation.

(98) "Effective dose equivalent ( $H_E$ )" means the sum of the products of the dose equivalent to the organ or tissue ( $H_T$ ) and the weighting factors ( $W_T$ ) applicable to each of the body organs or tissues that are irradiated ( $H_E = W_T H_T$ ).

(99) "Embryo or fetus" means the developing human organism from conception until the time of birth.

(100) "Energy compensation source or "ECS" means a small sealed source, with an activity not exceeding 100 microcuries (3.7 MBq), used within a logging tool, or other tool components, to provide a reference standard to maintain the tool's calibration when in use.

(101) "Entrance or access point" means a location through which an individual may gain access to a radiation area or radioactive material, including an entry or exit portal of sufficient size to permit human entry, irrespective of its intended use.

(102) "Entrance exposure rate" means the roentgens per unit time at the point the center of the useful beam enters the patient.

(103) "Environmental Protection Agency "EPA" Identification number" means the number received by a transporter following application to the EPA as required by 40 C.F.R. Part 263.

(104) "Exclusive use" means the sole use of a conveyance by a single consignor in which initial, intermediate, and final loading and unloading are carried out under the direction of the consignor or consignee.

- (a) Consignor and carrier shall each ensure that loading and unloading is performed by personnel having radiological training and resources appropriate for safe handling of the consignment.
- (b) Consignor shall include with the shipping paper information provided to the carrier, specific written instructions for maintenance of exclusive use shipment controls.

(105) "Exposure" means being exposed to ionizing radiation or to radioactive material.

(106) "Exposure rate" means the exposure per unit of time.

(107) "External beam radiation therapy" means therapeutic irradiation in which the source of radiation is at a distance from the body.

(108) "External dose" means that portion of the dose equivalent received from radiation sources outside the body.

(109) "Extremity" means hand, elbow, arm below the elbow, foot, knee, or leg below the knee.

(110) "Eye dose equivalent". See "lens dose equivalent".

(111) "Facility" means a location at which one (1) or more devices or sources are installed or located within one (1) building, vehicle, or under one (1) roof, under the same administrative control.

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

(113) "Field-flattening filter" means a filter used to homogenize the absorbed dose rate over the radiation field.

(114) "Field station" means a facility where radioactive sources may be stored or used and from which equipment is dispatched to temporary job sites.

(115) "Filter" means the material in the useful beam which usually absorbs preferentially the less penetrating radiations.

- (a) "Inherent filtration" means the filter permanently in the useful beam. It includes the window of the x-ray tube and the permanent tube enclosure.
- (b) "Added filter" means the filter added to the inherent filtration.
- (c) "Total filter" means the sum of the inherent and added filters.

(116) "Filtering facepiece (dust mask)" means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium, not equipped with elastomeric sealing surfaces and adjustable straps.

(117)

- (a) "Fissile material" means the:
  - 1. Radionuclides uranium-233, uranium-235, plutonium-239, and plutonium-241, or any combination of these radionuclides; and
  - 2. Fissile nuclides themselves, not material containing fissile nuclides.
- (b) Fissile material does not include unirradiated natural and depleted uranium; and natural or depleted uranium that has been irradiated in thermal reactors only;

- (c) Fissile material also excludes certain controls as provided in 10 C.F.R. 71.15.
- (118) "Fissile material package" means a fissile material packaging together with its fissile material contents.
- (119) "Fit factor" means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator while worn.
- (120) "Fit test" means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.
- (121) "Fluoroscopic imaging assembly" means a component that comprises a reception system in which x-ray photons produce a fluoroscopic image. It includes equipment housings, electrical interlocks if present, the primary protective barrier, and structural material providing linkage between the image receptor and the diagnostic source assembly.
- (122) "Focal spot" means the area projected on the anode of the x-ray tube by the electrons accelerated from the cathode and from which the useful beam originates.
- (123) "Former U.S. Atomic Energy Commission (AEC) or U.S. Nuclear Regulatory Commission (NRC) licensed facilities" means nuclear reactors, nuclear fuel reprocessing plants, uranium enrichment plants, or critical mass experimental facilities where AEC or NRC licenses have been terminated.
- (124) "Gantry" means that part of a radiation producing machine supporting and allowing movements of the radiation head about a center of rotation.
- (125) "General purpose radiographic x-ray system" means a radiographic x-ray system which, by design, is not limited to radiographic examination of specific anatomical regions.
- (126) "Generally applicable environmental radiation standards" means standards issued by the Environmental Protection Agency (EPA) under the authority of 42 U.S.C. sec. 2011 et seq., that impose limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.
- (127) "Generator" or means a licensee operating under the cabinet, U.S. Nuclear Regulatory Commission or an agreement state who:
- (a) Is a waste generator as defined in this administrative regulation; or
  - (b) Is the licensee to whom waste can be attributed within the context of the Low Level Radioactive Waste Policy Amendments Act of 1985, such as, waste generated as a result of decontamination or recycle activities.
- (128) "Gonad shield" means a protective barrier for the testes or ovaries.
- (129) "Graphite" means graphite with a boron equivalent content less than five (5) parts per million and density greater than one and five-tenths (1.5) grams per cubic centimeter.
- (130) "Gray" or "Gy" means the SI unit of absorbed dose. One (1) gray equals an absorbed dose of one (1) Joule/kilogram (100 rads).
- (131) "Half-value layer" or "HVL" means the thickness of specified material which attenuates the beam of radiation to one-half (1/2) of its original air kerma rate, exposure rate or absorbed dose rate. This excludes the contribution of scattered radiation, other than that which might be present initially in the beam concerned.
- (132) "Healing arts screening" means the testing of human beings using x-ray machines for the detection or evaluation of health indications if these tests are not specifically and individually ordered by a licensed practitioner of the healing arts legally authorized to prescribe these x-ray tests for the purpose of diagnosis or treatment.
- (133) "Heat unit" means a unit of energy equal to the product of the peak kilovoltage, milliamperes, and seconds.
- (134) "Helmet" means a rigid respiratory inlet covering that also provides head protection against impact and penetration.
- (135) "High integrity container or "HIC" means a container commonly designated to meet the structural stability requirements of 10 C.F.R. 61.56, and to meet the U.S. Department of Transportation requirements for a Type A package.
- (136) "High radiation area" means an area, accessible to individuals, in which radiation levels from radiation sources external to the body may result in an individual receiving a dose equivalent in excess of one-tenth (0.1) rem (1m Sv) in one (1) hour at thirty (30) centimeters from the radiation source or thirty (30) centimeters from a surface that the radiation penetrates.
- (137) "Hood" means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.
- (138) "Human use" means the internal or external administration of radiation or radioactive materials to human beings.
- (139) "Image intensifier" means a device that converts instantaneously, by means of photoemissive surfaces and electronic circuitry, an x-ray pattern into a light pattern of greater intensity than would have been produced by the original x-ray pattern.
- (140) "Image receptor" means a device that transforms incident radiation into a visual image or into another form which can be made into a visual image by further transformations.
- (141) "Image receptor support" means, for mammographic systems, that part of the system designed to support the image receptor in a horizontal plane during a mammographic examination.
- (142) "Individual" means a human being.
- (143) "Individual monitoring" means the assessment of:
- (a) Dose equivalent by the use of an individual monitoring device;
  - (b) Committed effective dose equivalent by:
    - 1. Bioassay; or
    - 2. Determination of the time-weighted air concentrations to which an individual has been exposed; or
  - (c) Dose equivalent by the use of survey data.
- (144) "Individual monitoring device" or "individual monitoring equipment" means a device designed to be worn by a single individual for the assessment of dose equivalent, such as film badges, thermoluminescence dosimeters (TLDs), pocket ionization chambers, or personal ("lapel") air sampling devices.
- (145) "Industrial radiography" means the examination of the macroscopic structure of materials by nondestructive methods utilizing sources of radiation.
- (146) "Injection tool" means a device used for controlled subsurface injection of radioactive tracer material.
- (147) "Interlock" means a device preventing the start or continued operation of equipment unless certain predetermined conditions prevail.

- (148) "Internal dose" means that portion of the dose equivalent received from radioactive material taken into the body.
- (149) "Irradiation" means the exposure of matter to ionizing radiation.
- (150) "Kilovolt (kV) {kilo electron volt}" means the energy equal to that acquired by a particle with one (1) electron charge in passing through a potential difference of 1,000 volts in a vacuum. (Note: current convention is to use kV for photons and keV for electrons.)
- (151) "Kilovolt peak" or "kVp" means the crest value in kilovolts of the potential difference of a pulsating potential generator. If only one-half (1/2) of the wave is used, the value refers to the useful half of the wave.
- (152) "Lead equivalent" means the thickness of lead affording the same attenuation, under specified conditions, as the material in question.
- (153) "Leakage radiation" means radiation emanating from the diagnostic or therapeutic source assembly, except for the useful beam.
- (154) "Leakage technique factor" means, with respect to different tube housing assemblies:
- For capacitor energy storage equipment: the maximum rated number of exposures in an hour for operation at the maximum rated peak tube potential, with a charge per exposure of ten (10) milliamperes seconds (mAs) or the minimum obtainable from the unit, whichever is larger.
  - For field emission equipment rated for pulsed operation: the maximum rated number of x-ray pulses in an hour for operation at the maximum rated peak tube potential.
  - For all other equipment: the maximum rated continuous tube current for the maximum rated peak tube potential.
- (155) "Lens dose equivalent" or "LDE" means the external exposure of the lens of the eye, and is taken as the dose equivalent at a tissue depth of 0.3 centimeter (300 mg/cm<sup>2</sup>).
- (156) "License" means a license issued by the cabinet under 902 KAR Chapter 100.
- (157) "Licensed material" means radioactive material, source material, or special nuclear material received, possessed, used, or transferred, under a general or specific license issued by the cabinet, U.S. Nuclear Regulatory Commission or an agreement state.
- (158) "Light field" means the area illuminated by light, simulating the radiation field.
- (159) "Limits" or "dose limits" means the permissible upper bounds of radiation doses.
- (160) "Lixiscope" means a portable light-intensified imaging device using a sealed source.
- (161) "Logging assistant" means an individual who, under the personal supervision of a logging supervisor:
- Handles sealed sources or tracers that are not in logging tools or shipping containers; or
  - Uses survey instruments in well-logging activities.
- (162) "Logging supervisor" means the individual who provides personal supervision of the utilization of sources of radiation at the well site.
- (163) "Logging tool" means a device used subsurface to perform well-logging.
- (164) "Loose-fitting facepiece" means a respiratory inlet covering that is designed to form a partial seal with the face.
- (165) "Lost or missing licensed material" means licensed material whose location is unknown. It includes material that has been shipped but has not reached its destination and whose location cannot be readily traced in the transportation system.
- (166) "Low-level radioactive waste" means radioactive waste not classified as:
- High-level radioactive waste;
  - Transuranic waste;
  - Spent nuclear fuel; or
  - By-product material as defined in Section 11e(2) of the Atomic Energy Act of 1954, 42 U.S.C. 2014.
- (167) "Low specific activity" or "LSA" means radioactive material with limited specific activity, which is nonfissile or is excepted pursuant to 10 C.F.R. 71.15 and that satisfies the descriptions and limits established in paragraphs (a), (b), and (c) of this subsection. Shielding materials surrounding the LSA material shall not be considered in determining the estimated average specific activity of the package contents. LSA material shall be in one (1) of three (3) groups:
- LSA-I:
    - Uranium and thorium ores, uranium or thorium concentrates of these ores, and other ores containing naturally occurring radioactive nuclides that are not intended to be processed for the use of these radionuclides;
    - Solid unirradiated natural or depleted uranium or natural thorium or their solid or liquid compounds or mixtures;
    - Radioactive material for which the  $A_2$  value is unlimited; or
    - Other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed thirty (30) times the value for exempt material activity concentration determined in 10 C.F.R. 71 Appendix A.
  - LSA-II:
    - Water with tritium concentration up to 20.0 curies/liter (0.8 TBq/liter); or
    - Material in which the radioactive material is distributed throughout, and the average specific activity does not exceed  $10^{-4}$   $A_2$ /gram for solids and gases, and  $10^{-5}$   $A_2$ /gram for liquids.
  - LSA-III: Solids (e.g., consolidated wastes, activated materials), excluding powders, that satisfy the requirements of 10 C.F.R. 71.77 in which:
    - The radioactive material is distributed throughout a solid or a collection of solid objects;
    - Is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.);
    - The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble material, so that, even under loss of packaging, the loss of radioactive material per package by leaching, when placed in water for seven (7) days, would not exceed 0.1  $A_2$ ; and the average specific activity of the solid does not exceed  $2 \times 10^{-3}$   $A_2$ /gram; and
    - The average specific activity of the solid does not exceed  $2 \times 10^{-3}$   $A_2$ /gram.
- (168) "Low toxicity alpha emitter" means natural uranium, depleted uranium, natural thorium, uranium-235, uranium-238, thorium-232, thorium-228 or thorium-230 when contained in ores or physical or chemical concentrates or tailings; or alpha

emitters with a half-life of less than ten (10) days.

(169) "mA" means milliampere.

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

(171) "mAs" means milliampere second.

(172) "Maximum normal operating pressure" means the maximum gauge pressure that would develop in the containment system in a period of one (1) year under the heat condition specified in 10 C.F.R. Part 71.71(c)(1), in the absence of venting, external cooling by an ancillary system, or operational controls during transport.

(173) "Medical institution" means an organization in which several medical disciplines are practiced.

(174) "Medical use" means the intentional internal or external administration of radioactive material, or the radiation therefrom, to patients or human research subjects under the supervision of an authorized user.

(175) "Member of the public" means an individual except when the individual is receiving an occupational dose.

(176) "Microscopic analytical x-ray equipment" means a device which utilizes x-rays for examining the microscopic structure of materials. This includes x-ray diffraction and spectrographic equipment.

(177) "Mineral logging" means logging performed for the purpose of mineral exploration other than oil or gas.

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

(179) "Misadministration" means the administration of:

(a) A radiopharmaceutical dosage greater than thirty (30) microcuries of sodium iodide I-125 or I-131:

1. Involving the wrong patient or human research subject or the wrong radiopharmaceutical; or
2. If both the administered dosage differs from the prescribed dosage by more than twenty (20) percent of the prescribed dosage and the difference between the administered dosage and prescribe dosage exceeds thirty (30) microcuries.

(b) A therapeutic radiopharmaceutical dosage, other than sodium iodide I-125 or I-131:

1. Involving the wrong patient, human research subject, radiopharmaceutical, or route of administration; or
2. If the administered dosage differs from the prescribed dosage by more than twenty (20) percent of the prescribed dosage.

(c) A gamma stereotactic radiosurgery radiation dose:

1. Involving the wrong patient, human research subject, or treatment site; or
2. If the calculated total administered dose differs from the total prescribed dose by more than ten (10) percent.

(d) A teletherapy radiation dose:

1. Involving the wrong patient, human research subject, mode of treatment, or treatment site;
2. If the treatment consists of three (3) or fewer fractions and the calculated total administered dose differs from the total prescribed dose by more than ten (10) percent;
3. If the calculated weekly administered dose is thirty (30) percent greater than the weekly prescribed dose; or
4. If the calculated total administered dose differs from the total prescribed dose by more than twenty (20) percent.

(e) A brachytherapy radiation dose:

1. Involving the wrong patient, human research subject, radioisotope, or treatment site except for permanent implant seeds that were implanted in the correct site but migrated outside the treatment site;
2. Involving a sealed source that is leaking;
3. If, for a temporary implant, one (1) or more sealed sources are not removed upon completion of the procedure; or
4. If the calculated administered dose differs from the prescribed dose by more than twenty (20) percent.

(f) A diagnostic radiopharmaceutical dosage, other than quantities greater than thirty (30) microcuries of sodium iodide I-125 or I-131:

1. Involving the wrong patient, human research subject, radiopharmaceutical, or route of administration, or if the administered dosage differs from the prescribed dosage; and
2. If the dose to the patient or human research subject exceeds five (5) rems effective dose equivalent or fifty (50) rems dose equivalent to an individual organ.

(180) "Mobile nuclear medicine service" means the transportation and medical use of radioactive material.

(181) "Monitor unit (MU)" (See "Dose monitor unit").

(182) "Monitoring" or "radiation monitoring" or "radiation protection monitoring" means the measurement of radiation levels, concentrations, surface area concentrations or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses.

(183) "Moving beam radiation therapy" means radiation therapy with any planned displacement of radiation field or patient relative to each other, or with any planned change of absorbed dose distribution. It includes arc, skip, conformal, intensity modulation and rotational therapy.

(184) "Natural thorium" means thorium with the naturally occurring distribution of thorium isotopes; that is, 100 weight percent thorium-232.

(185) "Negative pressure respirator (tight fitting)" means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

(186) "Nominal treatment distance" means:

- (a) For electron irradiation, the distance from the scattering foil, virtual source, or exit window of the electron beam to the entrance surface of the irradiated object along the central axis of the useful beam.
- (b) For x-ray irradiation, the virtual source or target to isocenter distance along the central axis of the useful beam. For non-isocentric equipment, this distance shall be that specified by the manufacturer.

(187) "Nonstochastic effect" or "deterministic effect" means a health effect, the severity of which varies with the dose and for which a threshold is believed to exist.

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

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

(190)

(a) "NRC Forms 540, 540A, 541, 541A, 542, and 542A" means official NRC forms as referenced in 902 KAR 100:021.

- (b) Licensees need not use originals of these forms as long as any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information.
- (c) Upon agreement between the shipper and consignee, NRC Forms 541, 541A, 542, and 542A may be completed, transmitted, and stored in electronic media.
- (d) The electronic media shall have the capability for producing legible, accurate, and complete records in the format of the uniform manifest.
- (191) "Occupational dose" means dose received by an individual in the course of employment in which the individual's assigned duties for the licensee or registrant involve exposure to sources of radiation, whether in the possession of the licensee, registrant, or other person. Occupational dose shall not include dose received:
  - (a) From background radiation;
  - (b) As a medical patient;
  - (c) From voluntary participation in a medical research program;
  - (d) As a member of the public; or
  - (e) From exposure to individuals administered radioactive material and released in accordance with 902 KAR 100:072, Section 27.
- (192) "Operating procedures" means detailed written instructions, such as:
  - (a) Normal operation of equipment and movable shielding;
  - (b) Closing of interlock circuits;
  - (c) Manipulation of controls;
  - (d) Radiation monitoring procedures for personnel and areas;
  - (e) Testing of interlocks; and
  - (f) Recordkeeping requirements.
- (193) "Output" means the exposure rate, dose rate, or a quantity related in a known manner to these rates from a teletherapy unit for a specified set of exposure conditions.
- (194) "Package" means the packaging together with its radioactive contents as presented for transport:
  - (a) Fissile material package or Type AF package, Type BF package, Type B(U)F package, or Type B(M)F package are all fissile material packaging types together with its fissile material complete.
  - (b) Type A package means a Type A packaging together with its radioactive contents. A Type A package is defined and shall comply with the DOT regulations in 49 C.F.R. Part 173.
  - (c) Type B package means a Type B packaging together with its radioactive contents.
    1. On approval, a Type B package design is designated by the U.S. Nuclear Regulatory Commission as B(U) unless the package has a maximum normal operating pressure of more than 100 pounds/in<sup>2</sup> (700 kPa) gauge or a pressure relief device that would allow the release of radioactive material to the environment under the tests specified in 10 C.F.R. Part 71.73 (hypothetical accident conditions), in which case it will receive a designation B(M).
    2. B(U) refers to the need for unilateral approval of international shipments.
    3. B(M) refers to the need for multilateral approval of international shipments.
    4. There is no distinction made in how packages with these designations might be used in domestic transportation.
    5. To determine their distinction for international transportation, refer to U.S. Department of Transportation Regulations in 49 C.F.R. Part 173.
    6. A Type B package approved before September 6, 1983, was designated only as Type B. Limitations on its use are specified in 902 KAR 100:070, Section 7.
- (195) "Packaging" means the assembly of components necessary to ensure compliance with the requirements of 902 KAR 100:070.
  - (a) It may consist of one (1) or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks.
  - (b) The vehicle, tie-down system, and auxiliary equipment may be designated as part of the packaging.
- (196) "Patient" means an individual subjected to healing arts examination, diagnosis, or treatment.
- (197) "Peak tube potential" means the maximum value of the potential difference across the x-ray tube during an exposure.
- (198) "Periodic quality assurance check" means a procedure which is performed to ensure that a previous calibration continues to be valid.
- (199) "Permanent radiographic installation" means an installation or structure designed or intended for radiography and in which radiography is regularly performed.
- (200) "Person" is defined by KRS 216B.015(16).
- (201) "Personal supervision" means guidance and instruction by the supervisor who is physically present at the job site and watching the performance of the operation in proximity so that contact can be maintained and immediate assistance given as required.
- (202) "Personnel monitoring equipment" means a device designed to be worn or carried by an individual for the purpose of estimating the dose received by the individual.
- (203) "Phantom" means a volume of material behaving in a manner similar to tissue with respect to the attenuation and scattering of radiation.
- (204) "Phototimer" means 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. See "automatic exposure control".
- (205) "Physical description" means the items called for on NRC Form 541 to describe low-level radioactive waste.
- (206) "Physician" is defined by KRS 311.720(9).
- (207) "Planned special exposure" means an infrequent exposure to radiation, separate from and in addition to the annual dose limits.
- (208) "Position indicating device" means 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.

- (209) "Positive pressure respirator" means a respirator in which the pressure inside the respirator inlet covering exceeds the ambient air pressure outside the respirator.
- (210) "Powered air-purifying respirator" or "PAPR" means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.
- (211) "Preceptor" means an individual who provides, directs, or verifies the training and experience required for an individual to become an authorized user, an authorized medical physicist, an authorized nuclear pharmacist, or a Radiation Safety Officer.
- (212) "Pressure demand respirator" means a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.
- (213) "Preregistrant" means a person who is preregistered with the cabinet for the intent of obtaining a radiation producing machine registerable under 902 KAR 100:110.
- (214) "Preregistration" means preregistration with the cabinet as specified in 902 KAR 100:110.
- (215) "Prescribed dosage" means the quantity of radiopharmaceutical activity as documented:
- (a) In a written directive;
  - (b) In the diagnostic clinical procedures manual; or
  - (c) In an appropriate record in accordance with the directions of the authorized user for diagnostic procedures.
- (216) "Prescribed dose" means:
- (a) For gamma stereotactic radiosurgery, the total dose as documented in the written directive;
  - (b) For teletherapy, the total dose and dose per fraction as documented in the written directive;
  - (c) For manual brachytherapy, the total source strength and exposure time or the total dose, as documented in the written directive; or
  - (d) For remote brachytherapy afterloaders, the total dose and dose per fraction as documented in the written directive.
- (217) "Primary dose monitoring system" means a system that:
- (a) Monitors the useful beam during irradiation; and
  - (b) Terminates irradiation if a preselected number of dose monitor units have been acquired.
- (218) "Principal activities" means activities authorized by the license that are essential to achieving the purpose for which the license was issued or amended. "Principal activities" do not include:
- (a) Storage during which licensed material is not accessed for use or disposal; and
  - (b) Activities incidental to decontamination or decommissioning.
- (219) "Protective apron" means an apron made of radiation absorbing materials of at least 0.25 mm lead equivalency; that is, if the HVL of the apron is not less than 0.25 mm lead at normal operating voltages.
- (220) "Protective barrier" means a barrier of radiation absorbing material used to reduce radiation exposure.
- (a) "Primary protective barrier" means a barrier sufficient to attenuate the useful beam to the required degree.
  - (b) "Secondary protective barrier" means a barrier sufficient to attenuate the stray radiation to the required degree.
- (221) "Protective glove" means a glove made of radiation absorbing materials of at least 0.25 mm lead equivalency; that is, if the HVL of the glove is not less than 0.25 mm lead at normal operating voltages.
- (222) "Public dose" means the dose received by a member of the public from sources of radiation from licensed or registered operations. It shall not include radiation received:
- (a) As an occupational dose;
  - (b) From background radiation;
  - (c) As a medical patient;
  - (d) From voluntary participation in a medical research program; or
  - (e) From exposure to an individual administered radioactive material and released in accordance with 902 KAR 100:072, Section 27.
- (223) "Qualified expert" means an individual who has been recognized by the cabinet to possess the knowledge and training to:
- (a) Measure ionizing radiation;
  - (b) Evaluate safety techniques; and
  - (c) Advise regarding radiation protection needs.
- (224) "Qualitative fit test or "QFT" means a pass or fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.
- (225) "Quality factor" or "Q" means the modifying factor used to derive dose equivalent from absorbed dose.
- (a) Quality factors and absorbed dose equivalencies:

Type of Radiation	Quality Factor	Absorbed Dose Equal to a Unit Dose Equivalent
X-, gamma, or beta radiation	1	1
Alpha particles, multiple-charged particles, fission fragments, and heavy particles of unknown charge	20	0.05
Neutrons of unknown energy	10	0.1
High-energy protons	10	0.1

<sup>a</sup>Absorbed dose in rad equal to one (1) rem or the absorbed dose in gray equal to one (1) sievert.

- (b) If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in rems per hour or sieverts per hour, as provided in paragraph (a) of this subsection, one (1) rem (0.01 sievert) of neutron radiation of unknown energies may, for purposes of the regulations in this part, be assumed to result from a total fluence of twenty-five (25) million neutrons per square centimeter incident upon the body. If sufficient information exists to

estimate the approximate energy distribution of the neutrons, the licensee may use the fluence rate per unit dose equivalent or the appropriate Q value from paragraph (c) of this subsection to convert a measured tissue dose in rads to dose equivalent in rems.

(c) Mean quality factors, Q, and fluency per unit dose equivalent for monoenergetic neutrons:

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

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

<sup>b</sup> Monoenergetic neutrons incident normally on a thirty (30)-cm diameter cylinder tissue-equivalent phantom.

(226) "Quantitative fit test "QNFT" means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

(227) "Quarter" is defined by KRS 341.080(1)(b).

(228) "Rad" means the special unit of absorbed dose. One (1) rad equals an absorbed dose of 0.01 joule per kilogram (0.01 gray) or 100 ergs per gram.

(229) "Radiation" means ionizing radiation.

(a) It includes the following:

1. Gamma rays;
2. X-rays;
3. Alpha particles;
4. Beta particles;
5. High speed electrons;
6. Neutrons;
7. High-speed protons; and
8. Other atomic particles capable of producing ions.

(b) It excludes nonionizing radiations, such as:

1. Sound;
2. Microwaves;
3. Radiowaves; or
4. Visible, infrared, or ultraviolet light.

(c) The following are specific forms of radiation:

1. "Leakage radiation" means radiation coming from within the tube or source housing except the useful beam.

2. "Scattered radiation" means radiation that, during passage through matter, has been deviated in direction, and may have been modified by a decrease in energy.
  3. "Useful radiation" or "primary beam" means radiation that passes through the window, aperture, cone, or other beam limiting device of the tube or source housing.
  4. "Stray radiation" means the sum of leakage and scattered radiation.
- (230) "Radiation area" means an area, accessible to individuals, in which there exists radiation at levels that an individual may receive in excess of five (5) millirems (0.05 mSv) in one (1) hour at thirty (30) centimeters from the radiation source or from a surface that the radiation penetrates.
- (231) "Radiation detector" means a device which, in the presence of radiation, by either direct or indirect means, provides a signal or other indication suitable for use in measuring one (1) or more quantities of incident radiation.
- (232) "Radiation head" means the structure from which the useful beam emerges.
- (233) "Radiation machine" means a device capable of producing radiation, except a device that produces radiation only from radioactive material.
- (234) "Radiation safety officer" means an individual who:
- (a) Meets the requirements in 902 KAR 100:072, Sections 63 and 64(1) or (3)(a); or
  - (b) Is identified as a radiation safety officer on:
    1. A specific medical use licensee issued by the cabinet, U.S. Nuclear Regulatory Commission, or an agreement state; or
    2. A medical use permit issued by a U.S. Nuclear Regulatory Commission master material licensee.
- (235) "Radiation therapy simulation system" means a fluoroscopic or radiographic x-ray system intended for:
- (a) Localizing the volume to be exposed during radiation therapy; and
  - (b) Confirming the position and size of the therapeutic irradiation field.
- (236) "Radioactive marker" means radioactive material placed subsurface or on a structure intended for subsurface use for the purpose of depth determination or direction orientation.
- (237) "Radioactive material" means a solid, liquid, or gas, which emits radiation spontaneously.
- (238) "Radioactivity" means the disintegration of unstable atomic nuclei by the emission of radiation.
- (239) "Radiograph" means an image receptor on which the image is created directly or indirectly by an x-ray pattern and results in a permanent record.
- (240) "Radiographer" means an 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 administrative regulations and license conditions.
- (241) "Radiographer's assistant" means an individual who, under the personal supervision of a radiographer, uses sources of radiation, related handling tools, or survey instruments in industrial radiography.
- (242) "Radiographer instructor" means a radiographer who has been authorized by the cabinet to provide on-the-job training to radiographer trainees under 902 KAR 100:100, Section 14.
- (243) "Radiographer trainee" means an individual who, under the personal supervision of a radiographer instructor, uses sources of radiation, related handling tools, or radiation survey instruments during the course of instruction.
- (244) "Radiographic exposure device" means an instrument containing a sealed source fastened or contained within, in which the sealed source or its shielding may be moved, or otherwise changed, from a shielded to an unshielded position for purposes of making a radiographic exposure.
- (245) "Radiographic imaging system" means a system designed to record a permanent or semipermanent image on an image receptor by the action of ionizing radiation.
- (246) "Radiographic personnel" means a:
- (a) Radiographer;
  - (b) Radiographer instructor; or
  - (c) Radiographer trainee.
- (247) "Rating" means the operating limits specified by the component manufacturer.
- (248) "Recordable event" means the administration of:
- (a) A radiopharmaceutical or radiation without a written directive, if a written directive is required;
  - (b) A radiopharmaceutical or radiation if a written directive is required without daily recording of each administered radiopharmaceutical dosage or radiation dose in the appropriate record;
  - (c) A radiopharmaceutical dosage greater than thirty (30) microcuries of sodium iodide I-125 or I-131 if:
    1. The administered dosage differs from the prescribed dosage by more than twenty (20) percent; and
    2. The difference between the administered dosage and prescribed dosage exceeds fifteen (15) microcuries;
  - (d) A therapeutic radiopharmaceutical dosage, other than sodium iodide I-125 or I-131, if the administered dosage differs from the prescribed dosage by more than twenty (20) percent;
  - (e) A teletherapy radiation dose, if the calculated weekly administered dose is fifteen (15) percent greater than the weekly prescribed dose; or
  - (f) A brachytherapy radiation dose, if the calculated administered dose differs from the prescribed dose by more than twenty (20) percent.
- (249) "Recording" means producing a permanent form of an image resulting from x-ray photons.
- (250) "Reference man" means a hypothetical aggregation of human physical and physiological characteristics arrived at by international consensus. These characteristics may be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base.
- (251) "Registrant" means a person who is registered with the cabinet and is legally obligated to register with the cabinet under 902 KAR 100:110.
- (252) "Registration" means registration with the cabinet under 902 KAR 100:110.
- (253) "Regulations of the U.S. Department of Transportation" means the regulations in 49 C.F.R. Parts 100-189.
- (254) "Rem" means a special unit of quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (one (1) rem = 0.01 sievert).

(255) "Research and development" means:

- (a) Theoretical analysis, exploration, or experimentation; or
- (b) 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.

(256) "Residential location" means an area where structures for human habitation are located.

(257) "Residual radioactivity" means low-level radioactive waste resulting from processing or decontamination activities that cannot be easily separated into distinct batches attributable to specific waste generators. This waste is attributable to the processor or decontamination facility, as applicable.

(258) "Respiratory protective device" means an apparatus used to reduce an individual's intake of airborne radioactive materials.

(259) "Restricted area" means an area access to which is limited by the licensee or registrant for purposes of protection of individuals against undue risks from exposure to radiation and radioactive materials. A restricted area shall not include areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.

(260) "Roentgen" or "R" means the special unit of exposure. One (1) roentgen (R) equals  $2.58 \times 10^{-4}$  coulombs per kilogram of air. See "Exposure".

(261) "Sanitary sewerage" means a system of public sewers for carrying off waste, water, and refuse, but excludes sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee.

(262) "Sealed source" means radioactive material that is encased in a capsule designed to prevent leakage or escape of the radioactive material.

(263) "Secondary dose monitoring system" means a system which terminates irradiation upon failure of the primary system.

(264) "Self-contained breathing apparatus" or "SCBA" means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

(265) "Shallow-dose equivalent ( $H_S$ )", with respect to external exposure of the skin of the whole body or the skin of an extremity, means the dose equivalent at a tissue depth of 0.007 centimeter (seven (7) mg/cm<sup>2</sup>).

(266) "Shielded position" means 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.

(267) "Shielded-room radiography" means industrial radiography conducted in a room shielded so that radiation levels at every location on the exterior meet the limitations specified in 902 KAR 100:019, Section 10.

(268) "Shipper" means the licensed entity, the generator that offers low-level radioactive waste for transportation, and may consign the waste to a licensed waste collector, waste processor, or land disposal facility operator.

(269) "Shipping paper" means NRC Form 540, and if required, 540A, or their equivalent, and includes the information required by the U.S. Department of Transportation in 49 C.F.R. Part 172.

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

(271) "Sievert" means:

- (a) The International System (SI) unit of quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv=100 rems).
- (b) See the table in the definition of "quality factors" for the quality factors to convert absorbed dose to dose equivalent.

(272) "Site area emergency" means the existence of situation where an event may occur, is in progress, or has occurred that may:

- (a) Lead to a significant release of radioactive material; and
- (b) Require a response by an off-site response organization to protect persons off site.

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

(274) "Source" means the focal spot of the x-ray tube.

(275) "Source changer" means 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.

(276) "Source holder" means a housing or assembly into which a radioactive source is placed for the purpose of facilitating the handling and use of the source.

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

(278) "Source material" means:

- (a) Uranium or thorium, or a combination thereof, in a physical or chemical form; or
- (b) Ores that contain by weight 0.05 percent or more of:
  - 1. Uranium;
  - 2. Thorium; or
  - 3. A combination of uranium and thorium.
- (c) Source material does not include special nuclear material.

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

(280) "Special form radioactive material" means radioactive material that satisfies the following conditions:

- (a) It is a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;
- (b) The piece or capsule has at least one (1) dimension not less than five (5) millimeters (0.197 inch); and
- (c)
  - 1. It satisfies the test requirements specified by the NRC in 10 C.F.R. Part 71.75.
  - 2. A special form encapsulation designed under the NRC requirements in 10 C.F.R. 71.4 in effect on June 30, 1983, and constructed prior to July 1, 1985, may continue to be used.

3. A special form encapsulation designed in accordance with the NRC requirements in 10 C.F.R. 71.4 in effect on March 31, 1996, and constructed before April 1, 1998 may continue to be used.
4. Any other special form encapsulation shall meet the specifications of this definition.
- (281) "Special nuclear material" means:
- (a) Plutonium, uranium 233, uranium enriched in the isotope U-233 or in the isotope U-235, and other material which the Governor declares by order to be special nuclear material after the United States Nuclear Regulatory Commission, or successor thereto, has determined the material to be special nuclear material, but does not include source material; or
  - (b) Material artificially enriched by one (1) of the foregoing, but does not include source material.
- (282) "Special nuclear material in quantities not sufficient to form a critical mass" means:
- (a) Uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained U-235;
  - (b) U-233 in quantities not exceeding 200 grams;
  - (c) Plutonium in quantities not exceeding 200 grams; or
  - (d) A combination of them as specified by the following formula:
    1. 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.
    2. The sum of these ratios for the different kinds of special nuclear material in combination shall not exceed one (1).
    3. For example, the following quantities in combination would not exceed the limitation and are within the formula:

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

- (283) "Special purpose x-ray system" means a radiographic x-ray system which, by design, is limited to radiographic examination of a specific anatomical region.
- (284) "Specific activity" means the radioactivity of the radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the radioactivity per unit mass of the material.
- (285) "Spot check" means a procedure performed to assure that a previous calibration continues to be valid.
- (286) "Spot film" means a radiograph which is made during a fluoroscopic examination to permanently record conditions which exist during that fluoroscopic procedure.
- (287) "Spot-film device" means a device intended to transport or position a radiographic image receptor between the x-ray source and fluoroscopic image receptor. It includes a device intended to hold a cassette over the input end of an image intensifier for the purpose of making a radiograph.
- (288) "SSD" means the distance between the source and the skin of the patient.
- (289) "Stationary beam radiation therapy" means radiation therapy without displacement of one (1) or more mechanical axes relative to the patient during irradiation.
- (290) "Stochastic effect" means a health effect that occurs randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose plus threshold factors.
- (291) "Storage" or "waste storage" means the holding of waste for treatment or disposal for a period of twenty-four (24) hours or more.
- (292) "Storage area" means:
- (a) A location, facility, or vehicle used to store, transport, or secure a radiographic exposure device, storage container, or sealed source if the source is not in use; and
  - (b) Which is locked or has a physical barrier to prevent accidental exposure, tampering with, or unauthorized removal of the device, container, or source.
- (293) "Storage container" means a device in which a sealed source is transported or stored.
- (294) "Stray radiation" means the sum of leakage and scattered radiation.
- (295) "Subsurface tracer study" means the release of a substance tagged with radioactive material for the purpose of tracing the movement or position of the tagged substance in the well-bore or adjacent formation.
- (296) "Supplied-air respirator "SAR" "airline respirator" means an atmosphere-supplying respirator for which the source of breathing air is not designated to be carried by the user.
- (297) "Surface contaminated object" or "SCO" means a solid object that is not classed as radioactive material, but which has radioactive material distributed on a surface. SCO must be in one (1) of two (2) groups with surface activity not exceeding the following limits:
- (a) SCO-I: A solid object on which:
    1. The nonfixed contamination on the accessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 10<sup>-4</sup> microcurie/cm<sup>2</sup> (4 Bq/cm<sup>2</sup>) for beta and gamma and low toxicity alpha emitters, or 10<sup>-5</sup> microcurie/cm<sup>2</sup> (0.4 Bq/cm<sup>2</sup>) for all other alpha emitters;
    2. The fixed contamination on the accessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 1.0 microcurie/cm<sup>2</sup> (4x10<sup>4</sup> Bq/cm<sup>2</sup>) for beta and gamma and low toxicity alpha emitters, or 0.1 microcurie/cm<sup>2</sup> (4x10<sup>3</sup> Bq/cm<sup>2</sup>) for all other alpha emitters; and
    3. The nonfixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 1 microcurie/cm<sup>2</sup> (4x10<sup>4</sup> Bq/cm<sup>2</sup>) for beta and gamma and low toxicity alpha emitters, for 0.1 microcurie/cm<sup>2</sup> (4x10<sup>3</sup> Bq/cm<sup>2</sup>) for all other alpha emitters.
  - (b) SCO-II: A solid object on which the limits for SCO-I are exceeded and on which:
    1. The nonfixed contamination on the accessible surface averaged over 300cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 10<sup>-2</sup> microcurie/cm<sup>2</sup> (400 Bq/cm<sup>2</sup>) for beta and gamma and low toxicity alpha emitters or 10<sup>-3</sup> microcurie/cm<sup>2</sup> (40 Bq/cm<sup>2</sup>) for all other alpha emitters;

2. The fixed contamination on the accessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 20 microcuries/cm<sup>2</sup> (8x10<sup>5</sup> Bq/cm<sup>2</sup>) for beta and gamma and low toxicity alpha emitters, or 2 microcuries/cm<sup>2</sup> (8x10<sup>4</sup> Bq/cm<sup>2</sup>) for all other alpha emitters; and
  3. The nonfixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 20 microcuries/cm<sup>2</sup> (8x10<sup>5</sup> Bq/cm<sup>2</sup>) for beta and gamma and low toxicity alpha emitters, or 2 microcuries/cm<sup>2</sup> (8x10<sup>4</sup> Bq/cm<sup>2</sup>) for all other alpha emitters.
- (298) "Survey" means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of sources of radiation. If appropriate, the evaluation shall include at least:
- (a) A physical survey of the location of sources of radiation; and
  - (b) Measurements or calculations of levels of radiation or concentrations or quantities of radioactive material present.
- (299) "Target" means that part of an x-ray tube or accelerator onto which a beam of accelerated particles is directed to produce ionizing radiation or other particles.
- (300) "Technique factors" means the conditions of operation. They are specified as follows:
- (a) For capacitor energy storage equipment, peak tube potential in kV and quantity of charge in mAs;
  - (b) For field emission equipment rated for pulsed operation, peak tube potential in kV and number of x-ray pulses;
  - (c) For CT x-ray systems designed for pulsed operation, peak tube potential in kV, scan time in seconds, and either tube current in mA, x-ray pulse width in seconds, and the number of x-ray pulses per scan, or the product of tube current, x-ray pulse width, and the number of x-ray pulses in mAs;
  - (d) For CT x-ray systems not designed for pulsed operation, peak tube potential in kV, and either tube current in mA and scan time in seconds, or the product of tube current and exposure time in mAs and the scan time if the scan time and exposure time are equivalent; and
  - (e) For other equipment, peak tube potential in kV and tube current in mA and exposure time in seconds or the product of tube current and exposure time in mAs.
- (301) "Technically Enhanced Naturally Occurring Radioactive Material "TENORM" means N.O.R.M., which has been separated to various degrees from the original ore or other material, refining or implementing it.
- (302) "Teletherapy" means therapeutic irradiation in which the source of radiation is at a distance from the body.
- (303) "Teletherapy physicist" means the individual identified as the teletherapy physicist on a cabinet license.
- (304) "Temporary job site" means a location to which radioactive material has been dispatched to perform a job, operation, or study other than the location listed in a specific license or certificate of registration.
- (305) "Tenth-value layer (TVL)" means the thickness of a specified material that attenuates X-radiation or gamma radiation to an extent that the air kerma rate, exposure rate, or absorbed dose rate is reduced to one-tenth of the value measured without the material at the same point.
- (306) "Termination of irradiation" means the stopping of irradiation in a fashion that does not permit continuance of irradiation without the resetting of operating conditions at the control panel.
- (307) "Tests" means the process of verifying compliance with an applicable regulation.
- (308) "Therapeutic radiation machines" means x-ray or electron-producing equipment designed and used for external beam radiation therapy.
- (309) "Therapeutic-type protective tube housing" means:
- (a) For x-ray therapy equipment not capable of operating at 500 kVp or above: an x-ray tube housing so constructed that the leakage radiation at a distance of one (1) meter from the target does not exceed one (1) roentgen in one (1) hour if the tube is operated at its maximum rated tube potential. Small areas of reduced protection are acceptable providing the average reading over a 100-square centimeter area at one (1) meter distance from the target does not exceed the value established in this paragraph; or
  - (b) For x-ray therapy equipment capable of operating at 500 kVp or above: an x-ray tube housing so constructed that the leakage radiation at a distance of one (1) meter from the target does not exceed one-tenth (0.1) percent of the useful beam exposure rate at one (1) meter from the target, for its operating conditions. Small areas of reduced protection are acceptable providing the average reading over a 100-square centimeter area at one (1) meter distance from the target does not exceed the value established in this paragraph.
- (310) "Tight-fitting facepiece" means a respiratory inlet covering that forms a complete seal with the face.
- (311) "Tomogram" means the depiction of the x-ray attenuation properties of a section through the body.
- (312) "Total effective dose equivalent" or "TEDE" means the sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).
- (313) "Traceable to a national standard" means that a quantity or a measurement has been compared to a national standard directly or indirectly through one (1) or more intermediate steps and that comparisons have been documented.
- (314) "Transport container" means a package that is designed to provide radiation safety and security if sealed sources are transported and which meets the requirements of the 49 C.F.R. 173, Subpart I.
- (315) "Transport index" means:
- (a) The dimensionless number that designates the degree of control to be exercised by the carrier during transportation, rounded up to the next tenth required to be placed on the label of a package.
  - (b) The transport index is determined by multiplying the maximum radiation level in millisievert (mSv) per hour at one (1) meter (3.3 feet) from the external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour at one (1) meter (3.3 feet).
- (316) "Treatment" or "waste treatment" means a method, technique, or process, including storage for radioactive decay, designed to change the physical, chemical, or biological characteristics or composition of a waste in order to render the waste for transport, storage or disposal, amendable to recovery, convertible to another usable material, or reduced in volume.
- (317) "Treatment site" means the anatomical description of the tissue intended to receive a radiation dose, as described in a written directive.

- (318) "Tritium neutron generator target source" means a tritium source used within a neutron generator tube to produce neutrons.
- (319) "Tube" means an x-ray tube, unless otherwise specified.
- (320) "Tube housing assembly" means the tube housing with tube installed. It includes high-voltage or filament transformers and other appropriate elements if they are contained within the tube housing.
- (321) "Tube rating chart" means the set of curves which specify the rated limits of operation of the tube in terms of the technique factors.
- (322) "Type A quantity" means 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 given in 10 C.F.R. 71 Appendix A, or may be determined by procedures described in 10 C.F.R. 71 Appendix A.
- (323) "Type B packaging" means a packaging designed to retain the integrity of containment and shielding required by U.S. Nuclear Regulatory Commission regulations if subjected to the normal conditions of transport and hypothetical accident test conditions established in 10 C.F.R. Part 71.
- (324) "Type B quantity" means a quantity of radioactive material greater than a Type A quantity.
- (325) "Uniform low-level radioactive waste manifest" or "uniform manifest" means the combination of NRC Forms 540, 541, and if necessary, 542, or their equivalents, and their respective continuation sheets as needed, or equivalent.
- (326) "Unirradiated uranium" means uranium containing not more than  $2 \times 10^3$  Bq of plutonium per gram of uranium-235, not more than  $9 \times 10^6$  Bq of fission products per gram of uranium-235, and not more than  $5 \times 10^{-3}$  gram of uranium-236 per gram of uranium-235.
- (327) "U.S. Department of Energy" means the Department of Energy established by 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 and retransferred to the Secretary of Energy in 42 U.S.C. 7151, effective October 1, 1977.
- (328) "Unrefined and unprocessed ore" means ore in its natural form prior to processing, such as grinding, roasting, beneficiating, or refining.
- (329) "Unrestricted area" means an area access to which is not controlled or limited by the licensee or registrant for purposes of protection of individuals from exposure to radiation and radioactive material.
- (330) "Uranium - natural, depleted, enriched" means:
- (a) "Natural uranium" means uranium with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium-235, and the remainder by weight essentially uranium-238);
  - (b) "Depleted uranium" means uranium containing less uranium-235 than the naturally occurring distribution of uranium isotopes;
  - (c) "Enriched uranium" means uranium containing more uranium-235 than the naturally occurring distribution of uranium isotopes.
- (331) "Uranium fuel cycle" means the operations of milling of uranium ore, chemical conversion of uranium, isotopic enrichment of uranium, fabrication of uranium fuel, generation of electricity by a light-water-cooled nuclear power plant using uranium fuel, and reprocessing of spent uranium fuel to the extent that these activities directly support the production of electrical power for public use. Uranium fuel cycle shall not include mining operations, operations at waste disposal sites, transportation of radioactive material in support of these operations, and the reuse of recovered nonuranium special nuclear and byproduct materials from the cycle.
- (332) "Useful beam" means the radiation that passes through the tube housing port and the aperture of the beam limiting device if the exposure switch or timer is activated.
- (333) "User" means an individual who personally utilizes or manipulates a source of radiation.
- (334) "User seal check" or "fit check" means an action conducted by the respirator user to determine if the respirator is properly seated to the face. Examples include negative pressure check, positive pressure check, irritant smoke check, or isoamylacetate check.
- (335) "Variable-aperture beam limiting device" means a beam limiting device that has capacity for stepless adjustment of the x-ray field size at a given SID.
- (336) "Vendor" means a person who sells radiation producing machines or accelerators registerable with the cabinet as specified by 902 KAR 100:110.
- (337) "Vendor registrant" means a vendor who is registered with the cabinet.
- (338) "Vendor registration" means registration of a vendor with the cabinet described by 902 KAR 100:110.
- (339) "Very high radiation area" means an area, accessible to individuals, in which radiation levels from radiation sources external to the body may result in an individual receiving an absorbed dose in excess of 500 rads (five (5) grays) in one (1) hour at one (1) meter from a radiation source or one (1) meter from a surface that the radiation penetrates.
- (340) "Virtual source" means a point from which radiation appears to originate.
- (341) "Visible area" means that portion of the input surface of the image receptor over which incident x-ray photons are producing a visible image.
- (342) "Visiting authorized nuclear pharmacist" means a nuclear pharmacist who is not identified on the license of the licensee being visited.
- (343) "Visiting authorized user" means an authorized user who is not identified on the license of the licensee being visited.
- (344) "Waste". See "low-level radioactive waste".
- (345) "Waste collector" means an entity, operating under the cabinet, U.S. Nuclear Regulatory Commission or agreement state license whose principal purpose is to collect and consolidate low level waste generated by others and to transfer this waste, without processing or repackaging the collected waste, to another licensed waste collector, licensed waste processor, or licensed land disposal facility.
- (346) "Waste description" means the physical, chemical, and radiological description of a low-level radioactive waste as called for on NRC Form 541.

(347) "Waste generator" means an entity, operating under the cabinet, U.S. Nuclear Regulatory Commission, or agreement state license, who:

- (a) Possesses any material or component that contains radioactivity or is radioactively contaminated for which the licensee foresees no further use; and
- (b) Transfers this material or component to a licensed land disposal facility or to a licensed waste collector or processor for handling or treatment prior to disposal. A licensee performing processing or decontamination services may be waste generator if the transfer of low-level radioactive waste from its facility is defined as "residual waste".

(348) "Waste processor" means an entity, operating under a cabinet, U.S. Regulatory Commission or agreement state license, whose principal purpose is to process, repackage, or treat low-level radioactive material or waste generated by others prior to eventual transfer of waste to a licensed low-level radioactive waste land disposal facility.

(349) "Waste type" means a waste within a disposal container having a unique physical description, such as a specific waste descriptor code or description, or a waste sorbed on or solidified in a specifically defined media.

(350) "Wedge filter" means an added filter effecting continuous progressive attenuation on the useful beam or a part thereof.

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

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

Organ Dose Weighting Factors

Organ or tissue	$W_T$
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	<sup>1</sup> 0.30
Whole Body	<sup>2</sup> 1.00

<sup>1</sup>0.30 results from 0.06 for each of five (5) "remainder" organs (excluding the skin and the lens of the eye) that receive the highest doses.

<sup>2</sup>For the purpose of weighting the external whole body dose (for adding it to the internal dose), a single weighting factor,  $W_T=1.0$ , has been specified. The use of other weighting factors for external exposure will be approved on a case-by-case basis, pursuant to 10 C.F.R. Part 20, until a time as specific guidance is issued.

(353) "Well-bore" means a drilled hole in which wire line service operations and subsurface tracer studies are performed.

(354) "Well-logging" means the lowering and raising of measuring devices or tools which may contain sources of radiation in well-bores or cavities for the purpose of obtaining information about the well or adjacent formations.

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

(356) "Wire line" means a cable containing one (1) or more electrical conductors which is used to lower and raise logging tools in the well-bore.

(357) "Wire line service operation" means an evaluation or mechanical service which is performed in the well-bore using devices on a wire line.

(358) "Worker" means an individual engaged in activities licensed or registered by the cabinet and controlled by a licensee or registrant, but does not include the licensee or registrant.

(359) "Working level" or "WL" means a combination of short-lived radon daughters (for radon-222: polonium-218, lead-214, bismuth-214, and polonium-214; and for radon-220: polonium-216, lead-212, bismuth-212, and polonium-212) in one (1) liter of air that results in the ultimate emission of  $1.3 \times 10^5$  MeV of potential alpha particle energy.

(360) "Working level month" or "WLM" means an exposure to one (1) working level for 170 hours (2,000 working hours per year/twelve (12) months per year = approximately 170 hours per month).

(361) "Written directive" means an order in writing for a specific patient or human research subject, dated and signed by an authorized user prior to the administration of a radiopharmaceutical or radiation, except as specified in paragraph (f) of this subsection, and containing the following information:

- (a) For an administration of quantities greater than thirty (30) microcuries of sodium iodide I-125 or I-131: the dosage;
- (b) For a therapeutic administration of a radiopharmaceutical other than sodium iodide I-125 or I-131: the radiopharmaceutical, dosage, and route of administration;
- (c) For gamma stereotactic radiosurgery: target coordinates, collimator size, plug pattern, and total dose;
- (d) For teletherapy: the total dose, dose per fraction, treatment site, and overall treatment period;
- (e) For high-dose-rate remote afterloading brachytherapy: the radioisotope, treatment site, and total dose; or
- (f) For all other brachytherapy:
  - 1. Prior to implementation: the radioisotope, number of sources, and source strengths; and
  - 2. After implantation, but prior to completion of the procedure: the radioisotope, treatment site, and total source strength and exposure time (or, equivalently, the total dose).

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

x-ray exposure.

(363) "X-ray equipment" means an x-ray system, subsystem, or component thereof. X-ray equipment is further classified as:

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

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

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

(d) "Transportable" means x-ray equipment installed in a vehicle or trailer.

(364) "X-ray field" means that area of the intersection of the useful beam 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 exposure rate is one-fourth (1/4) of the maximum in the intersection.

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

(366) "X-ray subsystem" means a combination of two (2) or more components of an x-ray system.

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

(368) "X-ray tube" means an electron tube designed to be used primarily for the production of x-rays.

(369) "Year" means the period of time, beginning in January, used to determine compliance with the provisions of 902 KAR Chapter 100. The licensee or registrant may change the starting date of the year used to determine compliance by the licensee or registrant if:

(a) The change is made at the beginning of the year; and

(b) A day is not omitted or duplicated in consecutive years.

(1 Ky.R. 381; eff. 2-5-1975; Am. 12 Ky.R. 979; eff. 1-3-1986; 16 Ky.R. 2515; 17 Ky.R. 39; eff. 6-27-1990; 18 Ky.R. 1474; eff. 1-10-1992; 21 Ky.R. 610; 1057; eff. 9-21-1994; 24 Ky.R. 2770; 25 Ky.R. 336; eff. 8-17-1998; 26 Ky.R. 2371; 27 Ky.R. 782; eff. 9-11-2000; 37 Ky.R. 1799; 2594; eff. 6-3-2011; 41 Ky.R. 867; 1568; eff. 2-5-2015; TAm eff. 9-27-2019; Cert. eff. 11-12-2021.)