KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

STANDARDS FOR PROTECTION AGAINST RADIATION

Effective March 24, 2006

K.A.R. 28-35-133 through K.A.R. 28-35-505

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PART 1. GENERAL

28-35-133. Persons protected. These regulations state the requirements that shall be applied in the use of all radiation, radiation machines, and radioactive materials to ensure the maximum protection of the public health and the maximum safety to all persons at, or in the vicinity of, the place of use, storage, or disposal of sources of radiation. These regulations are intended to be consistent with the best use of radiation machines and radioactive materials, and to encourage the constructive uses of radiation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-134. Persons regulated and exempted. Except as otherwise specified, these regulations shall apply to all persons who receive, possess, use, transfer, own or acquire any source of radiation. However, nothing in these regulations shall apply to any person to the extent that the person is subject to regulation by the United States nuclear regulatory commission. Regulation by the secretary of source material, by-product material, and special nuclear material in quantities not sufficient to form a critical mass is subject to the provisions of the agreement between the department and the U.S. nuclear regulatory commission and to part 150 of the commission's regulations (10 CFR Part 150), as in effect on January 29, 1982. The provisions of part 4 of these regulations shall not limit the exposure of patients to radiation for the purpose of diagnosis or therapy, by persons licensed to practice one or more of the healing arts within the authority granted to them by the Kansas healing arts statues, or by persons licensed to practice dentistry or podiatry within the authority granted to them by Kansas licensing laws applying to dentists and podiatrists. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-135. (Authorized by K.S.A. 1992 Supp. 48-1607; implementing K.S.A. 1993 Supp. 48-1603, 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; revoked December 30, 2005.)

28-35-135a. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "A_1" means the maximum activity of special form radioactive material permitted in a type A package.

(b) "A_2" means the maximum activity of radioactive material, other than special form radioactive material, permitted in a type A package. These values either are listed in table I in K.A.R. 28-35-221b or may be derived in accordance with the procedure specified in K.A.R. 28-35-221b of these regulations.

(c) "Absorbed dose" means the energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. The units of absorbed dose are the rad and the gray (Gy).

(d) "Absorbed dose rate" means the absorbed dose per unit of time or, for linear accelerators, the dose monitor unit per unit of time.

(e) "Accelerator-produced material" means any material made radioactive by exposing it in a particle accelerator.

(f) "Accessible surface" means the surface of equipment or of an equipment part that can be easily or accidentally touched by persons without the use of a tool.

(g) "Accident" means an unintended event, including an operating error, equipment failure, and other mishap, that could result in either of the following:

(1) A dose in excess of regulatory limits on site or for the public; or

(2) consequences or potential consequences that cannot be ignored from the point of view of protection or safety, including an actual or potential substantial degradation of the level of protection or safety of the facility or the release of radioactive material in sufficient quantity to warrant consideration of protective actions.

(h) "Act" means the "nuclear energy development and radiation control act," K.S.A. 48-1601 et seq., and amendments thereto.

(i) "Activity" means the rate of disintegration, transformation, or decay of radioactive material.

Activity is expressed in the SI unit of becquerel (Bq) or in the special unit of curie (Ci), or the multiples of either unit, or disintegrations or transformations per unit of time as follows:

(1) One becquerel (Bq) equals one disintegration or transformation per second (dps or tps); and

(2) one curie (Ci) equals 3.7E+10 disintegrations or transformations per second (dps or tps). One curie also equals 3.7E+10 becquerels (Bq).

(j) "Added filter" means the filter added to the inherent filtration.

(k) "Address of use" means the building or buildings that are identified on the license and each location where radioactive material could be produced, prepared, received, used, or stored.

(l) "Adult" means an individual who is 18 or more years of age.

(m) "Agreement state" means any state with which the United States nuclear regulatory commission enters, or has entered, into an effective agreement pursuant to 42 U.S.C.' 2021, as in effect on January 4, 1995.

(n) "Airborne radioactive area" means the following:

(1) Any room, enclosure, or operating area in which airborne radioactive material exists in concentrations in excess of the derived air concentrations (DAC) specified in "Appendices to part 4: standards for protection against radiation," effective April 1994, published by the department and hereby adopted by reference; or

(2) any room, enclosure, or operating area in which airborne radioactive material exists in concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the ALI or 12 DAC-hours.

(o) "Airborne radioactive material" means any radioactive material dispersed in the air in the form of dust, fumes, mists, vapors, or gases.

(p) "Air kerma (K)" means the kinetic energy released in air by ionizing radiation. Kerma is determined by dividing 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).

(q) "Alert" means a period during which an event could occur, is in progress, or has occurred and could lead to a release of radioactive material. However, the event is not expected to require a response by off-site response organizations to protect persons off-site.

(r) "Aluminum equivalent" means the thickness of type 1100 aluminum alloy that affords the same attenuation, under specified conditions, as that of the material in question. The nominal chemical composition of type 1100 aluminum alloy is a minimum of 99.00 percent aluminum and 0.12 percent copper.

(s) "Amendment" means any change to a license or registration issued under these regulations.

(t) "Analytical X-ray system" means a group of local and remote components utilizing X-rays to determine the elemental composition or to examine the microstructure of materials.

(1) Local components shall include those components that are struck by X-rays, including radiation source housings, port and shutter assemblies, collimators, sample holders, cameras, goniometers, detectors, and shielding.

(2) Remote components may include power supplies, transformers, amplifiers, readout devices, and control panels.

(u) "Annual limit on intake (ALI)" means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent of 5 rem (0.05 Sv) or a committed dose equivalent of 50 rem (0.5 Sv) to any individual organ or tissue. ALI values for intake by ingestion and by inhalation of selected radionuclides are specified in appendix B, table I, published in "Appendices to part 4: standards for protection against radiation," effective April 1994.

(v) "Annual refresher safety training" means a review conducted or provided by the licensee or registrant for its employees on radiation safety aspects of industrial radiography. The review shall include, at a minimum, any results of internal inspections, new procedures or equipment, new or revised regulations, and accidents or errors that have been observed. The review shall also provide opportunities for employees to ask safety questions.

(w) "ANSI" means the American national standards institute.

(x) "Applicator" means a structure that determines the extent of the treatment field at a given distance from the virtual source.

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

(z) "As low as is reasonably achievable (ALARA)," when used to describe exposures to radiation workers, means that every reasonable effort has been made to maintain exposures to radiation workers as far below the dose limits specified in these regulations as is practical, consistent with the purpose for which the licensed or registered activity is undertaken, taking the following into account:

(1) The state of technology;

(2) the economics of improvements in relation to the state of technology;

(3) the economics of improvements in relation to benefits to public health and safety and to other societal and socioeconomic considerations; and

(4) the economics of improvements in relation to the utilization of nuclear energy and licensed or registered sources of radiation in the public interest.

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

(bb) "Associated equipment" means equipment that is used in conjunction with a radiographic exposure device that makes radiographic exposures and that drives, guides, or comes in contact with the source.

(cc) "Attenuation block" means a block or stack, with dimensions of 20 cm by 20 cm by 3.8 cm, made of type 1100 aluminum alloy or other materials having equivalent attenuation.

(dd) "Authorized user" means a practitioner of the healing arts who is identified as an authorized user on a license issued by the department permitting the medical use of radioactive material or a practitioner of the healing arts who is designated by a registered facility as a user of medical X-ray machines or accelerators.

(ee) "Automatic exposure control" means a device that automatically controls one or more technique factors in order to obtain a required quantity of radiation, at one or more preselected locations. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135b. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) (1) "Background radiation" means the following:

(A) Radiation from cosmic sources;

(B) naturally occurring radioactive materials, including radon, except for those radioactive materials that are a decay product of source material or special nuclear material; and

(C) global fallout as it exists in the environment from the testing of nuclear explosive devices.

(2) The term "background radiation" shall not include radiation from radioactive materials regulated by the department.

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

(c) "Beam-limiting device" means a device that provides a means to restrict the dimensions of the X-ray field.

(d) "Beam-monitoring filter" means a filter used to scatter a beam of electrons.

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

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

(g) "Becquerel (Bq)" means the SI unit of activity. One becquerel is equal to one disintegration per second (dps) or transformation per second (tps).

(h) "Bent-beam linear accelerator" means a linear accelerator in which the accelerated electron beam must change direction by passing through a bending magnet.

(i) "Bioassay" means the determination of kinds, quantities, or concentrations and, in some cases, the locations of radioactive material in the human body, whether by direct measurement, in vivo counting, or

analysis and evaluation of materials excreted or removed from the human body. For purposes of these regulations, "radiobioassay" shall be considered an equivalent term.

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

(k)(1) "Byproduct material" means the following:

(A) Any radioactive material, except special nuclear material, yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material; and

(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 or thorium solution-extraction processes. Underground ore bodies depleted by these solution-extraction processes shall not constitute "byproduct material" within this definition.

(2) For the purposes of part 6, "byproduct material" shall mean all radioactive material regulated by the department. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135c. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Cabinet radiography using radiation machines" means industrial radiography that is conducted in an enclosed, interlocked cabinet that prevents the radiation machine from operating unless all openings are securely closed and that is sufficiently shielded so that every location on the cabinet's exterior meets the conditions for an unrestricted area as specified in K.A.R. 28-35-214a.

(b) "Cabinet X-ray system" means an X-ray system with the X-ray tube installed in an enclosure, called a "cabinet," that is independent from existing architectural structures except the floor on which the cabinet could be placed. The cabinet is intended for the following purposes:

(1) To contain at least that portion of a material being irradiated;

(2) to provide radiation attenuation; and

(3) to exclude personnel from the interior of the cabinet during the generation of X-rays.

Cabinet X-ray systems may include all X-ray systems designed primarily for the inspection of carry-on baggage at airline, railroad, and bus terminals, and in similar facilities. An X-ray tube that is used within a shielded part of a building, or X-ray equipment that may temporarily or occasionally incorporate portable shielding, shall not be considered a cabinet X-ray system.

(c) "Calendar quarter" means at least 12 but not more than 14 consecutive weeks. first calendar quarter of each year shall begin in January. Subsequent calendar quarters shall be arranged so that no day is included in more than one calendar quarter and no day in any one year is omitted from inclusion within a calendar quarter. A licensee or registrant shall not change the method of determining and observing calendar quarters for purposes of these regulations except at the beginning of a calendar year.

(d) "Calibration" means the determination of either of the following:

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

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

(e) "Camera" means a radiographic exposure device.

(f) "Central axis of the beam" means a line passing through the virtual source and the center of the plane figure formed by the edge of the first beam-limiting device.

(g) "Cephalometric device" means a device intended for the radiographic visualization and measurement of the dimensions of the human head.

(h) "Certifiable cabinet X-ray system" means an existing, uncertified X-ray system that has been modified to meet the certification requirements specified in 21 CFR 1020.40, as in effect on April 30, 1984.

(i) "Certified cabinet X-ray system" means a cabinet X-ray system that has been certified as manufactured and assembled as specified in 21 CFR 1020.40, as in effect on April 30, 1984.

(j) "Certified components" means the components of X-ray systems that are subject to regulations promulgated under public law 90-602, the radiation control for health and safety act of 1968 and amendments thereto.

(k) "Certified system" means any X-ray system that has one or more certified components.

(l) "Certifying entity" means an independent certifying organization or state regulatory program meeting the requirements in K.A.R. 28-35-292.

(m) "Changeable filter" means any filter, exclusive of inherent filtration, that can be removed from the useful beam through any electronic, mechanical, or physical process.

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

(o) "Class" means a classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. For the purposes of these regulations, "lung class" and "inhalation class" shall be considered equivalent terms. Materials are classified as D, W, or Y, which applies to the following range of clearance half-times:

(1) For class D, fewer than 10 days;

(2) for class W, from 10 through 100 days; and

(3) for class Y, more than 100 days.

(p) "Coefficient of variation" or "C" means the ratio of the standard deviation to the mean value of a population of observations. This ratio is estimated using the following equation:

$$C = \frac{s}{\bar{x}} = \frac{1}{\bar{x}}\left(\sum_{i=1}^{n}\frac{\left(x_i - \bar{x}\right)}{n-1}\right)^{1/2}$$

s = Estimated standard deviation of the population.

$\bar{x}$ = Mean value of observations in sample.

x_i = sample observation number "i."

(q) "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.

(r) "Collimator" means a radiation shield that is placed at the end of a guide tube or directly onto a radiographic exposure device to restrict the size of the radiation beam when the sealed source is cranked into position to make a radiographic exposure.

(s) "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 50-year period following the intake.

(t) "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 each of these organs or tissues ($H_{E,50} = \sum w_T H_{T,50}$).

(u) "Computed tomography" means the production of a tomogram by the acquisition and computer processing of X-ray transmission data.

(v) "Contact therapy" means therapy in which the X-ray tube port is put in contact with, or within five centimeters of, the surface being treated.

(w) "Contact therapy system" means a therapeutic radiation machine with a short target-to-skin distance (TSD), usually less than five centimeters.

(x) "Control cable" means the cable that is connected to the source assembly and used to drive the source to and from the exposure location.

(y) "Control drive mechanism" means a device that enables the source assembly to be moved into and out of the exposure device.

(z) "Controlled area" means an area outside of a restricted area but inside the site boundary, access to which can be limited by the licensee or registrant for any reason.

(aa) "Control panel" means that part of the X-ray system where the switches, knobs, push buttons, and other hardware necessary for manually setting the technique factors are mounted.

(bb) "Control tube" means a protective sheath for guiding the control cable. The control tube connects the control drive mechanism to the radiographic exposure device.

(cc) "Cooling curve" means the graphical relationship between the heat units stored and the cooling

time.

(dd) "Curie" means a unit of activity. One curie (Ci) is the quantity of radioactive material that decays at the rate of 3.7 x 10^{10} transformations per second (tps). Commonly used submultiples of the curie are the millicurie and the microcurie. One millicurie (mCi) = 0.001 curie = 3.7 x 10^{7} tps. One microcurie (µCi) = 0.000001 curie = 3.7 x 10^{4} tps. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135d. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Deadman switch" means a switch constructed so that circuit closure can be maintained only by continuous pressure by the operator.

(b) "Declared pregnant woman" means a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of delivery. The written declaration shall remain in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.

(c) "Decommission" means either of the following:

(1) To remove a facility or site safely from service and reduce residual radioactivity to a level that permits the release of the property for unrestricted use and the termination of the license; or

(2) to release the property under restricted conditions and to terminate the license.

(d) "Dedicated check source" means a radioactive source that is used to ensure the constant operation of a radiation detection or measurement device over several months or years. This source may also be used for other purposes.

(e) "Deep dose equivalent (H_d)," which applies to external whole body exposure, means the dose equivalent to a tissue depth of one centimeter (1,000 mg/cm^2).

(f) "Deliberate misconduct" means a person's intentional act or omission about which the person knows one of the following:

(1) If not detected, the act or omission would cause a licensee, a registrant, or an applicant to be in violation of any statute, regulation, or order or any term, condition, or limitation of any license issued by the secretary.

(2) The act or omission constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a licensee, registrant, applicant, contractor, or subcontractor.

(3) The act or omission involves the person's deliberate submission to the department, a licensee, a registrant, an applicant, or a licensee's contractor or subcontractor of information relating to a licensee's, a registrant's, or an applicant's operations that the person knows to be incomplete or inaccurate in some respect.

(g) "Dentistry" means the functions authorized by K.S.A. 65-1421 et seq., and amendments thereto.

(h) "Department" means the department of health and environment.

(i) "Depleted uranium" means source material uranium in which the isotope uranium 235 is less than 0.711 percent of the total weight of uranium present. This term shall not include special nuclear material.

(j) "Derived air concentration (DAC)" means the concentration of a given radionuclide in air that, if breathed by the reference man for a working year of 2,000 hours under conditions of light work, results in an intake of one ALI. For purposes of these regulations, the condition of light work is an inhalation rate of 1.2 cubic meters of air per hour for 2,000 hours in a year. The DAC are values specified in "appendices to part 4: standards for protection against radiation," effective April 1994.

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

(l) "Diagnostic clinical procedures manual" means a collection of written procedures that describes each method and other instructions and precautions by which the licensee performs diagnostic clinical procedures, each of which has been approved by the authorized user and includes the radiopharmaceutical, dosage, and route of administration.

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

(n) "Diagnostic-type tube housing" means an X-ray tube housing constructed so that the leakage radiation, at a distance of one meter from the target, does not exceed 100 milliroentgens in one hour when the tube is operated at the maximum rate of continuous tube current and the maximum rate of tube potential.

(o) "Diagnostic X-ray imaging system" means an assemblage of components for the generation, emission, and reception of X-rays and the transformation, storage, and visual display of the resultant X-ray image.

(p) "Diagnostic X-ray system" means an X-ray system designed for irradiation of any part of the human body for the purpose of diagnosis or visualization.

(q) "Direct scattered radiation" means scattered radiation that has been deviated in direction only by materials irradiated by the useful beam.

(r) "Dose" is a generic term that means the absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed dose equivalent, total organ dose equivalent, or total effective dose equivalent. For purposes of these regulations, "radiation dose" shall be considered an equivalent term.

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

(t) "Dose limits" means the permissible upper bounds of radiation doses established in accordance with these regulations. For purposes of these regulations, "limits" is an equivalent term.

(u) "Dose-monitoring system" means a system of devices for the detection, measurement, and display of quantities of radiation.

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

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

(x) "Doubly encapsulated sealed source" means a sealed source in which the radioactive material is sealed within an inner capsule and that capsule is sealed within an outer capsule.

(y) "Drill" means a supervised, hands-on instruction period intended to test, develop, or maintain a specific emergency response capability. A drill may be a component of an exercise. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135e. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Effective dose equivalent (H_E)" means the sum of the products of the dose equivalent to each organ or tissue (H_T) and the weighting factor (w_T) applicable to each of the body organs or tissues that are irradiated ($H_E = \Sigma\, w_T H_T$).

(b) "Embryo or fetus" means the developing human organism at any stage of development until the time of birth.

(c) "Emergency" means an event requiring prompt action to mitigate a threat to the health and safety of workers or the public or a threat of damage to the environment.

(d) "Emergency planning zone" means a geographic area surrounding a specific facility for which special planning and preparedness efforts are carried out to ensure that prompt and effective protective actions will reduce or minimize the impact of releases of radioactive material on public health and safety or the environment.

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

(f) "Entrance exposure rate" means the roentgens per unit of time at the point where the center of the useful beam enters any individual.

(g) "Entrance or access point" means any opening through which an individual or extremity of an individual could gain access to radiation areas or to licensed or registered radioactive materials. This term shall include entry and exit portals of sufficient size to permit human entry, irrespective of the intended use.

(h) "Evacuation" means the urgent removal of people from an area to avoid or reduce high-level, short-term exposure.

(i) "Event" means a situation reasonably discrete in time, location, and consequences.

(j) "Exercise" means a multifaceted activity that test the plans, procedures, adequacy of training,

resources, and integrated capability of an emergency response system.

(k) "Existing equipment" means therapy systems subject to K.A.R. 28-35-250a that were manufactured on or before January 1, 1985.

(l) "Explosive material" means any chemical compound, mixture, or device that produces a substantial, instantaneous release of gas and heat spontaneously or by contact with sparks or flame.

(m) "Exposure" means the quotient of dQ divided by dm. "dQ" is the absolute value of the total charge of the ions of one sign produced in air when all the electrons, negatrons, and positrons liberated by photons in a volume element of air having mass, expressed as "dm," are completely stopped in air. The special unit of exposure is the roentgen (R). One roentgen equals 2.58 x 10^{-4} coulombs per kilogram of air.

(n) "Exposure head" means a device that locates the sealed source in the selected working position. For the purposes of these regulations, "source stop" is an equivalent term.

(o) "Exposure rate" means the exposure per unit of time, including roentgens per minute (R/min) and milliroentgens per hour (mR/hr).

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

(q) "External dose" means that portion of the dose equivalent received from any source of radiation outside the body.

(r) "Extremity dose" means the external dose equivalent to the hand, elbow, arm below the elbow, foot, knee, and leg below the knee.

(s) "Eye dose equivalent" means the external dose equivalent to the lens of the eye, at a tissue depth of 0.3 centimeter or 300 mg/cm^2. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135f. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation:

(a) "Facility" means the specific location at which a person is licensed or registered to use radioactive material or radiation-producing devices. Separate physical locations shall be considered to be separate facilities.

(b) "Fail-safe characteristic" means a design feature that causes beam port shutters to close, or otherwise prevents emergence of the primary beam, upon the failure of a safety or warning device.

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

(d) "Field-flattening filter" means a filter used to provide dose uniformity over the area of a useful beam of X-rays at a specified depth.

(e) "Field size" means the dimensions along the major axes of an area in a plane perpendicular to the specified direction of the beam of incident radiation at the normal treatment distance. Field size is defined by the intersection of the major axes and the 50 percent isodose line. Material shall be placed in the beam so that the maximum dose is produced at the normal treatment distance when the field size is being determined.

(f) "Field station" means a facility where radioactive sources or radiation-processing devices are stored or used and from which equipment is dispatched to temporary job sites.

(g) "Filter" means material placed in the path of the useful beam of X-rays to selectively absorb the less penetrating radiation.

(h) "Fluoroscopic imaging assembly" means a component that comprises a reception system in which X-ray photons produce a fluoroscopic image. This term shall include equipment housings, any electrical interlocks, the primary protective barrier, and structural material providing linkage between the image receptor and the diagnostic source assembly.

(i) "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.

(j) "Full-cost reimbursement" means reimbursement of the total cost of staff time and any contractual support services expended. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135g. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation:

(a) "Gantry" means that part of the system supporting and allowing possible movements of the radiation head.

(b) "General emergency" means that an accident has occurred or is in progress, involving actual or imminent catastrophic reduction of facility safety systems with the potential for loss of containment or confinement integrity or release of radioactive material that can be reasonably expected to exceed off-site protective action guides.

(c) "Generally applicable environmental radiation standards" means standards issued by the U.S. environmental protection agency (EPA) under the authority of the atomic energy act of 1954, as amended, that impose limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.

(d) "General purpose radiographic X-ray system" means any radiographic X-ray system that, by design, is not limited to the radiographic examination of specific anatomical regions.

(e) "Gonadal shield" means a protective barrier for the testes or ovaries.

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

(g) "Group I" means prepared radiopharmaceuticals that are used for diagnostic studies involving measurements of uptake, dilution, and excretion, as specified in 10 CFR 35.100, which is adopted by reference in KA.R. 28-35-264.

(h) "Group II" means prepared radiopharmaceuticals that are used for diagnostic studies involving imaging and tumor localizations and any radioactive material in a radiopharmaeutical prepared from a group II kit or providing a single dose. With respect to radiopharmaceuticals prepared from group II kits or as single doses, group II shall refer to the unsealed byproduct material specified in 10 CFR 35.200, which is adopted by reference in K.A.R. 28-35-264.

(i) "Group III" means generators and reagent kits that are used following the manufacturer's instructions for the preparation of diagnostic radiopharmaceuticals. With respect to generators and reagent kits, group III shall refer to the unsealed byproduct material specified in 10 CFR 35.200, which is adopted by reference in K.A.R. 28-35-264.

(j) "Group IV" means prepared radiopharmaceuticals that are used for certain therapeutic uses that do not normally require hospitalization for purposes of radiation safety. With respect to uses that do not normally require hospitalization, group IV shall refer to the unsealed byproduct material specified in 10 CFR 35.300, which is adopted by reference in K.A.R. 28-35-264.

(k) "Group V" means prepared radiopharmaceuticals for certain therapeutic uses that normally require hospitalization for purposes of radiation safety. With respect to uses that normally require hospitalization, group V shall refer to unsealed byproduct material specified in 10 CFR 35.300, which is adopted by reference in K.A.R. 28-35-264.

(l) "Group VI" means sources and devices containing radioactive material used for medical diagnosis and therapy, as specified in 10 CFR 35.400, which is adopted by reference in K.A.R. 28-35-264.

(m) "Guide tube" means a flexible or rigid tube for guiding the source assembly and the attached control cable from the exposure device to the exposure head. This term may include the connections necessary for attachment to the exposure device and to the exposure head. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135h. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation

(a) "Half-life" means the time required for the activity of any given radioisotope to decay to one-half of its original activity.

(b) "Half-value layer (HVL)" means the thickness of specified material that attenuates the beam of radiation to an extent that the exposure rate is reduced to one-half of its original value.

(c) "Hands-on experience," as applied to industrial radiology, means experience in all areas considered to be directly involved in the radiography process. This term shall include taking radiographs, the calibration of survey instruments, operational and performance testing of survey instruments and devices, film development, the posting of radiation areas, transporting radiography equipment, the posting of records and radiation area surveillance, and other areas as applicable. A disproportionate amount of time

spent in only one or two of these areas shall not be counted toward the 2,000 hours of hands-on experience required for a radiation safety officer or a radiographer.

(d) "Hazardous waste" shall have the meaning assigned in K.A.R. 28-31-3.

(e) "Healing arts" means the activities authorized in K.S.A. 65-2801 et seq., and amendments thereto.

(f) "Healing arts screening" means the testing of human beings using X-ray machines for the detection or evaluation of health indications when the test is performed without any prior examination and without any specific and individual order by a licensed practitioner of the healing arts who is legally authorized to perform examinations and to prescribe X-ray tests for the purpose of diagnosis or treatment.

(g) "Heat unit" means a unit of energy equal to the product of the peak kilovoltage, milliamperes, and seconds (kVp x mA x second).

(h) "High dose-rate remote afterloader" means a brachytherapy device that remotely delivers a dose rate in excess of 12 grays (1,200 rads) per hour at the point or surface where the dose is prescribed.

(i) "High-radiation area" means any area that is accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive, in any one hour and at 30 centimeters from the source of the radiation or any surface that the radiation penetrates, a dose to the whole body in excess of 100 millirems. For purposes of these regulations, rooms or areas in which diagnostic X-ray systems are used for healing arts purposes shall not be considered high-radiation areas.

(j) "Human use" means the intentional internal or external administration of radiation or radioactive material to any individual. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135i. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Image intensifier" means a device that instantaneously converts, by means of photoemissive surfaces and electronic circuitry, an X-ray pattern into a light pattern of greater intensity than would have been provided by the original X-ray pattern.

(b) "Image receptor" means any device, including a fluorescent screen and radiographic film, that transforms incident X-ray photons into a visible image or into another form that can be made into a visible image by further transformations.

(c) "Image receptor support," for mammographic systems, means that part of the system designed to support the image receptor in a horizontal plane during a mammographic examination.

(d) "Immediate" means within not more than 15 minutes or as otherwise defined in a license condition.

(e) "Incident" means an individual event or series of related events that caused or threatened to cause any violation of these regulations or license conditions. For the purposes of part 13, "incident" means any unintended event involving radioactive material for which the public dose is a fraction of regulatory limits and safety provisions are sufficient, but further degradation of safety systems could lead to an accident.

(f) "Independent certifying organization" means an independent organization that meets all of the criteria specified in K.A.R. 28-35-292.

(g) "Individual" means any human being.

(h) "Individual monitoring" means the assessment of either of the following:

(1) A dose equivalent by the use of individual-monitoring devices or by the use of survey data; or

(2) a committed effective dose equivalent determined by bioassay or by computation of the number of DAC-hours to which an individual is exposed.

(i) "Individual-monitoring device" means any device designed to be worn by a single individual for the assessment of dose equivalent. "Individual-monitoring device" shall include any film badge, thermoluminescent dosimeter (TLD), optically stimulated dosimeter, pocket ionization chamber, and personal air-sampling device. For purposes of these regulations, "personnel dosimeter" and "dosimeter" shall be considered terms equivalent to "individual-monitoring device."

(j) "Industrial radiography" means the examination of the structure of materials by nondestructive methods utilizing sources of radiation.

(k) "Inherent filtration" means the filtration permanently mounted in the useful beam, including the window of the X-ray tube and any permanent tube or source enclosure.

(l) "Injection tool" means a device used for controlled subsurface injection of radioactive tracer material.

(m) "Inspection" means an official examination or observation that may include tests, surveys, and monitoring to determine compliance with federal rules, state regulations, orders, requirements, and license and registration conditions.

(n) "Installation" means the location where one or more sources of radiation are used, operated, or stored.

(o) "Interlock" means a device for precluding access by an individual to an area of radiation hazard without warning, either by preventing admission or by automatically removing the hazards.

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

(q) "Interruption of irradiation" means the stopping of irradiation with the possibility of continuing irradiation without the resetting of operating conditions at the control panel.

(r) "Ionizing radiation" means radiation capable of producing an ionization event, including gamma rays and X-rays, alpha and beta particles, high-speed electrons, neutrons, and other nuclear particles.

(s) "Irradiation" means the exposure of matter to ionizing radiation.

(t) "Irradiator" means a facility that uses radioactive sealed sources for the irradiation of objects or materials and in which radiation dose rates exceeding five grays (500 rads) per hour exist at one meter from the sealed radioactive sources in air or water, as applicable for the irradiator type. This term shall not include any irradiator in which both the sealed source and the area subject to irradiation are contained within a device and are not accessible to personnel.

(u) "Irradiator operator" means an individual who has successfully completed the required training and testing and is authorized by the terms of the license to operate an irradiator without a supervisor present.

(v) "Irretrievable well-logging source" means any sealed source containing licensed material that is pulled off or not connected to the wireline that suspends the source in the well and for which all reasonable effort at recovery has been expended.

(w) "Isocenter" means a fixed point in space that is located at the center of the smallest sphere through which the central axis of the beams passes under all conditions. (Authorized by K.S.A. 48-1607; implementing K.S.A 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135k. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation:

(a) "Kilovolts (kV)" means the energy equal to that acquired by a particle with one electron charge in passing through a potential difference of 1,000 volts in a vacuum.

(b) "Kilovolts peak (kVp)" has the meaning assigned to "peak tube potential."

(c) "kWs" means kilowatt second. This term is calculated using the following equation:

$$\mathbf{kWs = (X)kV \times (Y)mA \times (Z)s \times \frac{kWs}{10^3 kV \times mA \times s} = \frac{XYZ\ kWs}{10^3}}$$

(Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135l. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Lead equivalent" means the thickness of lead affording the same attenuation, under specified conditions, as the material in question.

(b) "Leakage radiation" means radiation emanating from the device source assembly, except for the following:

(1) The useful beam; and

(2) radiation produced when the exposure switch or timer is not activated for diagnosis or therapy.

(c) "Leakage technique factors" means the technique factors associated with the tube housing assembly that are used in measuring leakage radiation. The leakage technique factors shall be defined as follows:

(1) For diagnostic source assemblies intended for capacitor energy storage equipment, the maximum rated number of exposures in an hour for operation at the maximum rated peak tube potential, with the

quantity of charge per exposure being 10 millicoulombs or the minimum obtainable from the unit, whichever is larger;

(2) for diagnostic source assemblies intended 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; and(3) for all other diagnostic or therapeutic source assemblies, the maximum rated peak tube potential and the maximum rated continuous tube current for the maximum rated peak tube potential.

(d) "License" means a document issued in accordance with these regulations specifying the conditions of use of radioactive material.

(e) "Licensed or registered material" means radioactive material received, possessed, used, transferred, or disposed of under a general or specific license or registration issued by the department.

(f) "Licensee" means any person who is licensed in accordance with these regulations.

(g) "Licensing state" means any state that has been granted final designation by the conference of

radiation control program directors, inc., for the regulatory control of NARM, as defined in K.A.R. 28-35-135n.

(h) "Light field" means that area of the intersection of the light beam from the beam-limiting device and one plane in the set of planes parallel to and including the plane of the image receptor, whose perimeter is the locus of points at which the illumination is one-fourth of the maximum in the intersection.

(i) "Line-voltage regulation" means the difference between the no-load and the load line potentials, expressed as a percent of the load line potential, using the following equation:

Percent line-voltage regulation = $100\ (V_n - V_1)/V_1$

where

V_n = No-load line potential and

V_1 = Load line potential.

(j) "Local component" means any part of an analytical X-ray system. This term shall include components that are struck by X-rays, including radiation source housings, port and shutter assemblies, collimators, sample holders, cameras, goniometers, detectors, and shielding. This term shall not include power supplies, transformers, amplifiers, readout devices, and control panels.

(k) "Logging supervisor" means the individual who uses sources of radiation or provides personal supervision of the utilization of sources of radiation at a well site.

(l) "Logging tool" means a device used subsurface to perform well logging.

(m) "Lost or missing licensed or registered source of radiation" means a licensed or registered source of radiation whose location is unknown. This term shall include licensed or registered material that has been shipped but has not reached its planned destination and whose location cannot be readily traced in the transportation system.

(n) "Lot tolerance percent defective" means the poorest quality, expressed as the percentage of defective units, in an individual inspection lot that may be accepted.

(o)"Low dose-rate remote afterloader" means a brachytherapy device that remotely delivers a dose rate in excess of 12 grays per hour at the point or surface where the dose is prescribed. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135m. Definitions. As used in these regulations, each of following terms shall have the meaning assigned in this regulation:

(a) "mA" means milliampere.

(b) "Major processor" means a user processing, handling, or manufacturing radioactive material exceeding type A quantities as unsealed sources or material, or exceeding four times the type B quantities as sealed sources. This term shall not include nuclear medicine programs, universities, industrial radiographers, and small industrial programs. Type A and B quantities are specified in K.A.R. 28-35-221b of these regulations.

(c) "Management" means the chief executive officer or other individual having the authority to manage, direct, or administer the licensee's activities, or that person's delegate or delegates.

(d) "Manual brachytherapy" means a type of brachytherapy in which the brachytherapy sources, including seeds and ribbons, are manually placed topically on or inserted either into the body cavities that are in close proximity to a treatment site or directly into the tissue volume.

(e) "mAs" means the product of milliamperes and seconds.

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

(g) "Medical event" means an event that meets the criteria specified in part 6 of these regulations.

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

(i) "Medical use" means the intentional internal or external administration of radioactive material, or radiation, to humans in the practice of the healing arts.

(j) "Medium dose-rate remote afterloader" means a brachytherapy device that remotely delivers a dose rate of greater than two grays, but less than 12 grays per hour at the point or surface where the dose is prescribed.

(k) "Megavolt (MV)" means the energy equal to that acquired by a particle with one electron charge in passing through a potential difference of one million volts in a vacuum.

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

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

(n) "Minor" means an individual younger than 18 years of age.

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

(p) "Mobile X-ray equipment" means X-ray equipment mounted on a permanent base with wheels or casters, or both, for moving while completely assembled. This term shall include X-ray equipment mounted in a vehicle.

(q) "Monitoring" means the measurement of radiation, radioactive material concentrations, surface area activities, or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses. For purposes of these regulations, "radiation monitoring" and "radiation protection monitoring" shall be considered terms equivalent to "monitoring."

(r) "Moving beam therapy" means radiation therapy with relative displacement of the useful beam and the patient during irradiation, including therapy, skip therapy, and rotational therapy. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135n. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation:

(a) "NARM" means any naturally occurring or accelerator-produced radioactive material, not including byproduct, source, or special nuclear material.

(b) "Natural radioactivity" means the radioactivity of naturally occurring nuclides.

(c) "New equipment" means any system subject to K.A.R. 28-35-249 that was manufactured after January 1, 1985.

(d) "Nonionizing radiation" means radiation not capable of producing ionization, including sound and radio waves and visible, infrared, or ultraviolet light.

(e) "Non-stochastic effect" means a health effect, the severity of which varies with the dose and for which a threshold is believed to exist. For purposes of these regulations, "deterministic effect" shall be considered an equivalent term.

(f) "Normal operating procedures" means operating procedures for conditions suitable for routine purposes with shielding and barriers in place, including routine alignment procedures. This term shall not include maintenance procedures and routine and emergency radiation safety considerations.

(g) "Normal treatment distance" means either of the following:

(1) For electron irradiation, the distance from the virtual source to the surface along the central axis of the useful beam, as specified by the manufacturer; or

(2) for X-ray irradiation, the distance from the virtual source to the isocenter along the central axis of the useful beam. For non-isocentric equipment, this distance shall be the distance specified by the manufacturer.

(h) "Nuclear regulatory commission (NRC)" means the U.S. nuclear regulatory commission or its duly authorized representatives.

(i) "NVLAP" means the national voluntary laboratory accreditation program. (Authorized by

K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effectiveDecember 30, 2005.)

28-35-135o. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Occupational dose" means the dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to radiation or radioactive material from licensed or unlicensed sources of radiation. The term "occupational dose" shall not include any dose received under any of the following circumstances:

(1) As background radiation;

(2) as a patient from medical practices;

(3) from voluntary participation in medical research programs; or

(4) as a member of the public.

(b) "Off-site response organization" means any non-licensee off-site organization that could be needed to respond to an emergency, including local fire, police, ambulance, and hospital emergency management services.

(c) "Open-beam configuration" means an X-ray system in which an individual could accidentally place some part of the individual's body in the primary beam path during normal operation.

(d) "Output" means the exposure rate or dose rate, or a quantity related in a known manner to these rates from a teletherapy unit for a specified set of exposure conditions. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135p. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Package" means a container and packing material, together with the radioactive contents, as presented for transport.

(b) "Panoramic dry-source-storage irradiator" means an irradiator in which the irradiations occur in air in areas potentially accessible to personnel and in which the sources are stored in shields made of solid materials. This term shall include beam-type dry-source-storage irradiators in which one narrow beam of radiation is produced for performing irradiations.

(c) "Panoramic wet-source-storage irradiator" means an irradiator in which the irradiations occur in air in areas potentially accessible to personnel and in which the sources are stored underwater in a storage pool.

(d) "Particle accelerator" means any machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of one mega electron volt (MeV).

(e) "Patient" means an individual subjected to examination, diagnosis, or treatment.

(f) "Patient intervention" means any action by the patient or human research subject, whether intentional or unintentional, that affects the prescribed treatment. This term shall include dislodging or removing any treatment device and prematurely terminating the prescribed treatment.

(g) "Peak tube potential" means the maximum value of the potential differences across an X-ray tube during an exposure. This term is also referred to as Akilovolts peak (kVp)."

(h) "Periodic quality-assurance check" means a procedure that is performed to ensure that the previous calibration continues to be valid.

(i) "Permanent radiographic installation" means an enclosed, shielded room, cell, or vault, not located at a temporary job site, in which radiography is performed.

(j) "Person" means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, political subdivision of this or any other state, or political subdivision or agency, excluding federal government agencies.

(k) "Personnel-monitoring equipment" means any device designed to be carried or worn by an individual and used to measure the exposure of that individual to radiation. For purposes of these regulations, "PMD," which means "personnel-monitoring device," shall be an equivalent term.

(l) "Personnel supervision" means guidance and instruction by the supervisor who is physically present at the job site and who is watching the performance of the operation in such proximity that contact can be maintained and immediate assistance given, as required.

(m) "Phantom" means a volume of material behaving in a manner similar to that of tissue, with respect to the attenuation and scattering of radiation.

(n) "Pharmacist" means any individual licensed to practice pharmacy under K.S.A. 65-1626 et seq., and amendments thereto.

(o) "Phototimer" means a device used for controlling radiation exposures to image receptors by limiting the amount of radiation that reaches a radiation-monitoring device or devices. The radiation-monitoring device or devices are part of an electronic circuit that controls the period of time during which the tube is activated. For purposes of these regulations, "automatic exposure control" is an equivalent term.

(p) "Physician" means any individual licensed to practice the healing arts specified in K.S.A. 65-2869, K.S.A. 65-2870, or K.S.A. 65-2871, and amendments thereto.

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

(r) "Podiatry" means the activities authorized and specified in K.S.A. 65-2001 et seq., and amendments thereto.

(s) "Pool irradiator" means any irradiator at which the sources are stored or used in a pool of water, including panoramic wet-source-storage irradiators and underwater irradiators.

(t) "Portable X-ray equipment" means X-ray equipment designed to be hand-carried.

(u) "Position indication device (PID)" means a device on dental X-ray equipment used to indicate the beam position and to establish a definite source-to-skin-surface distance. A PID can incorporate or serve as a beam-limiting device.

(v) "Positive beam limitation" means the automatic or semiautomatic adjustment of an X-ray beam to the size of the selected image receptor. Exposures cannot be made without this adjustment.

(w) "Practical examination" means a demonstration by personnel through the application of safety principles, including the use of all procedures and equipment.

(x) "Preceptor" means an individual who provides or directs the training and experience required for another individual to become an authorized user, an authorized medical physicist, an authorized nuclear pharmacist, or a radiation safety officer.

(y) "Prescribed dosage" means the quantity of radiopharmaceutical activity documented as follows:

(1) In a written directive; or

(2) either in the diagnostic clinical procedures manual or in any appropriate record in accordance with the directions of the authorized user for diagnostic procedures.

(z) "Prescribed dose" means any of the following:

(1) For gamma stereotactic radiosurgery, the total dose as documented in the written directive;

(2) for teletherapy, the total dose and dose per fraction as documented in the written directive; or

(3) for brachytherapy, either the total source strength and exposure time or the total dose, as documented in the written directive.

(aa) "Primary beam" means ionizing radiation that passes through an aperture of the source housing by a direct path from the X-ray tube or a radioactive source located in the radiation source housing.

(bb) "Primary dose-monitoring system" means a system that monitors the useful beam during irradiation and that terminates irradiation when a preselected number of dose monitor units are acquired.

(cc) "Primary protective barrier" means a barrier of attenuating materials used to reduce the useful X-ray beam to the required degree.

(dd) "Product conveyor system" means a system for moving the product to be irradiated to, from, and within the area where irradiation takes place.

(ee) "Projected dose" means a future dose calculated for a specified time period on the basis of estimated or measured initial concentrations of radionuclides or exposure rates and in the absence of protective actions.

(ff) "Protective action" means an action taken by members of the public to protect themselves from radiation from an accident involving radioactive material. This term may include sheltering, evacuation, relocation, control of access, administration of a radioprotective drug, decontamination of persons, decontamination of land or property, and controls placed on food or water.

(gg) "Protective action guide" means a projected dose from an accidental release of radioactive material at which protective action may be considered.

(hh) "Protective apron" means an apron made of radiation-absorbing materials used to reduce radiation exposure.

(ii) "Protective barrier" means a barrier of attenuating materials used to reduce radiation exposure

to the required degree.

(jj) "Protective glove" means a glove made of radiation-absorbing materials used to reduce radiation exposure.

(kk) "Public dose" means the dose received by a member of the public from exposure to radiation, radioactive material released by a licensee or registrant, or any other source of radiation under the control of the licensee or registrant. This term shall not include an occupational dose, a dose received from background radiation, a dose received as a patient from medical practices, and a dose received from voluntary participation in a medical research program.

(ll) "Pulse dose-rate remote afterloader" means a special type of remote afterloading brachytherapy device that meets all of the following conditions:

(1) The device uses a single source capable of delivering more than 12 grays per hour.

(2) The source activity of the device is approximately one-tenth of the activity of typical high dose-rate remote afterloader sources.

(3) The device is used to stimulate the radiobiology of a low dose-rate treatment by inserting the source for a given fraction of each hour.

(mm) "Pyrophoric liquid" means any liquid that ignites spontaneously in dry or moist air at or below 130°F (54.4°C).

(nn) APyrophoric solid" means any solid material, other than one classified as an explosive, that under normal conditions results in the following:

(1) Is liable to cause fires through friction or retained heat from manufacturing or processing;

(2) is ignited readily; and

(3) if ignited, burns vigorously and persistently enough to create a serious transportation, handling, or disposal hazard, including spontaneously combustible and water-reactive materials. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135q. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Qualified expert" means an individual having the knowledge and training to measure ionizing radiation, to evaluate safety techniques, and to advise regarding radiation protection needs.

(1) This term shall include any individual certified in the appropriate field by any of the following, or an individual with equivalent qualifications as determined by the secretary:

(A) The American board of radiology;

(B) the American board of health physics; or

(C) the American board of medical physics.

(2) With reference to the calibration of radiation therapy equipment, this term shall include any individual having, in addition to the qualifications specified in paragraph (1) of this subsection, training and experience in the clinical applications of radiation physics to radiation therapy, including any individual certified in either of the following, or an individual with equivalent qualifications as determined by the secretary:

(A) Therapeutic radiological physics by the American board of radiology; or

(B) X-ray and radium physics by the American board of radiology.

(b) "Quality factor (Q)" means the modifying factor, as listed in tables I and II in K.A.R. 28-35-144a, used to derive the dose equivalent from the absorbed dose.

(c) "Quarter" means a period of time that is equal to one-fourth of the year and is approximately 13 consecutive weeks. The beginning of the first quarter in each year shall coincide with the starting date of the year, and no day shall be omitted or duplicated in consecutive quarters. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135r. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Rad" means the unit of absorbed dose. One rad equals one-hundredth of a joule per kilogram of material or the absorption of 100 ergs per gram of material. One millirad (mrad) equals 0.001 rad.

(b) "Radiation area" means any area that is accessible to individuals, in which there exists radiation at such levels that, at 30 centimeters from the source of the radiation or any surface that the radiation

penetrates, an individual could receive a dose equivalent in excess of five millirems.

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

(d) "Radiation head" means the structure from which the useful beam emerges.

(e) "Radiation machine" means either of the following:

(1) Any device that is primarily intended to produce, and is capable of producing, ionizing radiation; or

(2) any device that is not primarily intended to produce, but does produce, ionizing radiation at a level greater than 0.5 mR/hr at any point five centimeters from its surface.

This term shall not mean any device that produces ionizing radiation only by use of radioactive materials.

(f) "Radiation room" means a shielded room in which irradiations take place. Underwater irradiators shall not be deemed to have radiation rooms.

(g) "Radiation safety officer" means an individual directly responsible for radiation protection.

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

(i) "Radioactive marker" means radioactive material placed subsurface or on a structure intended for subsurface use for the purpose of depth determination or direction orientation.

(j) "Radioactive material" means any material, in any chemical or physical form, that emits radiation spontaneously.

(k) "Radioactivity" means the disintegration of unstable atomic nuclei by the emission of radiation.

(l) "Radiograph" means an image receptor on which the image is created directly or indirectly by an X-ray pattern that results in a permanent record.

(m) "Radiographer" means any individual who meets the following conditions:

(1) Performs nonmedical radiographic operations or, while in attendance at the site where those radiographic operations are being performed, personally supervises the operations; and

(2) is responsible to the licensee or registrant, or both, for ensuring compliance with the requirements of these regulations or the conditions of the license, including any specific authorization by the department to provide training to radiographic trainees.

(n) "Radiographer certification" means the written approval received from a certifying entity stating that an individual has satisfactorily met the radiation safety, testing, and experience criteria.

(o) "Radiographer's assistant" means any individual who, under the personal supervision of a radiographer, uses radiation machines, radiographic exposure devices, sealed sources, or related handling tools or survey instruments in industrial radiography.

(p) "Radiographic exposure device" means any instrument with a sealed source fastened or contained in the instrument in which the sealed source or shielding of the source can be moved or otherwise changed from a shielded to unshielded position for purposes of making a radiographic exposure.

(q) "Radiographic imaging system" means any system that produces a permanent or semi-permanent image on an image receptor by the action of ionizing radiation.

(r) "Radiographic operations" means all activities performed with a radiographic exposure device or with a radiation machine. These activities shall include the following:

(1) Transporting, except by common or contract carriers;

(2) storing at a temporary job site;

(3) performing surveys to confirm the adequacy of boundaries;

(4) setting up equipment; and

(5) any activity performed inside restricted area boundaries.

This term shall not include transporting a radiation machine.

(s) "Radiological physicist" means an individual who meets at least one of the following requirements:

(1) Is certified by the American board of radiology in any the following:

(A) Therapeutic radiological physics;

(B) roentgen ray and gamma ray physics;

(C) X-ray and radium physics; or

(D) radiological physics;

(2) is certified by the American board of medical physics in radiation oncology physics; or

(3) (A) Holds a master's or doctor's degree in physics, biophysics, radiological physics, or health physics; and

(B) has completed one year of full-time training in therapeutic radiological physics and an additional year of full-time work experience under the supervision of teletherapy physicist at a medical institution that includes duties that involve performing calibration and spot checks of a medical accelerator or a sealed source teletherapy unit.

(t) "Rating" means the operating limits specified by the component manufacturer.

(u) "Recordable event" means the administration of any of the following:

(1) A radiopharmaceutical or radiation without a written directive if a written directive is required;

(2) a radiopharmaceutical or radiation if a written directive is required, without the daily recording of each administered radiopharmaceutical dosage or radiation dose in the appropriate record;

(3) a radiopharmaceutical dosage greater than 1.11 megabecquerels (30 µCi) of sodium iodide I-125 or I-131 if the administered dosage of both differs from the prescribed dosage by more than 10 percent of the prescribed dosage and if the difference between the administered dosage and the prescribed dosage exceeds 555 kilobecquerels (15 µCi);

(4) 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 10 percent of the prescribed dosage;

(5) a teletherapy radiation dose if the calculated weekly administered dose exceeds the weekly prescribed dose by 15 percent or more of the weekly prescribed dose; or

(6) a brachytherapy radiation dose if the calculated administered dose differs from the prescribed dose by more than 10 percent of the prescribed dose.

(v) "Recording" means producing a permanent form of an image resulting from X-ray photons.

(w) "Redundant beam-monitoring system" means a combination of two dose-monitoring systems in which each system is designed to terminate irradiation in accordance with a preselected number of dose monitor units.

(x) "Reference man" means a hypothetical aggregation of human physical and physiological characteristics determined by international consensus. These characteristics may be used by researchers and public health workers to standardize the results of experiments and to relate biological damage to a common base.

(y) "Registrable item" means any radiation machine.

(z) "Registrant" means any person who is registered with the department and is legally obligated to register with the department according to these regulations.

(aa) "Registration" means the process of completing and filing forms with the department as required by these regulations.

(bb) "Relocation" means the removal or, after a plume has passed, the continued exclusion of people from contaminated areas to avoid a chronic radiation dose.

(cc) "Rem" means the special unit of any of the quantities expressed as dose equivalent. One millirem (mrem) equals 0.001 rem.

(dd) "Research and development" means either the following:

(1) Theoretical analysis, exploration, or experimentation; or

(2) the extension of investigating findings and theories of a scientific or technical nature into practical application for experimental purposes, including the experimental production and testing of models, devices, equipment, materials, and processes.

Research and development, as used in these regulations, shall not include the internal or external administration of radiation or radioactive materials to any individual.

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

(ff) "Response time" means the time required for an instrument system to reach 90 percent of its final reading when the radiation-sensitive volume of the instrument system is exposed to a step change in radiation flux from zero to a level sufficient to provide a steady-state midscale reading.

(gg) "Restricted area" means any area to which the access is limited by the licensee or registrant to protect individuals against undue risks from exposure to sources of radiation. This term shall not include areas used as residential quarters. However, separate rooms in a residential building may be set apart and designated as a restricted area. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135s. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Sanitary sewerage" means a system of public sewers to carry off waste water and refuse. This term shall exclude sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee or registrant.

(b) "Scattered radiation" means radiation that, during its passage through matter, is deviated in direction.

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

(d) "Secondary dose-monitoring system" means a system that terminates irradiation if the primary system fails.

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

(f) "Secretary" means the secretary of the department of health and environment.

(g) "Seismic area" means any area where the probability of a horizontal acceleration in rock of more than 0.3 times the acceleration of gravity in 250 years is greater than 10 percent, as designated by the U.S. geological survey.

(h) "Shallow dose equivalent (H_s)," which applies to the external exposure of the skin or an extremity, means the dose equivalent at a tissue depth of 0.007 centimeter (7 mg/cm^2) averaged over an area of one square centimeter.

(i) "Sheltering" means using a structure for radiation protection from an airborne plume containing radioactive material.

(j) "Shielded position" means the location within the radiographic exposure device or storage container that, by the manufacturer's design, is the proper location for storage of the sealed source.

(k) "Shielded-room radiography using radiation machines" means industrial radiography using radiation machines that meets the following conditions:

(1) Is conducted in an enclosed room, the interior of which is not occupied during radiographic operations;

(2) is shielded so that every location on the exterior meets the conditions specified in K.A.R. 28-35-214a; and

(3) is accessible only through openings that are interlocked so that the radiation machine will not operate unless all openings are securely closed.

(l) "SI" means the abbreviation for the international system of units.

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

(n) "Sievert" means the SI unit of any of the quantities expressed as a dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv = 100 rem).

(o) "Site area emergency" means an event that could occur, is in progress, or has occurred, that could lead to a significant release of radioactive material, and that could require a response by off-site response organizations to protect persons off-site.

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

(q) "Source" means the focal spot of the X-ray tube.

(r) "Source assembly" means an assembly that consists of the sealed source and a connector that attaches the source to the control cable.

(s) "Source changer" means a device designed and used for replacement of sealed sources in radiographic exposure devices, including those devices also used for transporting and storaging sealed sources.

(t) "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 in well-logging operations.

(u) "Source-image receptor distance" and "SID" mean the distance from the source to the center of the input surface of the image receptor.

(v) "Source material" means the following:

(1) Uranium or thorium, or any combination of these, in any physical or chemical form; or

(2) ores that contain, by weight, 0.05 percent or more of uranium, thorium, or any combination of these.

The term Asource material" shall not include special nuclear material.

(w) "Source material milling" means any activity that results in the production of by-product material.

(x) "Source of radiation" means any material, device, or equipment that emits or is capable of producing radiation.

(y) "Source-to-skin distance" and "SSD" mean the distance between the source and the patient=s skin.

(z) "Special form" means any licensed material that meets either of the following conditions:

(1)(A) Is in solid form;

(B) has at least one dimension measuring at least five millimeters;

(C) does not melt, sublime, or ignite in air at a temperature of 1,000°F;

(D) does not shatter or crumble if subjected to the percussion test described in K.A.R. 28-35-144; and

(E) is not dissolved or converted into dispensable form to the extent of more than 0.005 percent by weight by immersion for one week in water at 68°F or in air at 86°F; or

(2)(A) Is in any physical form securely contained in a capsule;

(B) has at least one dimension measuring at least five millimeters;

(C) will retain its contents if subjected to the tests described in K.A.R. 28-35-144; and

(D) is constructed of materials that do not melt, sublime, or ignite in air at 1,475°F and do not dissolve or convert into dispensable form to the extent of more than 0.005 percent by weight by immersion for one week in water at 68°F or in air at 86°F.

(aa) "Special nuclear material" means either of the following:

(1) Plutonium, uranium-223, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the department declares by order to be special nuclear material after the U.S. nuclear regulatory commission, pursuant to the provisions of section 51 of the atomic energy act of 1954, has determined the material to be special nuclear material, except for source material; or

(2) any material artificially enriched as specified in paragraph (aa)(1), except for source material.

(bb) "Special nuclear material in quantities not sufficient to form a critical mass" means any of the following:

(1) Uranium enriched in the isotope U-235, in quantities not exceeding 350 grams of contained U-235;

(2) uranium enriched in the isotope uranium-233, in quantities not exceeding 200 grams of contained U-233;

(3) plutonium not exceeding 200 grams; or

(4) any combination of these special nuclear materials in accordance with the following formula:

$$\frac{\text{grams of contained U-235}}{350} + \frac{\text{grams of contained U-233}}{200} + \frac{\text{gram of Pu}}{200} \leq 1$$

The sum of the ratios for all of the kinds of special nuclear material in combination shall not exceed one.

(cc) "Spot check" means a procedure that is performed to ensure that a previous calibration

continues to be valid.

(dd) "Spot film" means a radiograph that is made during a fluoroscopic examination or radiation therapy treatment to permanently record conditions that exist during the procedure.

(ee) "Spot-film device" means a device intended either to transport and position a radiographic image receptor between the radiation source and image receptor or to position a radiographic image receptor between the radiation source and image receptor. This term shall include a device intended to hold a cassette over the input end of an image intensifier for the purpose of making a radiograph.

(ff) "Stationary beam therapy" means radiation therapy without relative displacement of the useful beam and the patient during irradiation.

(gg) "Stationary X-ray equipment" means X-ray equipment that is installed in a fixed location.

(hh) "Stereotactic radiosurgery" means the use of external radiation in conjunction with a stereotactic guidance device to very precisely deliver a therapeutic dose to a tissue volume.

(ii) "Stochastic effect" means a health effect that occurs randomly and for which the probability of the occurrence of the effect, rather than the severity of the effect, is assumed to be a linear function of dose without threshold. For purposes of these regulations, "probabilistic effect" shall be considered an equivalent term.

(jj) "Storage area" means any location, facility, or vehicle that is used to store, transport, or secure a radiographic exposure device, radiation machine, storage container, or sealed source when not in use. Each storage area shall be locked or have physical barriers to prevent accidental exposure, tampering, or unauthorized removal of the device, machine, sealed source, or container.

(kk) "Storage container" means a device in which radioactive materials are transported or stored.

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

(mm) "Structured educational program" means an educational program designed to impart particular knowledge and practical education through interrelated studies and supervised training.

(nn) "S-tube" means a tube through which the radioactive source travels when inside a radiographic exposure device.

(oo) "Subsurface studies" means the evaluation of parameters below the surface of the earth.

(pp) "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.

(qq) "Survey" means an evaluation of a radiation hazard resulting from the production, use, transfer, release, disposal, or presence of sources of radiation. This term shall include a physical survey of the location of materials or equipment, or both, and the measurements of levels of radiation contamination or concentrations of radioactive materials present. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135t. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Target" means the part of a radiation head that by design intercepts a beam of accelerated particles, with the subsequent emission of other radiation.

(b) "Target-to-skin distance (TSD)" means the distance measured along the beam axis from the center of the front surface of the X-ray target or electron virtual source to the irradiated object or patient.

(c) "Technique factors" means the conditions of operation specified as follows:

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

(2) for field emission equipment rated for pulsed operation, peak tube potential in kV and number of X-ray pulses; and

(3) for all equipment not specified in paragraphs (c)(1) and (2), peak tube potential in kV and either the tube current in mA and the exposure time in seconds or the product of the tube current and the exposure time in mAs.

(d) "Teletherapy" means therapeutic irradiation in which the source of radiation is located at a distance from the body.

(e) "Teletherapy physicist" means an individual identified as the qualified teletherapy physicist on a department license.

(f) "Temporary job site" means a location where operations are performed and where sources of

radiation may be stored, other than the location or locations of use authorized on the license or registration.

(g) "Tenth-value layer (TVL)" means the thickness of a specified material that attenuates X-radiation or gamma radiation to the 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.

(h) "Termination of irradiation" means the stopping of irradiation in a fashion not permitting the continuance of irradiation without the resetting of operating conditions at the control panel.

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

(j) "Therapeutic dosage" means a dosage of unsealed byproduct material that is intended to deliver a radiation dose to a patient or human research subject for palliative or curative treatment.

(k) "Therapeutic dose" means a radiation dose delivered from a source containing byproduct material to a patient or human research subject for palliative or curative treatment.

(l) "Therapeutic-type tube housing" means the following:

(1) For X-ray equipment not capable of operating at 500 kVp or above, an X-ray tube housing constructed so that the leakage radiation, at a distance of one meter from the source, does not exceed one roentgen in an hour when the tube is operated at its maximum rated continuous current for the maximum rated tube potential; and

(2) for X-ray equipment capable of operating at 500 kVp or above, an X-ray tube housing constructed so that the leakage radiation, at a distance of one meter from the source, does not exceed 0.1 percent of the useful beam dose rate at one meter from the source for any of the tube=s operating conditions. Areas of reduced protection shall be acceptable if the average reading over any area of 100 cm^2, at a distance of one meter from the source, does not exceed any of the values specified in this subsection.

(m) "These regulations" means article 35 in its entirety.

(n) "Tomogram" means the depiction of the X-ray attenuation properties of a section through the body.

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

(p) "Total organ dose equivalent (TODE)" means the sum of the deep dose equivalent and the committed dose equivalent delivered to the organ receiving the highest dose.

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

(r) "Transport index" means the dimensionless number, rounded up to the first decimal place, placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is the maximum radiation level in millirems per hour at one meter from the external surface of the package.

(s) "Tritium neutron-generator-target source" means a tritium source used within a neutron generator tube to produce neutrons for use in well-logging applications.

(t) "Tube" means an X-ray tube, unless otherwise specified.

(u) "Tube housing assembly" means the tube housing with a tube installed, including high-voltage transformers or filament transformers, or both, and other appropriate elements when contained within the tube housing.

(v) "Treatment site" means the anatomical description of the tissue intended to receive a radiation dose, as specified in a written directive.

(w) "Tube rating chart" means the set of curves that describes the rated limits of operation of the tube in terms of the technique factors.

(x) "Type A package" means packaging that, together with the radioactive contents limited to A_1 or A_2 as appropriate, is designed to retain the integrity of containment and shielding under normal conditions of transport as demonstrated by the tests specified in 49 CFR 173.465 or 49 CFR 173.466, as appropriate.

(y) "Type B package" and "type B transport container" mean packaging that meets the applicable requirements specified in 10 CFR 71.51. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135u. Definitions. As used in these regulations, each of the following terms shall have the

meaning assigned in this regulation: (a) "Underwater irradiator" means an irradiator in which the sources always remain shielded underwater and humans do not have access to the sealed sources or the space that is subject to irradiation without entering the pool.

(b) "Underwater radiography" means industrial radiography performed when the radiographic exposure device or the related equipment is beneath the surface of the water.

(c) "Unit dose" means a dosage prepared for medical use for administration to a patient or human research subject as a single dosage, without any further manipulation of the dosage after the dosage is initially prepared.

(d) "Unrefined and unprocessed ore" means ore in its natural form before any processing, including grinding, roasting, beneficiating, or refining.

(e) "Unrestricted area" means an area to which access is neither limited nor controlled by the licensee or registrant. For purposes of these regulations, "uncontrolled area" shall be considered an equivalent term.

(f) "Useful beam" means the part of the radiation that passes through a window, aperture, cone, or other collimating device. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135v. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation: (a) "Variable-aperture beam-limiting device" means a beam-limiting device that has the capacity for stepless adjustment of the X-ray field size at a given SID.

(b) "Very high radiation area" means an area that is accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of five Gy (500 rad) in one hour at one meter from a source of radiation or from any surface that the radiation penetrates.

(c) "Virtual source" means the point from which radiation appears to originate.

(d)"Visible area" means that portion of the input surface of the image receptor over which incident X-ray photons produce a visible image. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135w. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation:

(a) "Waste" means any low-level radioactive waste that is acceptable for disposal in a land disposal facility. Low-level radioactive waste shall mean radioactive waste that meets both of the following conditions:

(1) Is not classified as high-level radioactive waste, spent nuclear fuel, byproduct material as defined in the atomic energy act, uranium or thorium tailings, and waste; and

(2) is classified as low-level radioactive waste consistent with existing law and in accordance with paragraph (a)(1) by the U.S. nuclear regulatory commission.

(b) "Waste-handling licensee" means any person licensed to receive and store radioactive wastes before disposal, any person licensed to dispose of radioactive waste, or any person licensed to both receive and dispose of radioactive waste.

(c) "Wedge filter" means an added filter effecting continuous, progressive attenuation of all or part of the useful beam.

(d) "Week" means seven consecutive days, starting on Sunday.

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

ORGAN OR TISSUE DOSE WEIGHTING FACTORS	
Organ or Tissue (T)	w_T
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder organs	0.30[a]
Whole body	1.00[b]
[a] 0.30 results from 0.06 for each of the five remainder organs that receive the highest doses, excluding the skin and the lens of the eye.	
[b] For the purpose of weighting the external whole body dose in determining the total effective dose equivalent, a single weighting factor, $w_T = 1.0$, is specified. The use of other weighting factors for external exposure may be approved by the secretary if the licensee or registrant demonstrates that the effective dose to be received is within the limits specified in these regulations.	

(f) "Well bore" means a drilled hole in which wireline service operations and subsurface tracer studies are performed.

(g) "Well logging" means the lowering and raising of measuring devices or tools that could contain sources of radiation into well bores or cavities for the purpose of obtaining information about the well or adjacent formations.

(h) "Wet-source-change irradiator" means an irradiator whose sources are replaced underwater.

(i) "Wet-source-storage irradiator" means an irradiator whose sources are stored underwater.

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

(k) "Wireline" means a cable containing one or more electrical conductors that is used to raise and lower logging tools in the well bore.

(l) "Wireline service operation" means any evaluation or mechanical service that is performed in the well bore using devices on a wireline.

(m) "Worker" means an individual, contractor, or subcontractor engaged in work that is performed under a license or registration, or both, issued by the department and that is controlled by a licensee or registrant, or both. This term shall not include a specific licensee or registrant.

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

(1) For radon-222, the following:
(A) Polonium-218;
(B) lead-214;
(C) bismuth-214; and
(D) polonium-214; and
(2) for radon-220, the following:
(A) Polonium-216;
(B) lead-212;

(C) bismuth-212; and

(D) polonium-212.

(o) "Working-level month (WLM)" means an exposure to one working level for 170 hours.

(p) "Written directive" means a written order for a specific patient that is dated and signed by an authorized user before the administration of a radiopharmaceutical or radiation and that contains any of the following sets of information:

(1) For any administration of quantities greater than 1.11 megabecquerels (30 µCi) of sodium iodide I-125 or I-131, the radionuclide and dosage;

(2) for a therapeutic administration of a radiopharmaeutical other than sodium iodide I-125 or I-131, the radiopharmaceutical, dosage, and route of administration;

(3) for gamma stereotactic radiosurgery, the target coordinates, collimator size, plug pattern, and total dose;

(4) for teletherapy, the total dose, dose per fraction, treatment site, and overall treatment period;

(5) for high dose-rate remote afterloading brachytherapy, the radionuclide, treatment site, and total dose; or

(6) for all other brachytherapy, the following information:

(i) Before implantation, the radionuclide, number of sources, and source strengths; and

(ii) after implantation but before completion of the procedure, the radionuclide, treatment site, and either the total source strength and exposure time or the total dose. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135x. Definitions. As used in these regulations, each of the following terms shall have the meaning assigned in this regulation:

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

(b) "X-ray equipment" means an X-ray system or subsystem, or component of the system or

subsystem, which may be mobile, stationary, or portable.

(c) "X-ray exposure control" means a device, switch, button, or other similar means by which an operator initiates or terminates the radiation exposure. The X-ray exposure control may include associated equipment including timers and backup timers.

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

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

(f) "X-ray system" means an assemblage of components for the controlled production of X-rays. The X-ray system shall include, at a minimum, an X-ray high-voltage generator, an X-ray control, a tube housing assembly, a beam-limiting device, and supporting structures. Additional components that function with the system shall be considered integral parts of the system.

(g) "X-ray table" means a patient-support device used during radiography and fluoroscopy. This term shall include any stretcher equipped with a radiolucent panel and any table equipped with a cassette tray or bucky, cassette tunnel, image intensifier, or spot-film device beneath the tabletop.

(h) "X-ray tube" means any electron tube that is designed for the conversion of electrical energy into X-ray energy. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-135y. Definition. As used in these regulations, "year" shall have the meaning assigned in this regulation.

"Year" means the period of time beginning in January and consisting of four consecutive quarters,

as defined in K.A.R. 28-35-135q, that is used to determine compliance with the provisions of these regulations. Any licensee or registrant may change the starting date of the year used to determine compliance by the licensee or registrant if the change is made at the beginning of the year and if no day is omitted or duplicated in any consecutive year. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1603 and 48-1607; effective December 30, 2005.)

28-35-136. Revoked. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; revoked December 30, 2005.)

28-35-137. Records. Each licensee or registrant shall keep records showing the receipt, transfer, and disposal of all sources of radiation, and any other records specifically required by these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-138. Inspections. (a) Each licensee or registrant shall afford, at all reasonable times, the secretary or the secretary's duly authorized representative the opportunity to inspect sources of radiation and the premises and installations in which such sources of radiation are used or stored.

(b) Each licensee or registrant, upon reasonable notice, shall make available, for inspection by the secretary or the secretary's duly authorized representative records maintained pursuant to these regulations. (Authorized by K.S.A. 1984 Supp. 47-1607; implementing K.S.A. 1984 Supp. 48-1607, 48-1609; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-139. Testing and surveys. (a) Each licensee or registrant shall make, or cause to be made, those surveys that are necessary for the licensee or registrant to comply with these regulations.

(b)Each licensee or registrant shall perform, upon instructions from the department, or shall permit the department to perform, such reasonable tests as the department deems appropriate or necessary,

including, but not limited to, tests of:

(1) Sources of radiation;

(2) installations in which sources of radiation are used or stored;

(3) radiation detection and monitoring instruments; and

(4) other equipment and devices employed during use or storage of licensed or registered sources of radiation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-140. Exemptions. (a) General provision. The secretary, upon application for an exemption or upon the secretary's own initiative, may grant exemptions or exceptions from the requirements of these regulations, if it is determined that the exemption will not result in an undue hazard to public health and safety, or to property.

(b)Carriers. Common and contract carriers, freight forwarders, and warehousemen, who are subject to the rules and regulations of the U.S. department of transportation or the U.S. postal service (39 CFR Parts 14 and 15), shall be exempt from these regulations to the extent that they transport or store sources of radiation in the regular course of their carriage for another. Private carriers who are subject to the rules and regulations of the U.S. department of transportation shall be exempt from these regulations to the extent that they transport sources of radiation. Common, contract, and private carriers who are not subject to the rules and regulations of the U.S. department of transportation or the U.S. postal service shall be subject to applicable sections of these regulations.

(c) U.S. department of energy contractors and U.S. nuclear regulatory commission contractors. Any U.S. department of energy contractor or subcontractor and any U.S. nuclear regulatory commission contractor or subcontractor operating within this state shall be exempt from these regulations to the extent that the contractor or subcontractor, under the contract, receives, possesses, uses, transfers or acquires sources of radiation, and the contractor or subcontractor is included in one of the following categories:

(1) Prime contractors performing work for the U.S. department of energy at U.S. government-owned

or controlled sites, including the transportation of sources of radiation to or from such sites and the performance of contract services during temporary interruptions of such transportation;

(2) prime contractors of the U.S. department of energy performing research in, or development, manufacture, storage, testing or transportation of atomic weapons or components of atomic weapons;

(3) prime contractors of the U.S. department of energy using or operating nuclear reactors or other nuclear devices in a United States government-owned vehicle or vessel; and

(4) any other prime contractor or subcontractor of the U.S. department of energy or the U.S. nuclear regulatory commission when the secretary determines that, under the terms of the contract or subcontract, there is adequate assurance the work can be accomplished without undue risk to the public health and safety. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-141. Additional requirements. At the time of registration, at the time of action upon application for license or amendment to the license, or upon inspection, the department shall specify any requirements or conditions of use, or both, that are necessary to ensure compliance with these regulations under the particular usage to which the licensee of registrant proposes to put the source of radiation. (Authorized by and implementing K.S.A. 48-1607, as amended by L. 194 Ch. 198, Sec. 5; effective Jan. 1, 1970; amended, May 1, 1985.)

28-35-144. Appendix B—Tests for special form licensed material.

(a)"Free Drop" means releasing material, without thrust, from a point 30 feet above a flat, essentially unyielding, horizontal surface, so that the material strikes the surface.

(b)"Percussion" means impacting material with the flat, circular end of a one inch diameter steel rod weighing three pounds, by releasing the steel rod a distance of forty inches above the surface of the material. The material shall be placed on a sheet of lead, of hardness number 3.5 to 4.5 on the Vickers scale, and not more than one inch thick, supported by a smooth, essentially unyielding surface.

(c) Heating: heating in air to a temperature of 1,475°F. and remaining at that temperature for a period of 10 minutes.

(d) Immersion: immersion for 24 hours in water at room temperature. The water shall be at pH 6—pH 8, with a maximum conductivity of 10 micromhos per centimeter. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective May 1, 1976; amended T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-144a. (a) As used in these regulations, the quality factors for converting absorbed dose to dose equivalent are shown in table I.

TABLE I		
QUALITY FACTORS AND ABSORBED DOSE EQUIVALENCIES		
	Quality Factor	Absorbed Dose
		Equal to
TYPE OF RADIATION	(Q)	a Unit Dose
Equivalent[a]		
X, gamma, or beta radiation and		
high-speed electrons	1	1
Alpha particles, multiple-charged		
particles, fission fragments and		
heavy particles of unknown charge	20	0.05
Neutrons of unknown energy	10	0.1
High-energy protons	10	0.1

[a] **Absorbed dose in gray equal to 1 Sv or the absorbed dose in rad equal to 1 rem.**

(b) If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in sievert per hour or rem per hour, as provided in K.A.R. 28-35-144a(a), 0.01 Sv (1 rem) of neutron radiation of unknown energies may, for purposes of these regulations, be assumed to result from a total fluence of 25 million neutrons per square centimeter incident upon the body. If sufficient information exists to estimate the approximate energy distribution of the neutrons, the licensee or registrant may use the fluence rate per unit dose equivalent or the appropriate Q value from table II to convert a measured tissue dose in gray or rad to dose equivalent in sievert or rem.

TABLE II		
MEAN QUALITY FACTORS, Q, AND FLUENCE PER UNIT DOSE EQUIVALENT FOR MONOENERGETIC NEUTRONS		
Neutron Energy (MeV)	Quality Factor[a] (Q)	Fluence per Unit Dose Equivalent[b] (neutrons cm^{-2} rem^{-1}) cm^{-2} Sv^{-1})
(thermal) 2.5E-8	2	980E+6
1E-7	2	980E+6
1E-6	2	810E+6
1E-5	2	810E+6
1E-4	2	840E+6
1E-3	2	980E+6
1E-2	2.5	1010E+6
1E-1	7.5	170E+6
5E-1	11	39E+6
1	11	27E+6
2.5	9	29E+6
5	8	23E+6
7	7	24E+6
10	6.5	24E+6
14	7.5	17E+6
20	8	16E+6
40	7	14E+6
60	5.5	16E+6
1E+2	4	20E+6
2E+2	3.5	19E+6
3E+2	3.5	16E+6
4E+2	3.5	14E+6

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

[b] Monoenergetic neutrons incident normally on a 30-centimeter diameter cylinder tissue-equivalent phantom. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-145. Initial license and registration fees. (a) Each person required under part 3 of these regulations to obtain a license for the use of radioactive, by-product, source, or special nuclear materials shall submit to the department an application for a license and the nonrefundable license fee as specified in K.A.R. 28-35-147a.

(b) Each person required under part 2 of these regulations to register a radiation machine shall submit to the department a registration form and the nonrefundable registration fee as specified in K.A.R. 28-35-147a. The fee for each initial registration made after March shall be prorated by the department based on the number of calendar quarters remaining in the annual registration period.

(c) Each person paying an initial license fee or registration fee specified in this regulation shall make

the payment by check, draft, credit card, or money order payable to the Kansas department of health and environment. (Authorized by and implementing K.S.A. 48-1606, as amended by 2004 SB 396, § 1, and 48-1607; effective May 1, 1987; amended Oct. 8, 2004.)

28-35-146. Annual license and registration fees. (a) Payment method. Each licensee or registrant shall make initial and annual fee payments by check, draft, credit card, or money order payable to the Kansas department of health and environment.

(b) Annual license fees. Each licensee shall submit to the department the nonrefundable annual license fee as specified in K.A.R. 28-35-147a on or before the last business day of the month corresponding to the anniversary date of the license.

(c) Annual registration fees. Each registrant shall submit to the department a registration form and the nonrefundable annual registration fee as specified in K.A.R. 28-35-147a on or before March 1. If March 1 falls on a Saturday, Sunday, or holiday, then the fee payment shall be due on or before the next business day following March 1. (Authorized by and implementing K.S.A. 48-1606, as amended by 2004 SB 396, § 1 and 48-1607; effective May 1, 1987; amended May 1, 1988; amended Oct. 8, 2004.)

28-35-146a Determination of hourly rate and full cost fees. (a) If the department charges a fee to provide the following and there is no established fee category in K.A.R. 28-35-147a, the hourly rate charged shall be $55.00:

(1) Any radiation protection service that the department provides to a nonlicensee or nonregistrant; and

(2) any radiation control program activity.

(b) For each full-cost category specified in K.A.R. 28-35-147a(d)(1), the initial license fee, annual fee and amendment fees shall be paid in accordance with the following requirements:

(1) Each applicant shall pay a non-refundable $500,000 initial license fee to cover the actual costs incurred by the Department to review a new license application.

(A) If the initial license fee exceeds the actual cost of reviewing the license the overage shall be credited to the annual fee for the following fiscal year.

(B) If the initial license fee does not cover the actual cost of reviewing the application the difference shall be due within 30 days of receipt of written notification from the secretary. No license shall be issued until all required fees are paid in full.

(2) Each licensee shall pay a non-refundable annual fee to cover the actual costs incurred by the Department to service the license and any amendments to the license.

(A) If the annual fee exceeds the actual cost of servicing the license and any amendments the overage shall be credited to the annual fee for the following fiscal year.

(B) If the annual for any fiscal year is less than the to the department the difference shall be due within 30 days of receipt of written notification from the secretary.

(c) Fee payments as specified in subsection (b) shall be made in accordance with the following requirements:

(1) Each initial application for which a license fee is required shall be accompanied by the full amount of the fee. Any Application for which a fee is not received may be returned to the applicant.

(2) On or before June 1 of the fiscal year preceding the fiscal year for which the annual fee applies, the licensee shall be notified by the Secretary of the amount of the annual fee.

(3) Each fee payment shall be made within 30 days of receipt of written notification from the secretary of the annual fee, or by July 1, whichever date is earlier.

(4) Each fee payment shall be made by check, draft, money order, or electronic means payable to the department. (Authorized by and implementing K.S.A. 48-1606, as amended by 2004 SB 396, § 1; effective October 8, 2004.)

28-35-147. Revoked. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; revoked December 30, 2005.)

28-35-147a. Schedule of fees. Each fee for an initial license application or registration shall be equal to the sum of the annual fees for all applicable categories. Each annual fee for a license or registration shall be equal to the sum of the annual fees for all applicable categories. The following fees shall be paid as specified in K.A.R. 28-35-145 and 28-35-146:

(a) Special nuclear material.

(1) Licenses for possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems.

Annual fee: . . . . . $ 625.00

(2) Any licenses not otherwise specified in this table for possession and use of special nuclear material, except licenses authorizing special nuclear material in unsealed form in combination that would constitute a critical mass.

Annual fee: $1,450.00

(b) Source material.

(1) Licenses that authorize only the possession, use or installation, or both, of source material for shielding.

Annual fee: . . . . . $ 235.00

(2) All other source material licenses not otherwise specified in this table.

Annual fee: $3,650.00

(c) Radioactive or byproduct material.

(1) Licenses of broad scope for possession and use of radioactive or byproduct material issued for processing or manufacturing of items containing radioactive or byproduct material for commercial distribution.

Annual fee: $7,000.00

(2) Other licenses for possession and use of radioactive or byproduct material issued for processing or manufacturing of items containing radioactive or byproduct material for commercial distribution.

Annual fee: $2,150.00

(3) Licenses authorizing the processing or manufacturing and distribution or redistribution of radiopharmaceuticals, generators, reagent kits, sources or devices, containing radioactive or byproduct material. This category also includes the possession and use of source material for shielding when included on the same license.

Annual fee: $3,500.00

(4) Licenses and approvals authorizing distribution or redistribution of radiopharmaceuticals, generators, reagent kits or sources, or both, or devices not involving processing of radioactive or byproduct material. This category also includes the possession and use of source material for shielding when included on the same license.

Annual fee: $1,525.00

(5) Licenses for possession and use of radioactive or byproduct material in sealed sources for irradiation of materials in which the source is not removed from its shield.

Annual fee: $1,155.00

(6) Licenses for possession and use of less than 10,000 curies of radioactive or byproduct material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes. This category also includes underwater irradiators for irradiation of materials in which the source is not exposed for irradiation purposes.

Annual fee: $2,115.00

(7) Licenses for possession and use of more than 10,000 curies of radioactive or byproduct material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes. This category also includes underwater irradiators for irradiation of materials in which the source is not exposed for irradiation purposes.

Annual fee: $7,725.00

(8) Licenses issued to distribute items containing radioactive or byproduct material that require device review to persons exempt from licensing, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from licensing.

Annual fee $1,920.00

(9) Licenses issued to distribute items containing radioactive or byproduct material or quantities of radioactive or byproduct material that do not require device review to persons exempt from licensing, except for specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from licensing.

Annual fee: $1,950.00

(10) Licenses issued to distribute items containing radioactive or byproduct material that require sealed source or device, or both, review to persons generally licensed, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons with a general license.

Annual fee: . . . . . $ 700.00

(11) Licenses issued to distribute items containing radioactive or byproduct material or quantities of radioactive or byproduct material that do not require sealed source or device, or both, review to persons with a general license, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed.

Annual fee: . . . . . $ 450.00

(12) Licenses of broad scope for possession and use of radioactive or byproduct material issued for research and development that do not authorize commercial distribution.

Annual fee: $3,800.00

(13) Other licenses for possession and use of radioactive or byproduct material issued for research and development that do not authorize commercial distribution.

Annual fee: $1,800.00

(14) Licenses that authorize services for other licensees, except:

(A) Licenses that authorize only calibration or leak testing services, or both, are subject to the fees specified in fee category in paragraph (c)(16); and

(B) licenses that authorize waste disposal services are subject to the fees specified in the fee categories in subsection (d).

Annual fee: $1,950.00

(15) Licenses for possession and use of radioactive or byproduct material for industrial radiography operations. This category also includes the possession and use of source material for shielding when authorized on the same license.

Annual fee: $3,925.00

(16) All other specific radioactive or byproduct material licenses not otherwise specified in this regulation.

Annual fee . . . . . .$ 800.00

(17) Registration of general license for devices on sources specified in Part 3 devices or sources except those authorized by K.A.R. 28-35-178f.

Annual fee . . . . . .$ 145.00

(d) Waste disposal and processing.

(1) Licenses authorizing the possession and use of waste radioactive, by-product, source or special nuclear material for a commercial low-level radioactive waste disposal facility.

Annual fee: . . . . . As specified

in K.A.R. 28-35-146a

(A) Amendment to license concerning safety and environmental questions.

Amendment fee . . . . . As specified in K.A.R. 28-35-146a

(B) Amendment to license concerning administration questions.

Amendment fee . . . . . As specified in K.A.R. 28-35-146a

(2) Licenses specifically authorizing the receipt of radioactive or by-product material, source material or special nuclear material from other persons for the purpose of packaging or repackaging the material. The licensee shall dispose of the material by transfer to another person authorized to receive or dispose of the material.

Annual fee: $3,295.00

(3) Licenses specifically authorizing the receipt of prepackaged waste radioactive or byproduct material, source material or special nuclear material from other persons. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material.

Annual fee: $2,370.00

(e) Well logging.

(1) Licenses for possession and use of radioactive or byproduct material, source material and special nuclear material, or both, for well logging, well surveys and tracer studies other than field flooding tracer studies.

Annual fee: $1,525.00

(2) Licenses for possession and use of radioactive or byproduct material for field flooding tracer studies.

Annual fee: $1,525.00

(f) Nuclear laundries.

Licenses for commercial collection and laundry of items contaminated with radioactive or byproduct material, source material or special nuclear material.

Annual fee: $7,400.00

(g) Medical licenses.

(1) Licenses issued for human use of radioactive or byproduct material, source material or special nuclear material in sealed sources contained in teletherapy devices. This category shall include the possession and use of source material for shielding when authorized on the same license.

Annual fee: $3,520.00

(2) Licenses of broad scope issued to medical institutions or two or more physicians authorizing research and development, including human use of radioactive or byproduct material except licenses for radioactive or byproduct material, source material or special nuclear material in sealed sources contained in teletherapy devices. This category shall include the possession and use of source material for shielding when authorized on the same license. Separate annual fees shall beassessed for pacemaker licenses issued to medical institutions who also hold nuclear medicine licenses under categories in paragraphs (g)(2).

Annual fee: $7,925.00

(3) Other license issued for human use of radioactive or byproduct material, source material and special nuclear material, or both, except licenses for radioactive or byproduct material, source material or special nuclear material in sealed sources contained in teletherapy devices. This category also includes the possession and use of source material for shielding when authorized on the same license. Separate annual fees will not be assessed for pacemaker licenses issued to medical institutions who also hold nuclear medicine licenses under categories in paragraphs (g)(2) or (3).

Annual fee: $1,475.00

(h) Civil defense.

Licenses for possession and use of radioactive or byproduct material, source material or special nuclear material for civil defense activities.

Annual fee . . . . . .$ 415.00

(i) Device, product or sealed source safety evaluation.

(1) Safety evaluation review of devices or products containing radioactive or byproduct material, source material or special nuclear material, except reactor fuel devices, for commercial distribution. This fee shall apply to each device or product.

Fee: $2,250.00

(2) Safety evaluation review of devices or products containing radioactive or byproduct material, source material or special nuclear material manufactured in accordance with the unique specifications of, and for use by, a single applicant, except reactor fuel devices. This fee shall apply to each device or product.

Fee: $2,250.00

(3) Safety evaluation of sealed sources containing radioactive or byproduct material, source material or special nuclear material, except reactor fuel, for commercial distribution. This fee shall apply to each device or product.

Fee: . . . . . $ 725.00

(4) Safety evaluation of each sealed source containing radioactive or byproduct material, source material or special nuclear material, manufactured in accordance with the unique specifications of, and for use by, a single applicant. This fee shall apply to each device or product.

Fee: . . . . . $ 250.00

(j) Reciprocity.

(1) Licensees who conduct activities under a reciprocal agreement.

Annual fee: . . . . . $ 480.00

(2) Registrants who conduct activities under a reciprocal agreement.

Annual fee: . . . . . $ 105.00

(k) X-ray machines.

(1) Base registration fee per facility.

Annual fee: . . . . . $ 105.00

(2) Registration fee for each x-ray tube at a facility. This fee shall be in addition to the base registration fee.

Annual fee per x-ray tube: . . . . . $ 25.00

(l) Particle accelerators.

Annual fee: . . . . . $ 100.00

(Authorized by and implementing K.S.A. 48-1606, as amended by 2004 SB 396, § 1; effective Oct. 8, 2004.)

28-35-148. Deliberate misconduct. (a) This regulation shall apply to the following:

(1) Each licensee;

(2) each registrant;

(3) each applicant for a license;

(4) each employee of a licensee, registrant, or applicant; and

(5) each contractor, including each supplier, consultant, subcontractor, and employee of a contractor or subcontractor of any licensee, registrant, or applicant for a license.

(b) Each individual specified in subsection (a) who knowingly provides to any licensee, applicant, registrant, contractor, or subcontractor any components, equipment, materials, or other goods or services that relate to a licensee's, registrant's, or applicant's activities in this article shall be prohibited from engaging in deliberate misconduct, as defined in K.A.R. 28-35-135d.

(c) Any person who violates the requirements of this regulation may be subject to enforcement action pursuant to K.S.A. 48-1613, and amendments thereto. (Authorized by and implementing K.S.A. 48-1607 and 48-1613; effective December 30, 2005.)

PART 2. REGISTRATION OF RADIATION PRODUCING DEVICES

28-35-152. Persons registered. Any person possessing a registrable item shall register with the department in accordance with the rules and regulations in this part. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-153. Initial registration. Any person who is not registered and who acquires possession of a registrable item shall register with the department, within 30 days of the date of acquiring the item. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-154. Renewal of registration. Each registrant who possesses a radiation-producing device shall reregister with the department annually. This registration shall be submitted on or before March 1 of each year. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-155. Registration form. Registration shall be made upon forms devised and furnished by the department. Each registrant shall provide all the information called for by the form and any additional information requested by the department. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-156. Separate installations. Except as otherwise provided in K.A.R. 28-35-157, and any amendment to that rule and regulation, a separate registration form shall be completed for each installation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-157. Special registration. If the reporting of each installation, or other information called for, is impractical, the secretary, upon the written request of a person and upon a finding that the public health and safety would not be adversely affected, may approve registration in such special form as the secretary may prescribe. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-158. Report of change. If a change is made on any x-ray equipment of other device producing radiation, or to any installation, so that information on file with the department is no longer accurate, the registrant shall notify the department, in writing, of the change, within 30 days of the date the change was made. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-159. Registration shall not imply approval. A person shall not refer, in any form of advertisement, to the fact a registrable item is registered with the department, or state or imply that any installation registered with the department is approved by the department. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-84-43. Dec. 19, 1984; amended May 1, 1985.)

28-35-160. Vendor notification. (a) Each distributor, retailer, or other person who sells, leases, transfers, or lends any registrable item or items shall notify the department, at 90-day intervals, of the following:

(1) The names and addresses of all persons who have received the item or items;

(2) the name of the manufacturer and the model number of the item or items transferred; and

(3) the date on which the registrable item or items were transferred.

(b) No person shall make, sell, lease, transfer, lend, assemble, or install radiation machines or the supplies used in connection with these machines unless the machines and supplies, when properly placed in operation and used, meet the requirements of these regulations. (Authorized by and implementing K.S.A.

48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-161. Discontinuance of use. If a registrant ceases to use a registrable item or items, for any reason, the registrant or the duly authorized representative of the registrant's estate shall give written notice to the department of the cessation of use. The notice shall be provided within 30 days of the date that the registrant ceases to use the registrable item or items, and shall state the date on which use of the item or items where disposed. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-162. Exclusion from registration. The following equipment shall not be required to be registered:

(a) Electronic equipment that produces radiation incidental to its operation for other purposes, if the dose equivalent rate averaged over an area of 10 square centimeters does not exceed five μ Sv (0.5 millirem) per hour at five centimeters from any accessible surface of the equipment.

(b) radiation-producing equipment that is in transit or is in storage incident to transit; and

(c) domestic television receivers. (Authorized by and implementing K.S.A. . 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-163. Excluded possessors. (a) Except as provided in subsection (b), a common carrier or contractor carrier operating within this state who is in possession of a registrable item or items shall be exempt from the provisions of these regulations, if the carrier possesses the registrable item or items for another person, solely for the purpose of transporting or storing the item or items.

(b) Each common carrier or contract carrier shall be subject to the provisions of K.A.R. 28-35-228a and 28-35-229a, and any amendments of those rules and regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-164. Temporary use or storage of registrable items. Any person desiring to bring a registrable item into this state for temporary use or storage shall give written notice to the department before bringing the item into this state. The notice shall be given to the department at least five days before the item is to be brought into this state and shall include the type and energy of the radiation source, the nature and scope of the use or storage, the proposed duration of use or storage, and the exact location where the radiation source is to be used or stored. If, in a specific case, the five day period would impose an undue hardship on the person, the person, upon application by letter or telegram to the department, may obtain permission to proceed at an earlier date.

In addition, the person shall:

(a) Comply with all applicable regulations for the department; and

(b) supply the department with such other information as it may request. If a registrable item is kept in the state for a total of 30 days, in a period of 12 consecutive months, it shall be considered to be permanently located in the state and shall be considered to be permanently located in the state and shall be subject to the registration provision of these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-165. Disposal of registered items. Whenever any person disposes of a registrable item, or items, by any method, the person, or in the event of the person's death, the representative of the person's estate, shall give written notice to the department of the disposal within 30 days. The notice shall include the date of disposal, the method of disposal, and, if transferred to another person, the name and address of the recipient. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-166. Shoe fitting, fluoroscopic machines; prohibition of. No person shall install, operate or maintain any device or machine with the state of Kansas which used fluoroscopic, X-ray or radiation principles for the purpose of fitting shoes. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607;

effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-167. Shielding plan for radiation-producing devices. (a) Before construction, the floor plan or plans, shielding specifications, and equipment arrangement of all new installations, or modifications of existing installations, utilizing ionizing radiation machines shall be submitted to the department for review and consideration for approval, with the information specified in K.A.R. 28-35-168 and K.A.R. 28-35-169 of this part.

(b) If the applicant is not a qualified expert, then the applicant may be required to utilize the services of a qualified expert to determine the shielding specifications before the secretary's review and consideration for approval of the shielding plan.

(c) The approval of the shielding specifications shall not preclude the requirement of additional modifications if a subsequent analysis of operating conditions indicates the possibility that an individual could receive a dose in excess of the limits prescribed in K.A.R. 28-35-212a and K.A.R. 28-35-214a.

(d) After installation of each radiation machine, the registrant shall maintain the following records for inspection by the department:

(1) The maximum rated technique factors of the machine;

(2) a scale drawing of the room in which the stationary radiation machine system is located. This drawing shall indicate the use of areas adjacent to the room and an estimation of the extent of occupancy by an individual in these areas. The drawing shall include either of the following:

(A) The results of a survey for radiation levels present at the operator's position and at points surveyed outside the room, and the specific test conditions used; or

(B) The type and thickness of materials, or the lead equivalency, of each protective barrier

(e) A qualified expert, who shall be approved by the department, shall be consulted in the design of each particle accelerator installation and shall be called upon to perform a radiation survey when the accelerator is first capable of producing radiation.

(f) Each particle accelerator installation shall be provided with any primary or secondary barriers, or both, that are necessary to ensure compliance with the following:

(1) K.A.R. 28-35-212a;

(2) K.A.R. 28-35-212c;

(3) K.A.R. 28-35-212d;

(4) K.A.R. 28-35-212f;

(5) K.A.R. 28-35-212g;

(6) K.A.R. 28-35-213a;

(7) K.A.R. 28-35-214a; and

(8) K.A.R. 28-35-214b. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-168. Information on radiation shielding required for plan reviews. Each registrant shall submit the following information as specified in K.A.R. 28-35-167:

(a) (1) Each plan showing, at a minimum, all of the following:

(A) The normal location of the system's radiation port;

(B) the port's travel and traverse limits;

(C) the general direction or directions of the useful beam;

(D) the locations of any windows and doors and any other openings;

(E) the location of the operator's booth; and

(F) the location of the control panel;

(2) the type and thickness of materials, or the lead equivalency, of all walls, doors, partitions, floors, and ceilings of each room;

(3) the dimensions of each room;

(4) the type of occupancy of all adjacent areas, inclusive of the space above and below each room. If there is an exterior wall, the distance to the closest area or areas where individuals are likely to be present shall be shown;

(5) the make and model of the equipment, the maximum technique factors, and the energy waveform; and

(6) each type of examination or treatment, or both, that will be performed with the equipment;

(b) information on the anticipated workload of the system or systems in mA-minutes per week; and

(c) a report showing all basic assumptions used in the development of the shielding specifications. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-169. Design requirements for an operator's booth. (a) Space requirements.

(1) Each operator shall be allotted adequate room to operate the unit effectively.

(2) In determining whether the allotted space is adequate, any encumbrance by the control panel, overhang, cables, or other similar encroachments shall be evaluated.

(3) The booth shall be located or constructed so that unattenuated direct scattered radiation originating on the examination table or at the wall cassette cannot reach the operator's station in the booth.

(b) Structural requirements. Shielding shall be provided to meet the requirements of K.A.R. 28-35-211a through K.A.R. 28-35-234a of these regulations.

(c) Control placement. The control for the system shall be fixed within the booth.

(1) The operation of the radiation-producing devices shall be possible only from within the booth.

(2) The location of the control shall allow the operator to use the majority of the available viewing systems.

(d) Viewing system requirements.

(1) Each booth shall have at least one viewing device positioned so that both of the following conditions are met:

(A) The operator can view the patient during any exposure.

(B) The operator can have full view of any occupant of the room and anyone who enters the room. If any door allowing access to the room cannot be seen from the booth, that door shall have an interlock control that prevents exposure if the door is not closed.

(2) If the viewing system is a window, the window shall have the same lead equivalence as that required for the booth's wall in which the window is mounted.

(3) If the viewing system is by mirrors, each mirror shall be positioned so that the requirements of K.A.R. 28-35-254(d)(1) are met.

(4) If the viewing system utilizes a camera, both of the following requirements shall be met:

(A) The camera shall be positioned so that the requirements of K.A.R. 28-35-254(d)(1) are met.

(B) An alternate viewing system shall be provided as a backup for the primary system. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

PART 3. LICENSING OF SOURCES OF RADIATION

28-35-175a. Persons licensed. (a) A licensed person shall not receive, use, possess, transfer, or dispose of radioactive material, except as authorized in a specific or general license issued pursuant to these regulations. Each manufacturer, producer, or processor of any equipment, device, commodity, or other product containing source or byproduct material for which subsequent possession, use, transfer, and disposal by any other person is exempted from these regulations shall obtain authority to transfer possession or control to the other person from the U.S. nuclear regulatory commission .

(b) In addition to the requirements of this part, each licensee shall be subject to the requirements of part 1, part 4, and part 10 of these regulations. In addition to being subject to part 1, part 4, and part 10, specific licensees shall be subject to all of the following requirements:

(1) Licensees using radioactive material in the healing arts shall be subject to the requirements of part 6.

(2) Licensees using radioactive material in industrial radiography shall be subject to the requirements of part 7 .

(3) Licensees using radioactive material in wireline and subsurface tracer studies shall be subject to the requirements of part 11 of these regulations. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-176a. Types of licenses. Licenses for radioactive materials shall be either of the following types:

(a) Each general license shall be effective without the filing of an application with the department or the issuance of a licensing document to a particular person, although the filing of a certification with the department may be a requirement of the license. Each general licensee shall be subject to all other applicable portions of these regulations and any limitations of the general license. Any licensee may be required by the secretary to register a general license to protect public health and safety and the environment.

(b) Each specific license shall require the submission of an application to the department and the issuance of a licensing document by the department. Each specific licensee shall be subject to all applicable portions of these regulations as well as any limitations specified in the licensing document. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-177a. General licenses; source material. (a)(1) Each of the following persons shall be deemed to have been issued a general license authorizing the acquisition, possession, use, and transfer of not more than 15 pounds (6.8 kg) of source material at any one time or the receipt of a total of 150 pounds (68.2 kg) of source material in any calendar year:

(A) Any pharmacist using the source material solely for the compounding of medicinals;

(B) any physician using the source material for medicinal purposes;

(C) any person receiving possession of source material from pharmacists or physicians in the form of medicinals or drugs; and

(D) if the source material is used for research, development, education, or commercial purposes, the following persons:

(i) Any commercial or industrial firm;

(ii) any research, educational, or medical institution; and

(iii) any state or local governmental agency .

(2) Each person who acquires, possesses, uses, or transfers source material pursuant to the general license specified in subsection (a) shall be exempt from parts 4 and 10 of these regulations to the extent that the acquisition, possession, use, or transfer is within the terms of the general license. This exemption shall not apply to any person who is also in possession of source material under a specific license issued pursuant to these regulations.

(3) Each person who receives, possesses, uses, or transfers source material pursuant to the general license specified in subsection (a) shall be prohibited from administering source material or the radiation,

either externally or internally, to human beings except as may be authorized in a specific license.

(b) Each person receiving title to source material shall be deemed to have been issued a general license without regard to quantity. This general license shall not authorize any person to receive, possess, use, or transfer source material.

(c)(1) Each person who meets the requirements of paragraphs (2), (3), and (4) of this subsection shall be deemed to have been issued a general license to acquire, possess, use, or transfer depleted uranium contained in industrial products or devices for the purpose of providing a concentrated mass in a small volume of the product or device.

(2)(A) Each person who acquires, possesses, or uses depleted uranium pursuant to the general license issued in this subsection shall file a form specified by the department. The form shall be filed with the department within 30 days of the date on which the depleted uranium is received or acquired. Each person filing a form shall provide all the information requested by the form.

(B) If any change in circumstances renders any information provided on the form inaccurate, the department shall be provided with a written notice of the change within 30 days of the date of the change.

(3) A person who acquires, possesses, or uses depleted uranium pursuant to the general license specified in this subsection shall not perform any of the following:

(A) Introduce depleted uranium, in any form, into a chemical, physical, or metallurgical treatment or process, except a treatment or process for the repair or restoration of any plating or other covering of the depleted uranium;

(B) abandon depleted uranium; or

(C) export depleted uranium, except in accordance with a license issued by the U.S. nuclear regulatory commission.

(4)(A) Each person possessing depleted uranium pursuant to the general license specified in this subsection shall transfer or dispose of the depleted uranium only by transfer in accordance with K.A.R. 28-35-190a.

(B) When depleted uranium is transferred to any person in this state, the transferor shall provide a copy of this regulation and the required form to the transferee.

(C) When depleted uranium is transferred to any person outside this state, the transferor shall furnish the transferee with a copy of this regulation, the required form , and a written notice that possession or use of the depleted uranium is regulated by the U.S. nuclear regulatory commission or the state in which the person is located, under requirements substantially the same as those in this regulation.

(D) Each person who transfers depleted uranium pursuant to this subsection shall give written notice to the department of the name and address of the person to whom the depleted uranium was transferred. The notice shall be filed within 30 days of the date of transfer.

(5) The general license specified in this subsection shall apply only to industrial products or devices that have been manufactured or initially transferred in accordance with a specific license that authorizes the manufacture of the products or devices for distribution to persons generally licensed by the NRC or an agreement state.

(d) Each person who acquires, possesses, uses, or transfers depleted uranium pursuant to subsection (c) of this regulation shall be exempt from parts 4 and 10 of these regulations with respect to the depleted uranium acquired, possessed, used, or transferred by that person. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-178a. General license; certain ionization devices. (a) Each person shall be deemed to have been issued a general license to acquire, possess, use, and transfer radioactive material incorporated in any device or equipment as described in this subsection, if the device or equipment is manufactured, tested, and labeled by a manufacturer in accordance with the specifications of a specific license issued to the manufacturer by the secretary, the U.S. nuclear regulatory commission, or an agreement state. This general license shall apply to the following:

(1) Static elimination devices that are designed for ionization of air and that contain, as a sealed source or sources, radioactive material containing a total of not more than 500 microcuries of polonium-210 per device; and

(2) ion-generating tubes that are designed for ionization of air and that contain, as a sealed source or sources, radioactive material consisting of a total of not more than 500 microcuries of polonium-210 per

device or a total of not more than 50 millicuries of hydrogen-3 (tritium) per device.

(b) The general license specified in subsection (a) of this regulation shall be subject to the following regulations:

(1) K.A.R. 28-35-137 through 28-35-139;

(2) K.A.R. 28-35-192b;

(3) K.A.R. 28-35-184a;

(4) K.A.R. 28-35-190a;

(5) K.A.R. 28-35-191a;

(6) K.A.R. 28-35-196a; and

(7) all of parts 4 and 10 of these regulations. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985, effective May 1, 1986; amended December 30, 2005.)

28-35-178b. General license; certain detecting, measuring, gauging , or controlling devices and certain devices for producing light or an ionized atmosphere. (a) (1) Subject to the provisions of subsections (b) and (c) of this regulation, each person shall be deemed to have been issued a general license to acquire, possess, use, and transfer radioactive material that is contained in any device designed, manufactured, and used for one or more of the following purposes:

(A) Detecting, measuring, gauging, or controlling thickness, density, level interface location, radiation leakage, or qualitative or quantitative chemical composition; or

(B) producing light or an ionized atmosphere.

(2) The general license specified in paragraph (1) of this subsection shall apply only to radioactive material contained in any device that has been manufactured and labeled by a manufacturer in accordance with the specifications of a specific license issued to that manufacturer by the secretary, the U.S. nuclear regulatory commission, or an agreement state.

(3) The general license specified in paragraph (1) of this subsection shall not apply to radioactive material in any device containing at least 370 MBq (10 mCi) of cesium-137, 3.7 MBq (0.1 mCi) of strontium-90, 37 MBq (1 mCi) of cobalt-60, or 37 MBq (1 mCi) of americium-241 or any other transuranic element, based on the activity indicated on the label.

(4) Each device shall have been received from one of the specific licensees described in paragraph (a)(2) of this regulation or through a transfer made under paragraph (b)(9) of this regulation.

(b) Each person who acquires, receives, possesses, uses, or transfers radioactive material in a device pursuant to the general license specified in subsection (a) of this regulation shall comply with all of the following requirements:

(1) Each person subject to this subsection shall ensure that all labels affixed to the device at the time of receipt and bearing a statement that removal of the label is prohibited are maintained and shall comply with all instructions and precautions provided by these labels.

(2) Each person subject to this subsection shall ensure that the device is tested for leakage of radioactive material and proper operation of the on-off mechanism and indicator, if any, at no longer than six-month intervals or at any other intervals specified in any manufacturer's label affixed to the device, except as follows:

(A) The person shall not be required to test devices containing only krypton for leakage of radioactive material.

(B) The person shall not be required to test, for any purpose, any device containing only tritium, not more than 100 microcuries of other beta-emitting or gamma-emitting material, or 10 microcuries of alpha-emitting material or any device held in storage in the original shipping container before initial installation.

(3) Each person subject to this subsection shall ensure that the tests required by paragraph (b)(2) and other operations involving testing, installation, servicing, and removal from installation of the radioactive material, its shielding, or containment, are performed in compliance with one of the following:

(A) In accordance with instructions provided on labels affixed to the device; or

(B) by a person holding a specific license issued under this part or equivalent regulations of NRC or an agreement state to perform the tests and other operations.

(4)(A) Each person subject to this subsection shall maintain records showing compliance with the requirements of paragraphs (b)(2) and (b)(3). The records shall show the results of each test. The records also shall show the dates of the testing, installation, servicing, or removal from installation of the radioactive

material, its shielding, or containment and the name of each person performing one or more of these tests and other operations.

(B) Each person shall maintain records of tests for leakage of radioactive material required by paragraph (b)(2) for three years after the next required leak test is performed or until the sealed source is transferred or disposed of. Each person shall maintain records of tests on the on-off mechanism and indicator, as required by paragraph (b)(2), for three years after the next required test of the on-off mechanism and indicator is performed or until the sealed source is transferred or disposed of. Each person shall maintain the records required by paragraph (b)(3) for three years from the date of the recorded event or until the device is transferred or disposed of.

(5) Upon a failure of or damage to, or any indication of a possible failure of or damage to, the shielding of the radioactive material or the on-off mechanism or indicator, or upon the detection of 0.005 microcurie or more removable radioactive material, each person subject to this subsection shall take the following actions:

(A) Immediately suspend operation of the device until either of the following conditions is met:

(i) The device has been repaired by the manufacturer or other person holding a specific license issued under this part or equivalent regulations of NRC or an agreement state to repair the device; or

(ii) the device is transferred to a person authorized by a specific license to receive the radioactive material contained in the device;

(B) within 30 days, furnish to the secretary a report containing a brief description of the event and the remedial action taken; and

(C) within 30 days, if contamination of the premises or the environs is likely, furnish to the secretary a plan for ensuring that the premises and environs are acceptable for unrestricted use. The criteria for unrestricted use specified in K.A.R. 28-35-205 may be applicable, as determined by the secretary.

(6) A person subject to this subsection shall not abandon the device.

(7) Except as provided in paragraph (c)(8) of this subsection, each person subject to this subsection shall transfer the device only to a person holding a specific license to receive the A person shall not export any device containing radioactive byproduct material except in accordance with 10 CFR part 110.

(8) (A) Each person shall transfer or dispose of any device containing radioactive byproduct material only by export as provided in paragraph (b)(7) of this regulation, by transfer to another general licensee as authorized in paragraph (b)(9) of this regulation, or to a person authorized to receive the device by a specific license issued under this part or equivalent regulations of NRC or an agreement state.

(B) Each person shall furnish a report to the department within 30 days after the export of the device or the transfer of the device to a specific licensee. The report shall contain the following information:

(i) The identification of the device by manufacturer's name, model number, and serial number;

(ii) the name, address, and license number of the person receiving the device; and

(iii) the date of the transfer.

(C) Each person shall obtain written department approval before transferring the device to any other specific licensee not specifically identified in paragraph (b)(8)(A) of this regulation.

(9) Any person subject to this subsection may transfer the device to another general licensee only if either of the following conditions is met:

(A) The device remains in use at a particular location. In this case, the transferor shall give the transferee a copy of this regulation and any safety documents identified in any label affixed to the deviceand, within 30 days of the transfer, provide a written report to the secretary containing identification of the device by manufacturer's name, model number, and serial number; the name and address of the transferee; and the name, telephone number, and position of an individual who may be contacted by the secretary concerning the device.

(B) The device is held in storage in the original shipping container at its intended location of use before initial use by a general licensee.

(10) Each person subject to this subsection shall comply with the provisions of K.A.R. 28-35-228a and K.A.R. 28-35-229a relating to reports of radiation incidents, theft, or loss of licensed material, but shall be exempt from the other requirements of parts 4 and 10 of these regulations.

(11) Each person shall respond to all written requests from the department to provide information relating to the general license within 30 calendar days of the date of the request or on or before any other deadline specified in the request. If the person cannot provide the requested information within the allotted

time, the person, within that same time period, shall request a longer period to supply the information by submitting a letter to the department and shall provide written justification as to why the person cannot comply.

(12) Each general licensee shall appoint an individual responsible for having knowledge of the appropriate regulations and requirements and the authority for taking required actions to comply with appropriate regulations and requirements. The general licensee, through this individual, shall ensure day-to-day compliance with the appropriate regulations and requirements. This appointment shall not relieve the general licensee of any of the licensee's responsibility in this regard.

(13)(A) Each person shall register, in accordance with paragraph (b)(13)(B) of this regulation, each device generally licensed as required by this regulation. Each address for a location of use, as described in paragraph (b)(13)(B)(iv) of this regulation, shall represent a separate general licensee and shall require a separate registration and fee.

(B) In registering each device, the general licensee shall furnish the following information and any other information specifically requested by the department:

(i) The name and mailing address of the general licensee;

(ii) information about each device as indicated on the label, including the manufacturer's name, the model number, the serial number, and the radioisotope and activity;

(iii) the name, title, and telephone number of the responsible person appointed as a representative of the general licensee under paragraph (b)(12) of this regulation;

(iv) the address or location at which each device is used or stored, or both. For each portable device, the general licensee shall provide the address of the primary place of storage;

(v) certification by the responsible representative of the general licensee that the information concerning each device has been verified through a physical inventory and a check of the label information; and

(vi) certification by the responsible representative of the general licensee that the person is aware of the requirements of the general license.

(14) Each person shall report any change in the mailing address for the location of use, including any change in the name of the general licensee, to the department within 30 days of the effective date of the change. For a portable device, a report of address change shall be required only for a change in the primary place of storage of the device.

(15) No person may store a device that is not in use for longer than two years. If any device with shutters is not being used, the shutters shall be locked in the closed position. The testing required by paragraph (b)(2) of this regulation shall not be required to be performed during the period of storage only. If the device is put back into service or transferred to another person and was not tested at the required test interval, the device shall be tested for leakage before use or transfer, and all shutters shall be tested before use. Each device kept in storage for future use shall be excluded from the two-year time limit if the general licensee performs quarterly physical inventories of the device while the device is in storage.

(c) Nothing in this regulation shall be deemed to authorize the manufacture or import of any device containing radioactive material.

(d) The general license specified in subsection (a) of this regulation shall be subject to the provisions of K.A.R. 28-35-184a and K.A.R. 28-35-184b. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended Nov. 1, 1996; amended March 24, 2006.)

28-35-178c. General license to install devices generally licensed in K.A.R. 28-35-178b. Any person who holds a specific license issued by the U.S. nuclear regulatory commission or an agreement state authorizing the holder to manufacture, install, or service a device described in K.A.R. 28-35-178b is hereby granted a general license to install and service such a device in this state, if:

(a) The device has been manufactured, labeled, installed and serviced in accordance with the provisions of the specific licenses issued in regard to manufacturing, labeling, installing and servicing the device; and

(b) Such person assures that all labels required to be affixed to the device are in place. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178d. Luminous safety devices for use in aircraft. (a) A general license is hereby issued to

acquire, possess, and use tritium or promethium-147 contained in luminous safety devices for use in aircraft if:

(1) the device contains not more than 10 curies of tritium or 300 millicuries of promethium-147; and

(2) the device has been manufactured, assembled or imported in accordance with a specific license, issued under the provisions of section 32.53 of the regulations of the United States nuclear regulatory commission or manufactured or assembled in accordance with a specific license, issued under the provisions of section 32.53 of the regulations of the United States nuclear regulatory commission or manufactured or assembled in accordance with a specific license issued by an agreement state, which authorizes manufacture or assembly of the device for distribution to persons generally licensed by the agreement state.

(b) Persons who acquire, possess or use luminous safety devices pursuant to the general license issued in subsection (a) of this regulation shall be exempt from the requirements of parts 4 and 10 of these regulations, except that they shall comply with the provisions of K.A.R. 28-35-228a and 28-35-229a.

(c) The general license issued in this regulation shall not authorize the manufacture, assembly or repair, or the importation or exportation, of luminous safety devices containing tritium or promethium-147.

(d) The general license issued in this regulation shall not authorize the acquisition, possession or use of promethium-147 contained in instrument dials. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178e. Americium-241 in the form of calibration or reference sources. (a) A general license to acquire, possess, use and transfer, in accordance with the provisions of subsection (b) and (c) of this section, americium-241 in the form of calibration or reference sources is hereby issued to any person who holds a specific license issued by the U.S. nuclear regulatory commission which authorizes the agency to acquire, possess, use and transfer by-product material, source material, or special nuclear material.

(b) The general license issued in subsection (a) of this section applies only to calibration or reference sources which have been manufactured or initially transferred in accordance with the specifications contained in a specific license issued by the secretary, the U.S. nuclear regulatory commission or an agreement state.

(c) The general license issued in subsection (a) of this section is subject to the provisions of K.A.R. 28-35-184a, and to all of the provisions of parts 4 and 10 of these regulations. In addition, persons who acquire, possess, use, and transfer one or more calibration or reference sources pursuant to this general license:

(1) Shall not possess, at any one time, at any one location of storage or use, more than 5 microcuries of americium-241 in such sources;

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

"The receipt, possession, use and transfer of this source, Model_____, Serial No._____, are subject to a general license and the regulations of the United States Nuclear Regulatory Commission or of a State with which the commission has entered into an agreement for the exercise of regulatory authority. Do not remove this label.

CAUTION—RADIOACTIVE MATERIAL—THIS SOURCE CONTAINS AMERICIUM-241. DO NOT TOUCH RADIOACTIVE PORTION OF THIS SOURCE.

(Name of manufacturer or initial transferor)";

(3) shall not transfer, abandon, or dispose of such source except by transfer to a person authorized by a license issued by the secretary, the U.S. nuclear regulatory commission or by an agreement state to receive the source;

(4) shall store such source, except when the source is being used, in a closed container designed and constructed to contain americium-241 which might otherwise escape during storage; and

(5) shall not use the source for any purpose other than the calibration of radiation detectors or the standardization of other sources.

(d) The general license issued in this regulation shall not authorize the manufacture, or the importation or exportation, of calibration or reference sources containing americium-241. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178f. General license to own radioactive material. A general license is hereby issued to own radioactive material without regard to quantity. However, a general licensee under this regulation is not authorized to manufacture, produce, transfer, receive, possess, use, import or export radioactive material, except as authorized in a specific license. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178g. General license for strontium-90 in ice detection devices. (a) A general license is hereby issued to own, acquire, possess, use and transfer strontium-90 contained in ice detection devices if each device contains not more than 50 microcuries of strontium-90 and if each device is manufactured or initially transferred in accordance with the specifications contained in a license issued to the manufacturer by the secretary, the U.S. nuclear regulatory commission or an agreement state.

(b) Persons who own, acquire, possess, use, or transfer strontium-90 contained in ice detection devices pursuant to the general license issued in subsection (a) of this section:

(1) Shall, if visually observable damage to the device occurs, including a bend or crack or discoloration from overheating, discontinue use of the device until it has been inspected, tested for leakage and repaired by a person holding a specific license issued by the secretary, the U.S. nuclear regulatory commission or an agreement state to manufacture or service the device, or shall dispose of the device pursuant to the provisions of K.A.R. 28-35-223a;

(2) Shall assure that all labels affixed to the device at the time of receipt, and which bear a statement that prohibits removal of the labels, are maintained thereon;

(3) Shall be exempt from the requirements of Parts 4 and 10 of these regulations, except that such persons shall comply with the provisions of K.A.R. 28-35-223a, 28-35-228a, and 28-35-229a.

(c) This general license shall not authorize the manufacture, assembly, disassembly or repair, or the importation or exportation, of strontium-90 in ice detection devices. (Authorized by and implementing K.A.R. 1984 Supp. 48-1607; effective, T-86-37, Dec.11, 1985; effective May 1, 1986.)

28-35-178h. General license for use of by-product material for certain in vitro clinical or laboratory testing. (a) A general license is hereby issued to any physician, veterinarian in the practice of veterinary medicine, clinical laboratory or hospital to acquire, possess, use and transfer in accordance with the provisions of subsections (b), (c), (d), (e), and (f) of this section, the following radioactive materials in prepackaged units for use in any of the following stated tests:

(1) Iodine-125, in units not exceeding 10 microcuries each, for use in vitro clinical or laboratory test not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(2) Iodine-131, in units not exceeding 10 microcuries each, for use in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(3) Carbon-14, in units not exceeding 10 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(4) Hydrogen-3 (tritium), in units not exceeding 50 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(5) Iron-59, in units not exceeding 20 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(6) Selenium-75, in units not exceeding 10 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(7) Mock Iodine-125 reference or calibration sources, in units not exceeding 0.05 microcuries of

Iodine-129 and 0.005 microcurie of americium-241 each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(8) Cobalt-57, in units not exceeding 10 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(b)(1) A person shall not acquire, possess, use or transfer radioactive material pursuant to the general license issued in subsection (a) of this section until the person has filed form RH-31, "Registration Certificate—In Vitro Testing with Radioactive Material Under General License," with the secretary and has received from the secretary a validated copy of the form, with a registration number assigned, or until the person has been authorized pursuant to K.A.R. 28-35-181d(d) to use radioactive material under the general license issued in subsection (a) of this regulation.

(2) Each person who files a form RH-31 shall provide all the information requested by that form.

(c) Each person who acquires, possesses, or uses radioactive material pursuant to the general license issued in subsection (a) of this section:

(1) Shall not possess, at any one time, at any one location of storage or use, a total amount of iodine-125, iodine-131, selenium-75, cobalt-57 or iron-59 in excess of 200 microcuries;

(2) shall store the radioactive material, until used, in the original shipping container or in a container providing equivalent radiation protection;

(3) shall use the radioactive material only for the uses authorized in subsection (a) of this section;

(4) shall not transfer the radioactive material except by transfer to a person authorized to receive it under a license issued by the secretary, the U.S. nuclear regulatory commission or an agreement state, and shall not transfer the radioactive material in any manner other than in the unopened, labeled shipping container as received from a supplier; and

(5) shall dispose of mock iodine-125 reference or calibration sources in accordance with the requirements of K.A.R. 28-35-223a.

(d) Each general licensee shall not receive, acquire, possess, or use radioactive material pursuant to subsection (a) of this section:

(1) Except as prepackaged units which are labeled in accordance with the provisions of a specific license issued by the secretary, the U.S.nuclear regulatory commission, or an agreement state; and

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

"This radioactive material may be received, acquired, possessed, and used only by physicians, veterinarians in the practice of veterinary medicine, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use, and transfer are subject to the regulations and a general license of the U.S. nuclear regulatory commission or of a state with which the commission has entered into an agreement for the exercise of regulatory authority.

_____

(Name of Manufacturer)"

(e) Each person possessing or using radioactive materials under the general license issued in subsection (a) of this section shall file a written report with the secretary of any change in the information furnished on form RH-31. The report shall be filed within 30 days after the effective date of any change.

(f) Any person using radioactive material pursuant to the general license issued in paragraph (1) of subsection (a) shall be exempt from the requirements of parts 4 and 10 of these regulations with respect to radioactive materials covered by that general license, except that any person using Mock Iodine-125 shall comply with the provisions of K.A.R. 28-35-223a, 28-35-228a, and 28-35-229a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178i. General licenses for certain units of radium-226. (a) Subject to the limitations prescribed in subsection (b), (c) and (d) of this regulation, a general license is hereby issued to commercial and industrial firms, and to research, educational, medical and governmental institutions, to acquire, possess,

use, and transfer radium-226 in units not exceeding 0.1 microcurie each.

(b) A person shall not acquire, possess, use or transfer radium-226 pursuant to the general license issued in subsection (a) of this regulation until the person has filed form RH-37 with the secretary and has received from the secretary a validated copy of the form, with a certification number assigned. Each person filing a form RH-37 shall provide all the information required by that form.

(c) Each general licensee under this regulation:

(1) Shall not possess, at any one time and at any one location of storage or use, a total amount of radium-226 in excess of five microcuries;

(2) shall store the radium-226, until used, in the original shipping container or in a container providing equivalent radiation protection;

(3) shall transfer the radioactive material only to a person who is authorized to receive it pursuant to a license issued by the secretary, the United States nuclear regulatory commission or an agreement state; and

(4) shall not transfer the radioactive material in any manner other than in the unopened, labeled shipping container as received from the shipper.

(d) Each general licensee under this regulation shall file a written report with the secretary of any changes in the information filed in form RH-37. The report shall be furnished within 30 days after the effective date of the change.

(e) Each general licensee under this regulation shall be exempt from the requirements of parts 4 and 10 of these regulations with respect to the radioactive material covered by the general license.

(f) The general license issued in this regulation shall not authorize the manufacture, commercial distribution or human use of radium-226. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178j. General license for use of byproduct material for certain in vivo clinical or laboratory testing. (a) Except as provided in subsections (b) and (c), each person shall be exempt from the license requirements in part 3 and part 6 of these regulations if the person receives, possesses, uses, transfers, owns, or acquires any capsules containing 37 kBq (1 µCi) of carbon-14 urea, allowing for nominal variation that may occur during the manufacturing process for in vivo diagnostic use for humans.

(b) Before using the capsules specified in subsection (a) for research involving human subjects, each person shall apply and shall be considered for approval for a specific license. Each person shall be required to have a specific license before engaging in the research specified in this subsection.

(c) Before manufacturing, preparing, processing, producing, packaging repackaging, or transferring the capsules specified in subsection (a) for commercial distribution, each person shall apply and shall be considered for approval for a specific license. Each person shall be required to have a specific license before performing any of the actions specified in this subsection.

(d) Nothing in this regulation shall exempt any person from applicable FDA requirements, other federal requirements, and state requirements governing receipt, administration, and use of drugs. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-179a. Application for specific license; renewal or amendment. (a) Any person may file a written application with the secretary for a specific license to acquire, possess, use or transfer radioactive material, and shall file a written application with the secretary to renew or amend any specific license. Each application for a specific license, or a renewal or an amendment of an existing license, shall be made on the appropriate form prescribed and furnished by the secretary. Each person filing an application shall provide all the information requested on the application form, and any additional information requested by the secretary.

(b) Each application filed with the secretary shall be signed by the applicant or licensee, or by a person authorized to act for or on behalf of the applicant or licensee.

(c) Any application may incorporate, by reference, information provided in applications, reports or other documents previously filed with the secretary. Any reference to information previously filed with the secretary shall be clear and specific.

(d) An application for a specific license may include a request for a license authorizing activity at one or more installations or locations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-180a. General requirements for the issuance of specific licenses. Each application for a specific license shall be approved only if the application meets the requirements of these regulations.

(a) Each applicant shall be required to be qualified by reason of training and experience to use the material in question for the purpose requested, in accordance with these regulations, and in a manner that will protect public health and safety and the environment.

(b) The proposed equipment, facilities, and procedures used by each applicant shall protect public health and safety and the environment.

(c) A specific license shall be approved only if the secretary determines that the specific license will not be a detriment to the health and safety of the public .

(d) Each applicant shall meet the requirements prescribed in these regulations for the particular license sought.

(e) (1) Each application for a license for commercial waste disposal, source material milling, or any other operation that the secretary determines will affect the environment shall meet the requirement specified in this paragraph.

Each application shall include information that permits the secretary to weigh the environmental, economic, technical, and other benefits against the environmental costs and alternatives to ensure the protection of public health and safety and the environment.

(2) The approval of each application specified in paragraph (e)(1) shall be based upon the following:

(A) The information specified in paragraph (e)(1) and other information as necessary; and

(B) the applicable portions of 10 CFR, part 51, subpart A, § 51.45, as in effect on April 30, 1992.

(f) Each applicant shall be authorized to begin construction only after the issuance of the license. Commencement of construction before issuance of the license shall be grounds for denial of the license application. "Commencement of construction," as used in this regulation, shall mean any clearing of land, excavation, or other substantial action that would adversely affect the environment of a site.

(g) Each applicant for a license, other than a renewal, shall describe in the application how the facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended Sept. 20, 1993; amended Nov. 1, 1996; amended December 30, 2005.)

28-35-180b. Financial assurance for decommissioning. (a) Each applicant for a specific license authorizing the possession and use of unsealed radioactive material with a half-life greater than 120 days and in quantities exceeding 10^5 times the applicable quantities specified in K.A.R. 28-35-201 shall submit a decommissioning funding plan as described in subsection (e) of this regulation. Each applicant shall also submit the decommissioning funding plan if a combination of isotopes is involved and if R divided by 10^5 is greater than one, where R is defined here as the sum of the ratios of the quantity of each isotope to the applicable value specified in K.A.R. 28-35-201.

(b) Each applicant for a specific license authorizing the possession and use of radioactive material with a half-life greater than 120 days and in quantities specified in table I of this regulation shall submit either of the following:

(1) A decommissioning funding plan as described in subsection (e) of this regulation; or

(2) a certification that financial assurance for decommissioning has been provided in the amount prescribed by table I, using one of the methods described in subsection (f) of this regulation. The certification may state that the appropriate assurance is to be obtained after the application has been approved and the license has been issued, but before the receipt of licensed material. If the applicant defers execution of the financial instrument required under subsection (f) until after the license has been issued, a signed original of the financial instrument shall be submitted to the department before the applicant receives the licensed material. If the applicant does not defer execution of the financial instrument required under subsection (f) of this regulation, the applicant shall submit to the department, as part of the certification, a signed original of the financial instrument.

(c) Each holder of a specific license that is a type specified in subsection (a) or (b) shall provide financial assurance for decommissioning in accordance with the following requirements:

(1) Each holder of a specific license that is a type specified in subsection (a) shall submit a

decommissioning funding plan as specified in subsection (e) or a certification of financial assurance for decommissioning in an amount equal to at least $750,000.00. Each licensee shall submit the plan or certification to the department in accordance with the criteria specified in this regulation. If the licensee submits a certification of financial assurance rather than a decommissioning funding plan, the licensee shall include a decommissioning funding plan in any application for license renewal.

(2) Each holder of a specific license that is a type specified in subsection (b) shall submit a decommissioning funding plan as specified in subsection (e) or a certification of financial assurance for decommissioning. Each licensee shall submit the plan or certification to the department, in accordance with the requirements specified in this regulation.

(d) The amounts of financial assurance required for decommissioning, by quantity of material, shall be those specified in table I.

Table I
Financial assurance for decommissioning by quantity of material

If the possession limit is greater than 10^4 but less than or equal to 10^5 times the applicable quantities specified in K.A.R. 28-35-201, in unsealed form.....$1,125,000.00

For a combination of isotopes, if R, as defined in subsection (a), divided by 10^4 is greater than one, but R divided by 10^5 is equal to or less than one.....$1,125,000.00

If the possession limit is greater than 10^3 but less than or equal to 10^4 times the applicable quantities specified in K.A.R. 28-35-201, in unsealed form.....$ 225,000.00

For a combination of isotopes, if R, as defined in subsection (a), divided by 10^3 is greater than one, but R divided by 10^4 is less than or equal to one.....$ 225,000.00

If the possession limit is greater than 10^{10} times the applicable quantities specified in K.A.R. 28-35-201, in sealed sources or foils..... $ 113,000.00

For a combination of isotopes, if R, as defined in subsection (a), divided by 10^{10} is greater than one.....$ 113,000.00

(e) Each decommissioning funding plan shall contain the following:

(1) A cost estimate for decommissioning;

(2) a description of the method of ensuring funds for decommissioning, selected from the methods specified in subsection (f);

(3) a description of the means for periodically adjusting cost estimates and associated funding levels over the life of the facility;

(4) a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning; and

(5) a signed original of the financial instrument obtained to satisfy the requirements specified in

subsection (f).

(f) Each licensee shall provide financial assurance for decommissioning by one or more of the following methods.

(1) Prepayment. "Prepayment" shall mean cash or liquid assets that meet the following criteria:

(A) Before the start of operation, are deposited into an account that is segregated from the licensee's assets and outside of the licensee's administrative control; and

(B) consist of an amount that is sufficient to pay decommissioning costs.

The prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.

(2) A surety instrument, insurance policy, or other guarantee method. The licensee may use a surety instrument, insurance policy, or other similar means to guarantee that decommissioning costs will be paid. A surety instrument may be in the form of a surety bond, letter of credit, or line of credit. A parent company's guarantee of funds for decommissioning costs based on a financial test may be used if the guarantee and test meet the requirements of K.A.R. 28-35-203. A parent company's guarantee shall not be used in combination with other financial methods to meet the requirements in this regulation. A guarantee of funds by the applicant or licensee for decommissioning costs based on a financial test may be used if the guarantee and test meet the requirements of K.A.R. 28-35-203. A guarantee by the applicant or licensee shall not be used in combination with any other financial methods to meet the requirements in this regulation or in any situation in which a parent company of the applicant or licensee holds majority control of the voting stock of the company. Each surety instrument or insurance policy used to provide financial assurance for decommissioning shall contain the following conditions:

(A) The surety instrument or insurance policy shall be open-ended or, if written for a specified term, shall be renewed automatically, unless 90 days or more before the renewal date, the insurer notifies the department, the beneficiary, and the licensee of the insurer's intention not to renew. The surety instrument or insurance policy shall also provide that the full face amount will be paid to the beneficiary automatically

before the expiration without proof of forfeiture if the licensee fails to provide a replacement that meets the requirements of this regulation within 30 days after receipt of notification of cancellation.

(B) The surety instrument or insurance policy shall be payable to an approved trust established for decommissioning costs. The trustee may include an appropriate state or federal agency or an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency.

(C) The surety instrument or insurance policy shall remain in effect until the license is terminated by the department.

(3) External sinking fund. A licensee may provide financial assurance for decommissioning through an external sinking fund in which deposits are made at least annually, coupled with a surety instrument or insurance policy. The value of the surety instrument or insurance policy may decrease by the amount accumulated in the sinking fund. "External sinking fund" shall mean a fund that meets both of the following conditions:

(A) Is established and maintained by setting aside funds periodically in an account segregated from the licensee's assets and outside the licensee's administrative control; and

(B) contains a total amount of funds sufficient to pay the decommissioning costs when termination of the operation is expected. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities. The surety or insurance provisions shall meet the requirements specified in this subsection.

(4) Statement of intent. Any federal, state, or local government licensee may submit a statement of intent containing a cost estimate for decommissioning or an amount based on table I of this regulation and indicating that funds for decommissioning will be obtained when necessary.

(g) Each person licensed under subsections (a) through (g) shall keep records of all information that is relevant to the safe and effective decommissioning of the facility. The records shall be kept in an identified location until the license is terminated by the department. If records of relevant information are kept for other purposes, the licensee may refer to these records and the location of these records within the records kept pursuant to this subsection.

(h) Each licensee shall maintain decommissioning records, which shall consist of the following

information:

(1) Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to records of instances in which contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants could have spread to inaccessible areas. These records shall include any known information identifying the nuclides, quantities, forms, and concentrations involved in the spill or occurrence;

(2) drawings of the following, both as originally built and, if applicable, as modified:

(A) The structures and equipment in restricted areas where radioactive materials are used or stored, or both; and

(B) the locations of possible inaccessible contamination. If the licensee refers to required drawings other than those kept pursuant to this regulation, the licensee shall not be required to index each relevant document individually. If drawings are not available, the licensee shall substitute available information concerning these areas and locations;

(3) a list of the following information, which shall be contained in a single document and updated every two years:

(A) All areas designated and formerly designated as restricted areas;

(B) all areas outside of restricted areas that require the documentation specified in this subsection;

(C) all areas outside of restricted areas where current and previous wastes have been buried and documented as specified in K.A.R. 28-35-227j; and

(D) all areas outside of restricted areas that contain material so that, if the license expired, the licensee would be required either to decontaminate the area to unrestricted release levels or to apply for approval for disposal as specified in K.A.R. 28-35-225a.

Those areas containing sealed sources only shall not be included in the list if the sources have not leaked, no contamination remains in the area after any leak, or the area contains only radioactive materials having half-lives of less than 65 days; and

(4) the following records:

(A) Records of the cost estimate performed for the decommissioning funding plan or records of the amount certified for decommissioning; and

(B) if either a funding plan or certification is used, records of the funding method used for assuring funds.

(i) Each applicant for a specific license shall make arrangements for a long-term care fund pursuant to K.S.A. 48-1623, and amendments thereto. Each applicant for any of the following types of specific licenses shall establish the long-term fund before the issuance of the license or before the termination of the license if the applicant chooses, at the time of licensure, to provide a surety instrument in lieu of a long-term care fund:

(1) Waste-handling licenses;

(2) source material milling licenses; and

(3) licenses for any facilities formerly licensed by the U.S. atomic energy commission or the U.S. nuclear regulatory commission, if required.

(j)(1) Each applicant shall agree to notify the department, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of title 11, bankruptcy, of the United States code by or against any of the following:

(A) The licensee;

(B) any person controlling the licensee or listing the license or licensee as property of the estate; or

(C) any affiliate of the licensee.

(2) The bankruptcy notification shall indicate the following:

(A) The name of the bankruptcy court in which the petition for bankruptcy was filed; and

(B) the date on which the petition was filed. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-181a. Specific licenses for materials, human use of radioactive material in medical institutions. An application for a specific license for human use of radioactive material in institutions shall not be approved unless:

(a) The applicant has appointed a radiation safety committee of at least three members to oversee the licensed radioactive material throughout the institution and to review the institution's radiation safety

program. Membership of the committee shall include at least the following: an authorized user for each type of use permitted by the license, a representative of the nursing staff, a representative of the institution's management, and a radiation safety officer;

(b) the applicant possesses adequate facilities for the clinical care of patients;

(c) the physician or physicians designated on the application as the user or users have substantial experience in handling and administering radioactive materials, and where applicable, clinical management of radioactive patients; and

(d) if the application is for a license to use unspecified quantities or multiple types of radioactive material, the applicant or applicant's staff has substantial experience in the use of a variety of radioactive materials for a variety of human uses. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181b. Specific licenses to individual physicians for human use of radioactive material. (a) A specific license for the human use of radioactive materials outside of a medical institution shall not be issued to an individual physician unless:

(1) The applicant has access to a hospital and adequate facilities are available for the hospitalization and monitoring of the applicant's radioactive patients when such action is advisable; and

(2) the applicant has extensive experience in the proposed use, handling and administration of radioactive material, and where applicable, clinical management of radioactive patients. The physician shall furnish evidence of this experience with the application for the specific license.

(b) The secretary shall not approve an application by an individual physician or group of physicians for a specific license to receive, possess, or use radioactive material on the premises of a medical institution unless:

(1) The use of radioactive material is limited to:

(A) The administration of radiopharmaceuticals for diagnostic or therapeutic purposes;

(B) the performance of diagnostic studies on patients to whom a radiopharmaceutical has been administered;

(C) the performance of in vitro diagnostic studies; and

(D) calibration and quality control checks of radioactive assay instrumentation, radiation safety instrumentation and diagnostic instrumentation;

(2) the physician brings the radioactive material to the institution for each use and removes the radioactive material from the institution after each use; and

(3) the medical institution or institutions at which the radioactive materials are to be used by the physician or physicians do not hold a specific license under K.A.R. 28-35-181a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181c. Specific license for human use of radioactive material in sealed sources. (a) A specific license for human use of radioactive materials in sealed sources shall not be issued unless the applicant, or if the application is made by an institution, each individual user of the radioactive material:

(1) Has specialized training in the diagnostic or therapeutic use of the sealed source device or extensive experience in the use of the device; and

(2) is a physician.

(b) The applicant shall furnish evidence of the training or experience required by subsection (a) at the time of filing the application for the specific license. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181d. Specific licenses for a group or groups of medical uses. (a) Any institution, person or group of persons who meet the requirements of K.A.R. 28-35-181a or 28-35-181b may file a written application with the secretary for a specific license to use radioactive material for any group or groups of medical uses specified in K.A.R. 28-35-199a. Each such application shall meet the requirements of K.A.R. 28-35-179a and shall designate the intended group or groups of uses for the radioactive material.

(b) An application for a specific license to use radioactive material for any group or groups of medical uses specified in K.A.R. 28-35-199a schedule shall not be approved unless:

(1) The applicant, or the physician or physicians designated in the application as the individual

user or users, has adequate clinical experience in performing the medical use or uses for which application is made;

(2) the applicant's proposed radiation detection instrumentation is adequate for conducting the medical procedures specified in the group or groups of uses for which application is made;

(3) the applicant's radiation safety operating procedures are adequate for the proper handling and disposal of radioactive material involved in the group or groups of uses for which application is made; and

(4) the applicant, or the physician or physicians designated in the application as the individual user or users, and all other personnel who will be involved in the preparation and use of the radioactive material, have adequate training and experience in the handling of radioactive material. Such training and experience shall be appropriate for the conduct of the uses included in the group or groups of uses for which application is made.

(c) Each licensee who is licensed under this regulation shall be subject to the following limitations:

(1) Each licensee who has been issued a license for group I, II, IV, or V uses shall not receive, possess, or use radioactive material, except those radiopharmaceuticals manufactured in the form to be administered to the patient, and labeled, packaged, and distributed in accordance with a specific license issued by the secretary, or the United States nuclear regulatory commission or an agreement state.

(2) Each licensee who has been issued a license for group III uses shall not receive, possess, or use generators or reagent kits containing radioactive material, nor shall any licensee use reagent kits that do not contain radioactive material to prepare radiopharmaceuticals containing radioactive material, except:

(i) Reagent kits not containing radioactive material that are approved by the secretary, the United States nuclear regulatory commission or an agreement state for use by persons licensed pursuant to this regulation for group III medical uses; or

(ii) Generators or reagent kits containing radioactive material that are manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state.

(3) Each licensee who has been issued a license for group III uses and who uses generators or reagent kits shall elute the generator or process radioactive material with the reagent kit in accordance with instructions that are approved by the secretary, the United States nuclear regulatory commission or an agreement state and furnished by the manufacturer on the label attached to, or in the leaflet or brochure that accompanies, the generator or reagent kit.

(4) Each licensee who has been issued a license for groups I, II, or III uses and who uses the radioactive material for clinical procedures other than those specified in the product labeling or package insert shall comply with the product labeling regarding:

(i) Chemical and physical form;

(ii) route of administration; and

(iii) dosage range.

(5) Each licensee who has been issued a license for group IV uses shall not receive, possess, or use radioactive material unless contained in a source or device that has been manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state.

(d) Each licensee who is licensed under this regulation shall be authorized to use radioactive material under the general license issued in K.A.R 28-35-178h for the specified in vitro uses, without filing form RH-31 as otherwise required by that regulation. However, the licensee shall be subject to the other requirements of K.A.R. 28-35-178h.

(e) Any licensee who is licensed under this regulation shall be authorized, subject to the provisions of subsections (f) and (g) of this regulation, to receive, possess, and use for calibration and reference standards:

(1) Any radioactive material listed in groups I, II, or III of K.A.R. 28-35-199a that has a half-life of 100 days or less, in amounts not exceeding 15 millicuries;

(2) any radioactive material listed in group I, II, or III of K.A.R. 28-35-199a that has a half-life greater than 100 days, in amounts not exceeding 200 microcuries;

(3) technetium-99m, in amounts not exceeding 30 millicuries; and

(4) any radioactive material, in amounts not exceeding three millicuries per source, contained in calibration or reference sources that have been manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state.

(f)(1) Any licensee who possesses sealed sources as calibration or reference sources pursuant to subsection (e) of this regulation shall cause each sealed source containing radioactive material, other than hydrogen 3, that has a half-life greater than 30 days, and that is in any form other than gas, to be tested for leakage, contamination or both at intervals not exceeding six months. In the absence of a certificate from a transferor indicating that a leak test has been made within six months prior to the transfer of a particular sealed source, that sealed source shall not be used until tested, unless:

(A) The source contains 100 microcuries or less of beta, gamma, or beta and gamma-emitting material, or 10 microcuries or less of alpha-emitting material; or

(B) the sealed source is stored and is not being used.

(2) Each leak test required under paragraph (1) of this subsection shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored and on which contamination might be expected to accumulate. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the department.

(3) If the leak test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired, or to be disposed of in accordance with parts 3 and 4 of these regulations. A report shall be filed with the secretary within five days of the test, describing the equipment involved, the test results, and the corrective action taken.

(g) Each licensee who possesses and uses calibration and reference sources pursuant to subsection (e) of this regulation shall:

(1) Follow radiation safety and handling instructions that are approved by the secretary, the United States nuclear regulatory commission or an agreement state and furnished by the manufacturer on the label attached to the source, or permanent container thereof, or in the leaflet or brochure that accompanies the source;

(2) maintain the instructions referenced in paragraph (1) of this subsection in a legible and conveniently available form; and

(3) conduct a quarterly physical inventory to account for all sources received and possessed. Records of the inventories shall be maintained for inspection by the department and shall include the quantities and kinds of radioactive material, location of sources, and the date of the inventory. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181e. Specific licenses for certain items containing radioactive material other than source, byproduct, or special nuclear material. (a) (1) Each applicant for any of the following types of specific licenses shall submit in the application the information specified in paragraph (a)(2):

(A) A specific license to apply radioactive material other than source, byproduct, or special nuclear material to products specified in K.A.R. 28-35-192c(a);

(B) a specific license to incorporate radioactive material, other than source, byproduct, or special nuclear material into products specified in K.A.R. 28-35-192c(a); and

(C) a specific license to import products that are specified in K.A.R. 28-35-192c(a) and that contain radioactive material other than source, byproduct, or special nuclear material .

(2) Each applicant shall include the following information in the application:

(A) The chemical and physical form and maximum quantity of radioactive material in each product;

(B) the details of construction and design of each product;

(C) the method of containment or binding of the radioactive material in the product;

(D) the procedures for and the results of prototype testing to demonstrate that the material will be not become detached from the product and that the radioactive material will not be released to the environment under the most severe conditions likely to be encountered during normal use of the product;

(E) the quality control procedures to be followed in the fabrication of production lots of the product and the quality control standards that the product will be required to meet;

(F) the proposed method of labeling or marking each unit, except timepieces, hands, and dials containing tritium or promethium-147, and each unit's container with the identification of the manufacturer or initial transferor of the product and the radioactive material in the product;

(G) for products for which limits on levels of radiation are specified in this part, the radiation level and the method of measurement; and

(H) any additional information, including experimental studies and tests, required by the secretary to facilitate a determination of the safety of the product.

(b)(1) Each person licensed under subsection (a) of this regulation shall file an annual report with the secretary regarding items transferred to other persons for use under K.A.R. 28-35-192c(a). Each report shall include the following:

(A) A description or identification of the type of each product transferred;

(B) for each radionuclide in each type of product, the total quantity of radionuclide transferred; and

(C) the number of units of each type of product transferred during the reporting period.

(2) If no transfers of radioactive material have been made as specified in K.A.R. 28-35-192c(a) during a reporting period, the report shall indicate this fact.

(3) Each report shall cover the 12-month period commencing on July 1 and ending on the following June 30 and shall be filed on or before July 31 of each year. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-181f. Special licenses for the introduction of radioactive material into products in exempt concentrations. (a) An application for a specific license to introduce radioactive material into a product or material and to transfer the product or material to any person who is exempt from regulation under K.A.R. 28-35-192b(a) shall not be approved unless the applicant submits with the application for the specific license:

(1) A description of the product or material into which the radioactive material is to be introduced;

(2) an explanation of the intended use of the radioactive material;

(3) the method by which the radioactive material is to be introduced;

(4) the concentration of the radioactive material to be introduced;

(5) the control method or methods to be employed to assure that no more than the specified concentration is introduced;

(6) the estimated time interval between introduction of radioactive material into the product or material into the product or material and the transfer of the product or material;

(7) the estimated concentration of radioactive material that will be present in the product or material at the time of transfer; and

(8) reasonable assurances that:

(A) the concentrations of radioactive material at the time of transfer will not exceed the limitations prescribed in K.A.R. 28-35-198a, Schedule C;

(B) reconcentration of the radioactive material concentrations exceeding the limitations prescribed in K.A.R. 28-35-198a, Schedule C is not likely to occur;

(C) use of lower concentrations or radioactive material is not practical or feasible; and

(D) the product or material is not likely to be incorporated in any food, beverage, cosmetic, drug or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

(b)(1) Each person licensed under subsection (a) of this regulation shall file an annual report with the secretary describing the type and quantity of each product or material into which radioactive material has been introduced during the reporting period; the name and address of the person to whom possession of the product of material has been introduced was transferred; the type and quantity of radioactive material which was introduced into each product or material and the initial concentration of radioactive material in the product or material at time of transfer of the radioactive material by the licensee.

(2) If no transfers of radioactive materials have been made during a reporting period, the report shall indicate this fact.

(3) Each report shall cover the 12-month period commencing on July 1 of each year. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181g. Licensing for industrial radiography operations. (a) Each application for a specific license shall be considered for approval for the use of licensed material for industrial radiography only if the

application contains the following:

(1) A description of a program for training radiographers and radiographer's assistants that meets the requirements of part 7 in these regulations;

(2) the procedures for verifying and documenting the certification status of radiographers and for ensuring that the certification of individuals acting as radiographers remains valid;

(3) the written operating and emergency procedures as specified in part 7 in this article;

(4) a description of a program for inspections of the job performance of each radiographer and radiographer's assistant at intervals not to exceed six months;

(5) a program for inspection and maintenance of radiographic exposure devices, equipment, and storage containers to ensure proper functioning;

(6) a description of the applicant's overall organizational structure as it applies to the radiation safety responsibilities in industrial radiography, including specified delegation of authority and responsibility;

(7) the qualifications of the individual designated as the radiation safety officer;

(8) if the applicant intends to perform leak testing of sealed sources or exposure devices containing depleted uranium (DU) shielding, a description of the procedures for performing the test. The description shall include the following:

(A) The methods of collecting the samples;

(B) the qualifications of the individual who analyzes the samples;

(C) the instruments to be used; and

(D) the methods of analyzing the samples;

(9) if the applicant intends to perform calibrations of survey instruments and alarming ratemeters, a description of the methods to be used and the experience of each person who will perform the calibrations. All calibrations shall be performed according to the procedures described and at the intervals specified in part 7 in these regulations;

(10) identification and description of the location of each field station and permanent radiographic installation;

(11) identification of each location where all records required by this part and the other parts of these regulations will be maintained; and

(12) if the applicant intends to perform underwater radiography, a description of the following:

(A) Radiation safety procedures and radiographer responsibilities unique to the performance of underwater radiography;

(B) radiographic equipment and radiation safety equipment unique to underwater radiography; and

(C) methods of gas-tight encapsulation of equipment.

(b) Each licensee shall retain the records of each inspection for review by the department, for two years from the date the inspection is performed. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-181h. Specific licenses to manufacture and distribute the devices specified in K.A.R. 28-35-178b. An application for a specific license to manufacture and distribute one or more of the devices specified in K.A.R. 28-35-178b shall not be approved unless the applicant meets the requirements of subsections (a) and (b) of this regulation in addition to meeting all of the additional applicable requirements specified in these regulations.

(a) Each applicant shall submit information about the design, manufacture, prototype testing, quality control, labels, proposed uses, installation, servicing, leak testing, operating and safety instructions, and potential hazards of the device to provide reasonable assurance that the following conditions are met:

(1) The device can be safely operated by individuals not having training in radiological protection;

(2) under ordinary conditions of handling, storage, and use of the device, the radioactive material contained in the device will not be released or inadvertently removed from the device, and it is unlikely that any individual will receive a dose in excess of 10 percent of the limits specified in K.A.R. 28-35-212a; and

(3) under accident conditions, including fire and explosion, associated with handling, storage, and use of the device, it is unlikely that any individual will receive an external radiation dose or dose commitment in excess of the following organ doses:

(A) Whole body; head and trunk; active blood-forming organs; gonads; or lens of eye 15 rems

(B) Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 square centimeter 200 rems

(C) Other organs 50 rems.

(b) (1) Each device shall bear a durable, legible, clearly visible label or labels that contain, in clearly identified and separate statements, the following information:

(A) Instructions and precautions necessary to ensure safe installation, operation, and servicing of the device. Operating and service manuals may be identified in the label and used to provide this information;

(B) specification of whether or not leak testing or testing of any on-off mechanism and indicator is required. The information shall include the maximum allowable time intervals between tests and shall identify the radioactive material by isotope, quantity of radioactivity, and date that the quantity was determined; and

(C) the information required in one of the following statements, as appropriate, in the same or a substantially similar form:

(i) "The receipt, possession, use, and transfer of this device, model_____, serial no._____, are subject to a general license or the equivalent and the regulations of the U.S. nuclear regulatory commission or a state with which the U.S. nuclear regulatory commission has entered into an agreement for the exercise of regulatory authority. This label shall be maintained on the device in a legible condition. Removal of this label is prohibited.

CAUTION - RADIOACTIVE MATERIAL

_____

(Name of manufacturer or distributor)";

or

(ii) "The receipt, possession, use, and transfer of this device, model_____, serial no._____, are subject to a general license or the equivalent, and the regulations of a licensing state. This label shall be maintained on the device in a legible condition. Removal of this label is prohibited.

CAUTION - RADIOACTIVE MATERIAL

_____

(Name of manufacturer or distributor)"

(2) The model, serial number, and name of the manufacturer or distributor may be omitted from the requirements specified in paragraphs (b)(1)(C)(i) and (ii) if the information is elsewhere specified in labeling affixed to the device.

(3) Each device having a separate source housing that provides the primary shielding for the source shall also bear, on the source housing, a durable label containing the device model number and serial number, the isotope and quantity, the words "Caution - Radioactive Material," the radiation symbol described in part 4 of these regulations, and the name of the manufacturer or initial distributor.

(4) Each device containing at least 370 Mbq (10 mCi) of cesium-137, 3.7 Mbq (0.1 mCi) of strontium-90, 37 Mbq (1 mCi) of americium-241 or any other transuranic element based on the activity indicated on the label shall meet the following criteria:

(A) (i) Bear a permanent label affixed to the source housing if the source housing is separable, including the words "Caution - Radioactive Material"; or

(ii) bear a permanent label affixed to the device if the source housing is not separable, including the words "Caution - Radioactive Material"; and

(B) if practicable, bear the radiation symbol described in part 4 of these regulations.

(c) If the device is required to be tested at intervals longer than six months, either for proper operation of the on-off mechanism and indicator, if any, or for leakage of radioactive material, or for both, the applicant shall include in the application sufficient information to demonstrate that the longer interval is justified by the performance characteristics of the device or of similar devices and by design features that have a significant bearing on the probability or consequences of leakage of radioactive material from the device or failure of the on-off mechanism and indicator. In determining the acceptable interval for the test

for leakage of radioactive material, the applicant shall address the following in the application:

(1) The primary containment of the source capsule;

(2) protection of the primary containment;

(3) the methods of sealing the primary containment;

(4) the containment construction materials;

(5) the form of contained radioactive material;

(6) the maximum temperature withstood during prototype tests;

(7) the maximum pressure withstood during prototype tests;

(8) the maximum quantity of contained radioactive material;

(9) the radiotoxicity of contained radioactive material; and

(10) any prior operating experience with identical devices or similarly designed and constructed devices.

(d) If the general licensee under K.A.R. 28-35-181b, or under equivalent regulations of an agreement state, is authorized to install the device, collect the sample to be analyzed by a specific licensee for leakage of radioactive material, service the device, test the on-off mechanism and indicator, or remove the device, the applicant shall include in the application the written instructions to be followed by the general licensee, the estimated calendar-quarter doses associated with each operation, and the bases for the estimates. The submitted information shall demonstrate that performance of the specified operations by an individual untrained in radiological protection, in addition to other handling, storage, and use of devices under the general license, is unlikely to cause that individual to receive a dose in excess of 10 percent of the annual limits specified in part 4 of these regulations. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-181i. Special license to manufacture, distribute, assemble or repair luminous safety devices for use in aircraft. An application for a specific license to manufacture, assemble, or repair luminous safety devices containing tritium or promethium-147, for use in aircraft, and to distribute such devices to persons generally licensed under K.A.R. 28-35-178c shall not be approved unless the applicant meets the requirements of sections 32.53, 32.54, 32.55, 32.56 and 32.101 of 10 CFR Part 32, as in effect on May 31, 1984. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181j. Special licenses to manufacture and distribute calibration sources containing americium-241 or plutonium. An application for a specific license to manufacture calibration sources containing americium-241 or plutonium and to distribute those sources to persons generally licensed under K.A.R. 28-35-178e shall not be approved unless the applicant meets the requirements of sections 32.57, 32.58, 32.59 and 32.102 of 10 CFR Part 32, as in effect on May 31, 1984, and the requirements of section 70.39 of 10 CFR Part 70, as in effect on May 31, 1984. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181k. Specific licenses to manufacture and distribute ice detection devices. An application for a specific license to manufacture ice detection devices and to distribute those devices to persons generally licensed under K.A.R. 28-35-178g shall not be approved unless the applicant meets the requirements of sections 32.61, 32.62, and 32.103 of 10 CFR Part 32, as in effect on May 31, 1984. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181l. Specific licenses to manufacture and distribute industrial products and devices containing depleted uranium. (a) An application to manufacture industrial products and devices containing depleted uranium for mass-volume applications and to distribute those products or devices to persons generally licensed under K.A.R. 28-35-177a(c) shall not be approved unless all of the following conditions, in addition to all of the applicable requirements specified in these regulations, are met:

(1) The applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control procedures, labeling or marking, proposed uses, and potential hazards of the industrial product or device to provide reasonable assurance that the possession, use, or transfer of the

depleted uranium in the product or device is not likely to cause any individual to receive a radiation dose in excess of 10 percent of the limits specified in K.A.R. 28-35-212a.

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

(3) The secretary finds that the product or device combines a high degree of utility with a low probability of uncontrolled disposal or dispersal of significant quantities of depleted uranium into the environment.

(4) The application states clearly the use or uses for which the product or device is intended.

(b) Each person licensed pursuant to subsection (a) of this regulation shall meet the following requirements:

(1) In the manufacture of the industrial product or device and in the installation of the depleted uranium into the product or device, maintain the level of quality control required by the license;

(2) label or mark each unit to meet the following requirements:

(A) Identify the manufacturer of the product or device and the number of the license under which the product or device was manufactured, identify the fact that the product or device contains depleted uranium, and indicate the quantity of depleted uranium in each product or device; and

(B) state that the receipt, possession, use, and transfer of the product or device are subject to a general license and the regulations issued by the secretary, the U.S. nuclear regulatory commission, or an agreement state;

(3) ensure that the depleted uranium, before being installed in each product or device, has been impressed with the following legend clearly legible through any plating or other covering: "depleted uranium";

(4)(A) Furnish a copy of K.A.R. 28-35-177a and a form specified by the department to each person to whom the applicant transfers depleted uranium in a product or device for use pursuant to the general license issued under K.A.R. 28-35-177a(c); or

(B) furnish the following to each person to whom the applicant transfers depleted uranium in a product or device for use pursuant to a general license issued by the U.S. nuclear regulatory commission or an agreement state:

(i) A copy of the regulation of the U.S. nuclear regulatory commission or an agreement state that is equivalent to K.A.R. 28-35-177a(c) and a copy of the certificate of the U.S. nuclear regulatory commission or agreement state;

(ii) a copy of K.A.R. 28-35-177a and a copy of the form specified by the department; and

(iii) a note explaining that the use of the product or device is regulated by the U.S. nuclear regulatory commission or an agreement state under requirements substantially the same as those in K.A.R. 28-35-177a;

(5) report to the department all transfers of industrial products or devices to another person for use under the general license specified in K.A.R. 28-35-177a(c). This report shall identify each general licensee by providing the following information:

(A) The name and address;

(B) the name of an individual, by name and position, if any, who shall be a point of contact between the department and the general licensee;

(C) the type and model number of the device transferred; and

(D) the quantity of depleted uranium contained in the product or device. Each licensee shall submit a report within 30 days after the end of each calendar quarter. If no transfers have been made to persons generally licensed under K.A.R. 28-35-177a(c) during the reporting period, the report shall indicate this fact;

(6)(A) Report to the U.S. nuclear regulatory commission all transfers of industrial products or devices to persons for use under a U.S. nuclear regulatory commission general license that is equivalent to the license specified in K.A.R. 28-35-177a(c);

(B) report to the appropriate state agency of each agreement state all transfers of devices manufactured and distributed pursuant to this regulation for use under a general license issued by that particular agreement state; and

(C) identify the following in each report required under paragraph (b) (6)(A) or (b) (6)(B) :

(i) Each general licensee by name and address;

(ii) the name of an individual, by name and position, if any, who shall be a point of contact between the commission or state agency and the general licensee;

(iii) the type and model number of the device transferred; and

(iv) the quantity of depleted uranium contained in the product or device.

Each licensee shall submit the report within 30 days after the end of each calendar quarter. If no transfers are made to U.S. nuclear regulatory commission licensees during any reporting period, this information shall be reported to the U.S. nuclear regulatory commission. If no transfers are made to general licensees within a particular agreement state during the reporting period, this information shall be reported to the appropriate agency of the agreement state;

(7) keep and maintain, for two years, records showing the name, address, and point of contact for each general licensee to whom a transfer of depleted uranium in industrial products or devices has been made, including the date of the transfer and the quantity of depleted uranium in the product or device transferred; and

(8) keep and maintain, for two years, records showing compliance with the reporting requirements of this subsection. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended .December 30, 2005.)

28-35-181m. Specific licenses to manufacture , prepare, or distribute radiopharmaceuticals containing radioactive material for medical use . An application for a specific license to manufacture, prepare, or distribute radiopharmaceuticals containing radioactive material and used by persons as specified in part 6 of these regulations shall not be approved unless the applicant meets the requirements of this regulation and all other applicable requirements of these regulations.

(a) The applicant shall meet the requirements specified in K.A.R. 28-35-180a.

(b) The applicant shall submit evidence of all of the following:

(1) (A) The radiopharmaceutical containing radioactive material is subject to the federal food, drug and cosmetic act or the public health service act and will be manufactured, labeled, and packaged in accordance with a new drug application (NDA) approved by the food and drug administration (FDA), a biologic product license issued by the FDA, or a "notice of claimed investigational exemption for a new drug" (IND) accepted by the FDA; or

(B) the manufacture and distribution of the radiopharmaceutical containing radioactive material is not subject to the federal food, drug, and cosmetic act or the public health service act.

(2) The applicant is registered or licensed with the U.S. food and drug administration as a drug manufacturer.

(3) The applicant is registered or licensed with a state agency as a drug manufacturer.

(4) The applicant is licensed as a pharmacy by the state board of pharmacy.

(5) The applicant is operating as a nuclear pharmacy within a federal medical institution.

(c) The applicant shall submit the following information on the radionuclide:

(1) The chemical and physical form of the material;

(2) the packaging in which the radionuclide is shipped, including the maximum activity per package; and

(3) evidence that the shielding provided by the packaging of the radioactive material is appropriate for the safe handling and storage of radiopharmaceuticals by group licensees.

(d) (1) The applicant shall submit a description of the following:

(A) A label that shall be affixed to each transport radiation shield, whether the shield is constructed of lead, glass, plastic, or other material, of a radioactive drug to be transferred for commercial distribution. The label shall include the following:

(i) The radiation symbol and the words "CAUTION - RADIOACTIVE MATERIAL" or "DANGER - RADIOACTIVE MATERIAL";

(ii) the name of the radioactive drug and the abbreviation; and

(iii) the quantity of radioactivity at a specified date and time. For radioactive drugs with a half-life greater than 100 days, the time may be omitted; and

(B) a label that shall be affixed to each syringe, vial, or other container used to hold a radioactive drug to be transferred for commercial distribution. The label shall include the radiation symbol and the

words "CAUTION - RADIOACTIVE MATERIAL" or "DANGER - RADIOACTIVE MATERIAL" and an identifier that ensures that the syringe, vial, or other container can be correlated with the information on the transport radiation shield label.

(2) The labels, leaflets or brochures required by this regulation shall be made in addition to the labeling required by the FDA. The labels, leaflets or brochures may be separate from the FDA labeling, or with the approval of the FDA, the labeling may be combined with the labeling required by the FDA.

(e) All of the following shall apply to each licensee described in subsection (b):

(1) The licensee may prepare radioactive drugs for medical use, if each radioactive drug is prepared by either an authorized nuclear pharmacist, as specified in paragraphs (2) and (4) of this subsection, or an individual under the supervision of an authorized nuclear pharmacist.

(2) The licensee may allow a pharmacist to work as an authorized nuclear pharmacist if at least one of the following conditions is met:

(A) The pharmacist qualifies as an authorized nuclear pharmacist.

(B) The pharmacist meets the requirements specified in 10 CFR 35.55 (b) and 35.59, and the licensee has received an approved license amendment identifying this individual as an authorized nuclear pharmacist.

(C) The pharmacist is designated as an authorized nuclear pharmacist in accordance with paragraph (4) of this subsection.

(3) The actions authorized in paragraphs (1) and (2) of this subsection shall be permitted in spite of more restrictive language in license conditions.

(4) The licensee may designate a pharmacist as an authorized nuclear pharmacist if the individual was identified on or before December 2, 1994 as an "authorized user" on a nuclear pharmacy license issued under this part.

(5) Each licensee shall provide the following to the department no later than 30 days after the date that the licensee allows, pursuant to paragraphs (2)(A) and (2)(C) of this subsection, the individual to work as an authorized nuclear pharmacist:

(A) A copy of each individual's certification by the board of pharmaceutical specialties, the department or agreement state license, or the permit issued by a licensee of broad scope; and

(B) a copy of the state pharmacy license or registration.

(f) Each licensee shall possess and use instrumentation to measure the radioactivity of radioactive drugs. Each licensee shall have procedures for using the instrumentation. Each licensee shall measure, by direct measurement or by combination of measurements and calculations, the amount of radioactivity in dosages of alpha-, beta-, or photon-emitting radioactive drugs before transfer for commercial distribution. Each licensee shall meet the following requirements:

(A) Perform tests before initial use, periodically, and following repair on each instrument for accuracy, linearity, and geometry dependence, as appropriate for the use of the instrument, and make adjustments if necessary; and

(B) check each instrument for constancy and proper operation at the beginning of each day of use.

(g) Nothing in these regulations shall exempt the licensee from the requirement to comply with applicable FDA requirements and other federal and state requirements governing radioactive drugs. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-181n. Specific licenses to manufacture and distribute generators or reagent kits for preparation of radiopharmaceuticals containing radioactive material. An application for a specific license to manufacture and distribute generators or reagent kits containing radioactive material for preparation of radiopharmaceuticals by persons licensed pursuant to K.A.R. 28-35-181d for the uses listed in Group III of K.A.R. 28-35-199a, Schedule D, shall be approved if the applicant meets the requirements of subsections (a), (b), (c) and (d) of this regulation.

(a) The applicant shall satisfy the general requirements specified in K.A.R. 28-35-180a.

(b) The applicant shall submit evidence that:

(1) The generator or reagent kit is subject to the federal food, drug and cosmetic act or the public health service act and will be manufactured, labeled, and packaged in accordance with a new drug application (NDA) approved by the food and drug administration (FDA), a biologic product license issued by FDA, or a "notice of claimed investigational exemption for a new drug" (IND) accepted by FDA; or

(2) the manufacture and distribution of the generator or reagent kit is not subject to the federal food, drug, and cosmetic act and the public health service act.

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

(d) The label affixed to the generator or reagent kit shall contain information on the radionuclide, quantity, and date of assay.

(e) The label affixed to the generator or reagent kit, or the leaflet or brochure which accompanies the generator or reagent kit, shall contain:

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

(2) a statement that "this generator or reagent kit (as appropriate) is approved for use by persons licensed by the department pursuant to K.A.R. 28-35-181d for Group III uses under K.A.R. 28-35-199a, Schedule D, Group III of Part 3, or under equivalent licenses of the United States nuclear regulatory commission or another agreement state." The labels, leaflets or brochures required by this paragraph shall be in addition to the labeling required by the FDA. Such labels, leaflets or brochures may be separate from FDA labeling, or with the approval of FDA, the labeling may be combined with the labeling required by the FDA. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181o. Specific licenses to manufacture and distribute sources and devices for use as a calibration or reference source, or for certain medical uses. (a) An application for a specific license to manufacture and distribute sources and devices containing radioactive material to persons licensed under K.A.R. 28-35-181d for use as a calibration or reference source or for one or more of the uses listed in Group VI of K.A.R. 28-35-199a shall not be approved unless the applicant submits the following information regarding each type of source or device:

(1) The radioactive material contained, its chemical and physical form, and amount;

(2) details of design and construction of the source or device;

(3) procedures for, and results of, prototype tests to demonstrate that the source or device will maintain its integrity under stresses likely to be encountered in normal use and in accidents;

(4) for devices containing radioactive material, the radiation profile for a prototype device;

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

(6) procedures and standards for calibrating sources and devices;

(7) legend and methods for labeling sources and devices as to their radioactive content;

(8) radiation safety instructions for handling and storing the source or device. These instructions shall be included on a durable label attached to the source or device. However, instructions which are too lengthy for the label may be summarized on the label and printed in detail on a brochure which is referenced on the label; and

(9) the label which is to be affixed to the source or device, or to the permanent storage container for the source or device. The label shall contain information on the radionuclide, quantity, and date of assay, and a statement that the source or device is licensed by the department for distribution to persons licensed under K.A.R. 28-35-181d or under an equivalent license of the U.S. nuclear regulatory commission or an agreement state. Labeling for sources which do not require long term storage may be on a leaflet or brochure which is to accompany the source.

(b)(1) If the applicant desires that the source or device is required to be tested for leakage of radioactive material at intervals longer than six months, the applicant shall include in the application sufficient information to demonstrate that the longer interval is justified by performance characteristics of the source or device, or similar sources or devices, and by design features that have a significant bearing on the probability or consequences of leakage of radioactive material from the source.

(2) In determining the acceptable interval between tests for leakage of radioactive material, the secretary shall consider information that includes:

(A) the nature of the primary containment (source capsule);

(B) the method for protection of the primary containment;
(C) the method of sealing the containment;
(D) containment construction materials;
(E) the form of the contained radioactive material;
(F) the maximum temperature withstood during prototype tests;
(G) the maximum pressure withstood during prototype tests;
(H) the maximum quantity of contained radioactive material;
(I) the radiotoxicity of contained radioactive material; and
(J) the applicant's operating experience with identical sources or devices or similarly designed and constructed sources or devices. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181p. Specific license to manufacture or distribute radioactive material for use by persons generally licensed under K.A.R. 28-35-178h. An application for a specific license to manufacture or distribute, or to manufacture and distribute, or to manufacture and distribute radioactive material for use by persons who generally licensed under K.A.R. 28-35-178h, shall not be approved unless the applicant meets the requirements of subsections (a), (b), (c), and (d) of this regulation.
(a) The radioactive material shall be prepared for distribution in prepackaged units of:
(1) iodine-125 in units not exceeding 10 microcuries each;
(2) iodine-131 in units not exceeding 10 microcuries each;
(3) carbon-14 in units not exceeding 10 microcuries each;
(4) hydrogen-3 (tritium) in units not exceeding 50 microcuries each;
(5) iron-59 in units not exceeding 20 microcuries each;
(6) selenium-75 in units not exceeding 10 microcuries each;
(7) mock iodine-125 in units not exceeding 0.05 microcuries of iodine-129 and 0.005 microcuries of americium-241; or
(8) cobalt-57 in units not exceeding 10 microcuries each.
(b) Each prepackaged unit shall bear a durable clearly visible label:
(1) identifying the radioactive contents as to chemical form and radionuclide, and indicating that the amount of radioactivity does not exceed:
(A)10 microcuries of iodine-125, iodine-131, carbon-14, cobalt-57, or selenium-75;
(B)50 microcuries of hydrogen-3 (tritium);
(C)20 microcuries of iron-59; or
(D)0.05 microcurie of iodine-129 and 0.005 microcurie of americium-241 each; and
(2) Displaying the radiation caution symbol described in K.A.R. 28-35-219a and the words, "CAUTION—RADIOACTIVE MATERIAL", and "not for internal or external use in humans or animals".
(c) The following statement, or a substantially similar statement, shall appear on a label affixed to each prepackaged unit, or in a leaflet or brochure to accompany the package:
"The radioactive material may be received, acquired, possessed, and used only by physicians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use, and transfer are subject to the regulations and a general license of the United States nuclear regulatory commission or of a state with which the commission has entered into an agreement for the exercise of regulatory authority.

_____
Name of Manufacturer"

(d) The label to be affixed to the unit, or a leaflet or brochure which is to accompany the package, shall contain information concerning the precautions to be observed in handling and storing the radioactive material and regarding the waste disposal requirements of K.A.R. 28-35-223a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181q. Special licenses concerning gas and aerosol detectors containing radioactive material other than by-product, source or special nuclear material. (a) An application for a specific license to

manufacture, process, produce or transfer gas and aerosol detectors which contain radioactive material other than source, by-product, or special nuclear material, and which are designed to protect life or property from fires and airborne hazards, shall not be approved unless the applicant submits the information required by the United States nuclear regulatory commission under 10 CFR sections 32.26 and 32.27, as in effect on March 31, 1983, for similar devices containing by-product material.

(b) Each person issued a license under subsection (a) of this regulation shall:

(1) develop and carry out adequate control procedures in the manufacture of the product to assure that each production lot meets quality control standards approved by the department;

(2) agree to label or mark each unit so that the manufacturer of the product and the radioactive material in the product can be identified and provide other information with each unit that may be required by the department, including disposal instruction when appropriate; and

(3) agree to file an annual report with the department, which shall include the following information on products imported for sale or distribution or transferred to other persons for use under K.A.R. 28-35-192a or an equivalent regulation of the United States nuclear regulatory commission or an agreement state:

(A) A description or identification of the type of each product imported or transferred;

(B) for each radionuclide in each type of product, the total quantity of the radionuclide imported or transferred; and

(C) the number of units of each type of product imported or transferred during the reporting period. If no imports or transfers of radioactive material have been made during a reporting period, the report shall so indicate.

(c) The report required by paragraph (3) of subsection (b) of this regulation shall cover the 12-month period commencing on July 1, and ending on June 30, and shall be filed by July 31 of each year. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181r. Special licenses to manufacture, process, import, distribute or transfer certain radioactive material to persons exempt from regulation pursuant to K.A.R. 28-35-192a. (a) An application for a specific license to manufacture, process, produce, import, package, repackage, or transfer quantities of radioactive material other than source, by-product, or special nuclear material for commercial distribution to persons exempt from these regulations pursuant to K.A.R. 28-35-192a or an equivalent regulation of the United States nuclear regulatory commission or an agreement state shall not be approved unless the applicant submits the information required in 10 CFR sections 32.18 and 32.19, as in effect on March 31, 1983.

(b) Each person licensed under subsection (a) of this regulation shall maintain records identifying, by name and address, each person to whom the licensee transfers radioactive material and stating the kinds and quantities of radioactive material transferred. An annual summary report stating the total quantity of each isotope transferred shall be filed with the department. Each report shall cover the 12-month period commencing on July 1 and ending June 30 and shall be filed by July 31 of each year. If no transfers of radioactive material have been made during a reporting period, the report shall indicate this fact. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181s. Specific licenses for well-logging. An application for a specific license for the use of licensed material in well logging shall not be approved unless all of the following conditions, in addition to all of the applicable requirements specified in these regulations, are met:

(a) The application shall include a description of the training program for logging supervisors and logging assistants which specifies the following:

(1) The content and method for initial training;

(2) On-the-job training;

(3) Annual safety reviews provided by the licensee;

(4) The means the applicant will use to demonstrate the logging supervisor's knowledge and understanding of and ability to comply with the Commission's regulations and licensing requirements and the applicant's operating and emergency procedures; and

(5) The means the applicant will use to demonstrate the logging assistant's knowledge and understanding of and ability to comply with the applicant's operating and emergency procedures.

(c) The application shall include written operating and emergency procedures as specified in K.A.R. 28-35-383 or an outline or summary of the procedures that includes the important radiation safety aspects of the procedures.

(d) The applicant shall include in the application the program for annual inspections of the job performance of each logging supervisor to ensure that the these regulations, license requirements, and the applicant's operating and emergency procedures are followed. Inspection records must be retained for 3 years after each annual internal inspection.

(e) The application shall include a description of the applicant's overall organizational structure as it applies to the radiation safety responsibilities in well logging, including specified delegations of authority and responsibility.

(f) If an applicant wants to perform leak testing of sealed sources, the application shall include the manufacturer's name and model numbers of the leak test kits to be used. If the applicant wants to analyze its own wipe samples, the application shall include the procedures to be followed The procedures shall include the following:

(1) The instruments to be used;

(2) The methods of performing the analysis; and

(3) The applicable experience of the person who will analyze the wipe samples. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-182a. Specific licenses of broad scope; types of specific licenses. (a) A "type A specific license of broad scope" is a specific license which is issued to a person who meets the requirements of K.A.R. 28-35-182b and which authorizes that person to acquire, own, possess, use and transfer radioactive material in a quantity not exceeding the quantity specified in the license.

(b)(1) A "type B specific license of broad scope" is a specific license issued to a person who meets the requirements of K.A.R. 28-35-182c and which authorizes that person to acquire, own, possess, use and transfer a specified amount of one or more of the radionuclides listed in K.A.R. 28-35-200a.

(2) If only one radionuclide is acquired, owned, possessed, used and transferred, the quantity allowed under a type B specific license of broad scope shall be the quantity specified in column I of K.A.R. 28-35-200a.

(2) If two or more radionuclides are acquired, owned, possessed, used and transferred, the quantity of all the radionuclides allowed shall be determined as follows:

(A) Determine the ratio of the quantity of each radionuclide to the quantity of that radionuclide specified in column I of K.A.R. 28-35-200a.

(B)Add the ratios.

(C)The sum of those ratios shall not exceed unity.

(c)(1) A "type C specific license of broad scope" is a specific license which is issued to a person who meets the requirements of K.A.R. 28-35-182d and which authorizes that person to acquire, own, possess, use and transfer a specified amount of one or more of the radionuclides listed in K.A.R. 28-35-200a.

(2) If only one radionuclide is acquired, owned, possessed, used and transferred, the quantity allowed under a type C specific license of broad scope shall be the quantity specified in column II of K.A.R. 28-35-200a.

(3) If two or more radionuclides are acquired, owned, possessed, used and transferred, the quantity of all radionuclides allowed shall be determined as follows:

(A) Determine the ratio of the quantity of each radionuclide to the quantity of that radionuclide specified in column II of K.A.R. 28-35-200a.

(B) Add the ratios.

(C) The sum of the ratios shall not exceed unity. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182b. Qualifications for a type A specific license of broad scope. A type A specific license of broad scope shall be issued only to an applicant who:

(a) has previously engaged in activities involving the use of radioactive materials. The applicant shall submit a summary of the previous activities that involved the use of radioactive materials; and

(b) has established administrative controls and provisions relating to organization and management,

procedures, record-keeping, material control and accounting, and management review to assure safe operations. These controls shall include:

(1) The establishment of a radiation safety committee composed of a radiation safety officer, a representative of management, and persons trained and experienced in the safe use of radioactive material;

(2) the appointment of a radiation safety officer who is qualified by training and experience in radiation protection, and who is available for advice and assistance on radiation safety matters; and

(3) the establishment of appropriate administrative procedures. These procedures shall assure that:

(A) the procurement and use of radioactive material is controlled;

(B)safety evaluations of proposed uses of radioactive material are completed. These evaluations shall take into consideration the adequacy of facilities and equipment, training and experience of the user, and proper operating or handling procedures; and

(C) prior to the use of the radioactive material, the safety evaluation of proposed uses, prepared in accordance with paragraph (3)(B) of this subsection, is reviewed, approved and recorded by the radiation safety committee. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182c. Qualifications for a type B specific license of broad scope. A type B specific license of broad scope shall be issued only to an applicant who has established controls and provisions relating to organization and management, procedures, record-keeping, material control and accounting, and management review that are sufficient to assure safe operation. These controls and provisions shall include:

(a) The appointment of a radiation safety officer who is qualified by training and experience in radiation protection, and who is available for advice and assistance on radiation safety matters, and

(b) the establishment of appropriate administrative procedures. These procedures shall assure that:

(1) the procurement and use of radioactive material is controlled;

(2) safety evaluations of proposed uses of radioactive material are completed. Such evaluations shall take into consideration the adequacy of facilities and equipment, training and experience of the user, and proper operating or handling procedures; and

(3) prior to use of the radioactive material, the safety evaluation of proposed uses, prepared in accordance with paragraph (b)(2) of this regulation, is reviewed, approved, and recorded by the radiation safety committee. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182d. Qualifications for a type C specific license of broad scope. A type C specific license of broad scope shall be issued only to an applicant who:

(a) submits a statement that radioactive material will only be used by, or under the direct supervision of, an individual or individuals who have:

(1) at least a bachelor's degree or equivalent training and experience in a physical or biological science or in engineering; and

(2) at least 40 hours of training and experience in the safe handling of radioactive materials, and in the characteristics of ionizing radiation, units of radiation dose and quantities, radiation detection instrumentation, and biological hazards of exposure to radiation. Such training and experience shall be appropriate to the type and forms of radioactive material to be used; and

(b) has established administrative controls and provisions relating to procurement of radioactive materials, procedures, record-keeping, material control and accounting, and management review to assure safe operations. These control provisions shall include appropriate administrative procedures which assure that:

(1) procurement and use of radioactive material is controlled; and

(2) safety evaluations of proposed uses of radioactive material are completed. Such evaluations shall take into consideration the adequacy of facilities and equipment and proper operating or handling procedures. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182e. Restrictions on specific licenses of broad scope. (a) Any person who has been issued any type of specific license of broad scope shall not:

(1) Conduct tracer studies in the environment involving direct release or radioactive material;

(2) receive, acquire, own, possess, use, or transfer devices containing 100,000 curies or more of radioactive material as sealed sources used for irradiation of materials;

(3) conduct activities for which a particular specific license is required; or

(4) add, or cause the addition of, radioactive material to any food, beverage, cosmetic, drug, or other product designed for ingestion or inhalation by, or application to, a human being.

(b) Any radionuclide or radionuclides possessed under a type A specific license of broad scope shall be only used by, or under the direct supervision of, a person or persons approved by a licensee's radiation safety committee.

(c) Any radionuclide or radionuclides possessed under a type B specific license of broad scope shall be only used by, or under the direct supervision of, a person or persons approved by a licensee's radiological safety officer.

(d) Any radionuclide or radionuclides possessed under a type C specific license of broad scope shall be used only by, or under the direct supervision of, a person or persons who meet the requirements of K.A.R. 28-35-182d(a). (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-183a. Conditions imposed upon any specific license. (a) Upon determining that an application meets the requirements of the act and these regulations, the secretary shall issue a specific license authorizing the activity proposed by the applicant and may impose any limitations or conditions to the specific license as the secretary deems appropriate or necessary.

(b) The secretary may incorporate in any license, at the time of its issuance or thereafter, any requirements and conditions with respect to the licensee's receipt, possession, use, or transfer of radioactive material as the secretary deems appropriate or necessary in order to:

(1) Protect health or to minimize danger to life and property;

(2) assure the proper reporting, record-keeping and inspection of activities by the licensee; and

(3) prevent loss or theft of material subject to these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-184a. Specific conditions on all licenses. (a) No license and no right under any license shall be assigned or otherwise transferred except as authorized under the act or these regulations.

(b) Each person authorized under these regulations shall confine the use and possession of the radioactive material licensed to the locations and purposes authorized in the license.

(c) No person shall introduce radioactive material into any product or material knowing or having reason to believe that the product or material will be transferred to a person exempt from these regulations under K.A.R. 28-35-192a, 28-35-192b, 28-35-192c, 28-35-192d, 28-35-192e, 28-35-192f, or 28-35-192g or the equivalent regulations of the United States nuclear regulatory commission or an agreement state, except in accordance with a specific license issued under K.A.R. 28-35-181f or the general license issued under K.A.R. 28-35-194a.

(d) Each licensee shall file written notice with the secretary 30 days before vacating any facility when the licensee decides to permanently discontinue all activities involving licensed materials authorized in that facility under the license.

(e) Each licensee authorized under K.A.R. 28-35-181h to distribute devices to generally licensed persons shall perform the following:

(1) Report to the department all sales or transfers of those devices to persons generally licensed under K.A.R. 28-35-178b. The report shall identify each general licensee by name and address, the type of device transferred, and the quantity and type of radioactive material contained in the device. A report shall be submitted within 90 days of the sale or transfer; and

(2) furnish, to each general licensee to whom the licensee transfers any such device, a copy of the general license issued under K.A.R. 28-35-178b.

(f)(1) Each general licensee that is required by this part to register and each specific licensee shall notify the department, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of title 11, bankruptcy, of the United States code by or against the following:

(A) The licensee;

(B) any person controlling the licensee or listing the license or licensee as property of the estate; or

(C) any affiliate of the licensee.

(2) The notification specified in paragraph (f)(1) shall indicate the following:

(A) The name of the bankruptcy court in which the petition for bankruptcy was filed; and

(B) the date of the filing of the petition. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-184b. Reporting requirements. (a) Immediate report. Each licensee shall notify the department as soon as possible but not later than four hours after the discovery of any of the following types of events:

(1) An event that prevents immediate protective actions necessary to avoid exposures to radiation or radioactive materials that could exceed regulatory limits; or

(2) an event involving a release of licensed material that could exceed regulatory limits.

(b) Twenty-four hour report. Each licensee shall notify the department within 24 hours after the discovery of any of the following events involving licensed material:

(1) An unplanned contamination event in which the following occurs:

(A) Access to the contaminated area, by workers or the public, is restricted for more than 24 hours by imposing additional radiological controls or by prohibiting entry into the area;

(B) the quantity of material involved is greater than five times the lowest annual limit on intake specified for the material in appendix B of the "Kansas department of health and environment appendices to part 4: standards for protection against radiation," effective April 1994; and

(C) access to the area is restricted for a reason other than to allow isotopes with a half-life of less than 24 hours to decay before decontamination;

(2) an event in which equipment is disabled or fails to function as designed when the following conditions are met:

(A) The equipment is required by regulation or license condition to prevent releases exceeding regulatory limits, to prevent exposures to radiation and radioactive materials exceeding regulatory limits, or to mitigate the consequences of an accident;

(B) the equipment is required to be available and operable at the time the equipment is disabled or fails to function; and

(C) no redundant equipment is available and operable to perform the required safety function;

(3) an event that requires unplanned medical treatment at a medical facility of an individual with spreadable radioactive contamination on the individual or the individual's clothing; and

(4) an unplanned fire or explosion damaging any licensed material or any device, container, or equipment containing licensed material when the following conditions are met:

(A) The quantity of material involved is greater than five times the lowest annual limit of intake specified for the material in appendix B of the " appendices to part 4: standards for protection against radiation," effective April 1994; and

(B) the damage affects the integrity of the licensed material or its container.

(c) Preparation and submission of reports. Each report made by a licensee submitting reports in response to the requirements of this regulation shall meet the following requirements:

(1) Each licensee shall submit the reports required by subsections (a) and (b) of this regulation by telephone to the Kansas department of health and environment, bureau of air and radiation, radiation control program. Each report shall include the following information, to extent it is available:

(A) The caller's name and a callback number;

(B) a description of the event, including the date and time;

(C) the exact location of the event;

(D) the isotopes, quantities, and chemical and physical forms of the licensed material involved; and

(E) any personnel radiation exposure data available.

(2) Each licensee submitting any report required by subsection (a) or (b) of this regulation shall submit a written follow-up report within 30 days of each initial report. A written report submitted pursuant to other requirements of these regulations shall be considered to fulfill this requirement if the report contains all of the information required by this paragraph. The report shall include the following:

(A) a description of the event, including the probable cause, and the name of the manufacturer and the model number, if applicable, of any equipment that failed or malfunctioned;

(B) A description of the exact location of the event;

(C) the isotopes, quantity, and chemical and physical form of the licensed material involved;

(D) the date and time of the event;

(E) a description of corrective actions taken or planned and the results of any evaluations or assessments; and

(F) a description of the extent to which individuals were exposed to radiation or to radioactive materials, without identifying any individuals by name. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996; amended December 30, 2005.)

28-35-185a. Expiration of licenses. (a) Except as provided in K.A.R. 28-35-186a(b), each specific license shall expire at end of the day, in the month and year stated on the license.

(b) With respect to the possession of radioactive material and residual radioactive contamination, each specific license shall continue in effect beyond the expiration date until the department has notified the licensee, in writing, that the license is terminated, even if any of the following occurs:

(1) The licensee decides not to renew the license.

(2) No application for license renewal is submitted.

(3) An application for renewal is denied.

(4) The department modifies or suspends a license.

(c) After the expiration date specified in the license, each licensee to whom this regulation applies who possesses radioactive material, including residual radioactive material, shall meet the following requirements:

(1) Limit the licensee's actions involving radioactive material to those related to decommissioning; and

(2) continue to control entry to restricted areas until the areas meet the requirements of K.A.R. 28-35-205 or K.A.R. 28-35-205a. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-186a. Renewal of licenses. (a) Each application for the renewal of a specific license shall be filed in accordance with K.A.R. 28-35-179a.

(b) When a licensee, not less than 30 days prior to the expiration of the licensee's existing license, has filed an application in proper form for renewal of the existing license, the existing license shall not expire until final action on the application has been made by the secretary. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-187a. Amendment of licenses at request of licensee. Each application for the amendment of an existing license shall be filed in accordance with K.A.R. 28-35-179a and shall specify the respects in which the licensee desires the license to be amended and the grounds for the amendment. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-188a. Department action on application to renew or amend. In considering whether to grant or deny an application to renew an existing license, the secretary shall apply the criteria which are applied to determine whether an initial license should be granted or denied. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-189a. Advance notification of transport of nuclear waste. (a) Prior to the transport of any nuclear waste outside the confines of the licensee's facility or any other place of use or storage, or prior to the delivery of any nuclear waste to a carrier for transport, each licensee shall provide advance notification of such transport to the governor, or the governor's designee, of each state through which the waste will be transported. For the purpose of this regulation, "nuclear waste" means any large quantity of source, by-product, or special nuclear material required to be in type B packaging while transported to, through, or across state boundaries to a disposal site, or to a collection point for transport to a disposal site.

(b) Each advance notification required by this regulation shall contain the following information:

(1) the name, address, and telephone number of the shipper, carrier and receiver of the shipment;

(2) a description of the nuclear waste contained in the shipment as required by regulation of the U.S.

department of transportation 49 CFR 172.202 and 172.203(d), as in effect July 1, 1984;

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

(4) the seven day period during which arrival of the shipment at state boundaries is estimated to occur;

(5) the destination of the shipment, and the seven day period during which arrival of the shipment is estimated to occur; and

(6) a point of contact with a telephone number for current shipment information.

(c) The notification required by this regulation shall be made in writing to the office of each appropriate governor or the governor's designee and to the Kansas department of health and environment. A notification delivered by mail shall be postmarked at least seven days before the beginning of the seven day period during which departure of the shipment is estimated to occur. A notification delivered by messenger shall reach the office of each governor, or the governor's designee, at least four days before the beginning of the seven day period during which departure of the shipment is estimated to occur. A copy of the notification shall be retained by the licensee for one year.

(d) The licensee shall notify each appropriate governor, or the governor's designee, and the Kansas department of health and environment of any changes to the schedule information provided pursuant to this regulation. Such notification shall be by telephone to a responsible individual in the office of each appropriate governor, or to the governor's designee. The licensee shall maintain for one year a record of the name of the individual contracted.

(e) Each licensee who cancels a nuclear waste shipment for which advance notification has been sent shall send a cancellation notice to the governor, or the governor's designee, of each appropriate state and to the Kansas department of health and environment. A copy of the notice shall be retained by the licensee for one year.

(f) A list of the mailing addresses of each governor and each designee is available upon request from the director, office of state programs, U.S. nuclear regulatory commission, Washington, D.C. 20555. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-190a. Transfer of material. (a) A licensee shall not transfer radioactive material except as authorized in regulation.

(b) Any licensee may transfer radioactive material, subject to the acceptance of the transferee:

(1) To the department;

(2) to the United States nuclear regulatory commission or its successor;

(3) to any person exempt from these regulations under K.A.R. 28-35-192a, 28-35-192b, 28-35-192c, 28-35-192d, 28-35-192e, 28-35-192f and 28-35-192g, as permitted under those regulations;

(4) to any person authorized to receive the material under an appropriate general or specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state, or to any person otherwise authorized to receive the material by the federal government or any agency thereof, the secretary or an agreement state, or

(5) as otherwise authorized in writing by the secretary; or

(6) to the U.S. department of energy.

(c) Before transferring radioactive material to a specific licensee or to a general licensee who is required to register with the department, the United States nuclear regulatory commission, or an agreement state, the licensee transferring the material shall verify that the transferee's license authorizes receipt of the type, form, and quantity of radioactive material to be transferred.

(d) The following methods for the verification required by subsection (c) shall be acceptable.

(1) The transferor may obtain, and read, a current copy of the transferee's specific license or registration certificate.

(2) The transferor may obtain a written certification by the transferee that the transferee is authorized by license or registration certificate to receive the type, form, and quantity of radioactive material to be transferred, specifying the license or registration certificate number, issuing agency, and expiration date;

(3) For emergency shipments, the transferor may accept oral certification by the transferee that the transferee is authorized by license or registration certificate to receive the type, form, and quantity of radioactive material to be transferred. The oral certification shall include the license or registration certificate number, the issuing agency, and expiration date. The oral certification shall be confirmed in writing within 10 days following the oral certification.

(4) The transferor may obtain other sources of information compiled by a reporting service from official records of the department, United States nuclear regulatory commission, or an agreement state as to the identity of licensees and the scope and expiration dates of licenses and registration.

(5) When none of the methods of verification described in paragraphs (1) to (4) are readily available, or when a transferor desires to verify that information received by one of those methods is correct or up-to-date, the transferor may obtain and record confirmation, from the department, the United States nuclear regulatory commission or an agreement state, that the transferee is licensed to receive the radioactive material.

(e) The radioactive material shall be prepared for shipment and transport in accordance with K.A.R. 28-35-196a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-191a. Modification, revocation, and termination of licenses. (a) Any license may be suspended or revoked by reason of amendment to the act or these regulations or by an order of the secretary.

(b) Any license may be revoked, suspended, or modified, in whole or in part:

(1) For any material false statement in the application or any statement of fact required under provision of the act or these regulations;

(2) because of any condition, revealed by the application, or any statement of fact, or any report, record, or inspection or other means, which would warrant the denial of an original application; or

(3) for violation of, or failure to observe, any of the terms and conditions of the license, or any requirement of the act, or any rule and regulation or order of the secretary.

(c) Except in cases in which the public health, interest, or safety requires otherwise, no license shall be modified, suspended, or revoked unless, prior to the institution of such proceedings:

(1) those facts or conduct which appear to warrant such action have been called to the attention of the licensee in writing; and

(2) the licensee has been accorded an opportunity to demonstrate or achieve compliance with all lawful requirements.

(d) The secretary may revoke a specific license upon written request of a licensee. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192a. Exemptions; source material. (a) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses or transfers source material in any chemical mixture, compound, solution, or alloy in which the source material, by weight, is less than 0.05 percent of the mixture, compound, solution, or alloy.

(b) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses or transfers unrefined and unprocessed ore containing source material and does not refine or process the ore.

(c) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers:

(1) Any quantities of thorium contained in:

(A) Incandescent gas mantles;

(B) vacuum tubes;

(C) welding rods;

(D) electric lamps for illuminating purposes, if each lamp does not contain more than 50 milligrams of thorium;

(E) lamps, sunlamps, and lamps for outdoor or industrial lighting, if each lamp does not contain more than 0.25 percent thorium or uranium, or both, by weight; or

(F) rare earth metals and compounds, mixtures, and products containing not more than 0.25 percent thorium or uranium, or both, by weight; or

(G) personnel neutron dosimeters, if each dosimeter does not contain more than 50 milligrams of thorium;

(2) Source material contained in:

(A) Glazed ceramic tableware, if the glaze contains not more than 20 percent source material, by weight;

(B)glassware, containing not more than 10 percent source material by weight. This exemption shall not include commercially manufactured glass brick, pane glass, ceramic tile or other glass, or ceramic used in construction; and

(C) glass enamel or glass enamel frit that contains not more than 10 percent source material, by weight, and that was imported or ordered for importation into the United States, or initially distributed by manufacturers in the United States, before July 25, 1983; or

(D) piezoelectric ceramic containing not more than two percent source material by weight;

(3) photographic film, negatives, and prints containing uranium or thorium;

(4) any finished product or part of a product fabricated of, or containing, tungsten or magnesium-thorium alloys if the thorium content of the alloy does not exceed four percent, by weight. The exemption contained in this paragraph shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of any product or part of a product;

(5) uranium contained in counterweights installed in aircraft, rockets, projectiles or missiles or stored or handled in connection with installation or removal of these counterweights when:

(A) the counterweights are manufactured in accordance with the specifications contained in a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state, and when distribution by the licensee is authorized pursuant to this paragraph or an equivalent provision of the regulations of the United States nuclear regulatory commission or an agreement state;

(B) each counterweight has been impressed in a manner that is clearly legible through any plating or covering with the following legend: "DEPLETED URANIUM"; and

(C) each counterweight is durably and legibly labeled or marked with the identification of the manufacturer, and the statement: "UNAUTHORIZED ALTERATIONS PROHIBITED". The exemption contained in this paragraph shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of any counterweights, other than repair or restoration of any plating or other covering;

(6) uranium used as shielding and constituting part of any shipping container. The uranium shielding shall be conspicuously and legible impressed with the legend "CAUTION--RADIOACTIVE SHIELDING--URANIUM" and shall be enclosed in mild steel, or another equally fire resistant metal, with a minimum wall thickness of one-eighth inch (3.2 mm);

(7) thorium contained in finished optical lenses, if each lens does not contain more than 30 percent of thorium by weight. The exemption contained in this paragraph shall not be deemed to authorize either:

(A) The shaping, grinding, or polishing of the lens or any manufacturing processes other than the assembly of the lens into optical systems and devices without any alteration of the lens; or

(B) the receipt, possession, use or transfer of thorium contained in contact lenses, or in spectacles, or in eyepieces in binoculars or other optical instruments;

(8) uranium contained in detector heads for use in fire detection units, if each detector head contains not more than 0.005 microcurie of uranium; and

(9) thorium contained in any finished aircraft engine part containing nickel-thoria alloy, if:

(A) The thorium is dispersed in the nickel-thoria alloy in the form of finely divided thoria (thorium dioxide); and

(B) the thorium content in the nickel-thoria alloy does not exceed four percent by weight.

(d) The exemptions provided in this regulation shall not authorize the manufacture, processing or production of any of the products described in this regulation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192b. Exemptions; exempt concentrations of radioactive materials. (a) Except as provided in K.A.R. 28-35-184a(e), any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers products or materials containing radioactive material in concentrations not exceeding those specified in K.A.R. 28-35-198a.

(b) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers products containing naturally occurring radionuclides of elements with an atomic number less than 82, in isotopic concentrations not in excess of those which occur naturally.

(c) No person shall introduce radioactive material into a product or material knowing, or having reason to believe, that it will be transferred to a person exempt from these regulations under subsection (a) or under an equivalent regulation of the U.S. nuclear regulatory commission or an agreement state, except in accordance with a specific license issued under K.A.R. 28-35-181e or the general license issued in K.A.R. 28-35-194a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192c. Exceptions; other radioactive material. Except for persons who apply tritium, promethium-147 or radium to, or persons who incorporate tritium, promethium-147 or radium into, the products listed in this regulation, any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers the products listed in this subsection:

(a) Timepieces or hands or dials containing radium, or timepieces, hands or dials containing not more than the following specified quantities of other radioactive materials:

(1) 25 millicuries of tritium per timepiece;

(2) 5 millicuries of tritium per hand;

(3) 15 millicuries of tritium per dial. Bezels, when used, shall be considered as part of the dial;

(4) 100 microcuries of promethium-147 per watch or 200 microcuries of promethium-147 per any other timepiece;

(5) 20 microcuries of promethium-147 per watch hand or 40 microcuries of promethium-147 per hand on other timepieces; and

(6) 60 microcuries of promethium-147 per watch dial or 120 microcuries of promethium-147 per dial on other time pieces. Bezels, when used, shall be considered as part of the dial. The levels of radiation from hands and dials containing promethium-147 shall not exceed, when measured through 50 milligrams per square centimeter of absorber:

(A) For wrist watches, 0.1 millirad per hour at 10 centimeters from any surface;

(B) for pocket watches, 0.1 millirad per hour at one centimeter from any surface; and

(C) for any other timepiece, 0.2 millirad per hour at 10 centimeters from any surface;

(b) lock illuminators containing not more than 15 millicures of tritium or not more than two millicuries of promethium-147 installed in automobile locks. The level of radiation from each lock illuminator containing promethium-147 shall not exceed one millirad per hour at one centimeter from any surface when measured through 50 milligrams per square centimeter of absorber;

(c) balances of precision containing not more than one millicurie of tritium per balance or not more than 0.5 millicurie of tritium per balance part;

(d) automobile shift quadrants containing not more than 25 millicuries of tritium.

(e) marine compasses containing not more than 750 millicuries of tritium gas and other marine navigational instruments containing not more than 250 millicuries of tritium gas;

(f) thermostat dials and pointers containing not more than 25 millicuries of tritium per thermostat;

(g) electron tubes, if each tube does not contain more than one of the following specified quantities of radioactive material:

(1) 150 millicuries of tritium per microwave receiver protector tube or 10 millicuries of tritium per any other electron tube;

(2) 1 microcurie cobalt-60;

(3) 5 microcurie nickel-63;

(4) 30 microcurie krypton-85;

(5) 5 microcurie cesium-137; or

(6) 30 microcuries promethium-147. The levels of radiation from each electron tube containing radioactive material shall not exceed one millirad per hour at one centimeter from any surface when measured through seven milligrams per square centimeter of absorber. For purposes of this paragraph, "electron tubes" include spark gap tubes, power tubes, gas tubes, gas tubes including glow lamps, receiving tubes, microwave tubes, indicator tubes, pickup tubes, radiation detection tubes and any other completely

sealed tube that is designed to conduct or control electrical currents.

(h) ionizing radiation measuring instruments containing, for purposes, of internal calibration or standardization, sources or radioactive material. No source shall exceed the applicable quantity set forth in K.A.R. 28-35-197a. No single instrument shall contain more than 10 sources. For the purposes of this paragraph, 0.05 uCi of Am-241 shall be considered an exempt quantity; and

(i) spark gap irradiators containing not more than 1 microcurie of cobalt-60 per spark gap irradiator for use in electrically ignited fuel oil burners having a firing rate of at least three gallon (11.4 liters) per hour. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 2, 1986.)

28-35-192d. Exceptions; resins containing scandium-46 and designed for sand consolidation in oil wells. Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers synthetic plastic resins containing scandium-46 which are designed for sand consolidation in oil wells. These resins shall have been manufactured or imported in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission, or an agreement state. This exemption shall not authorize the manufacture of any resins containing scandium-46. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192e. Exemptions; gas and aerosol detectors containing radioactive material. (a) Except for persons who manufacture, process, or produce gas and aerosol detectors containing radioactive material or who import these products, any person shall be exempt from these regulations to the extent the person acquires, possesses, uses or transfers radioactive material in gas and aerosol detectors designed to protect life or property from fires and airborne hazards. Each detector shall have been manufactured, processed, produced, imported, or transferred in accordance with a specific license issued by the secretary pursuant to K.A.R. 28-35-181q or a license issued by the United States nuclear regulatory commission, or an agreement state pursuant to an equivalent regulation of the U.S. nuclear regulatory commission or an agreement state.

(b) Gas and aerosol detectors previously manufactured and distributed to general licensees in accordance with a specific license issued by an agreement state shall be exempt under subsection (a) if the device is labeled in accordance with the specific license authorizing distribution of the general licensed device, and if the detectors meet the requirements of K.A.R. 28-35-181(r). (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192f. Exemptions; self-luminous products containing tritium, krypton-85 or promethium-147. (a) Except for persons who manufacture, process, or produce self-luminous products containing tritium, krypton-85, or promethium-147 and except as provided in subsection, (b) any person shall be exempt from these regulations to the extent that person acquires, possesses, uses, or transfers, tritium, krypton-85, or promethium-147 in self-luminous products manufactured, processed, produced, imported, or transferred in accordance with a specific license issued by the United States nuclear regulatory commission pursuant to Section 32.22 of Title 10 CFR 31, which authorizes the transfer of the product to persons who are exempt from regulatory requirements.

(b) The exemption in subsection (a) shall not apply to tritium, krypton-85, or promethium-147 used in toys, adornments, or similar items. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192g. Exemptions; exempt quantities. (a) Except as provided in subsections (c) and (d), any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers radioactive material in individual quantities which do not exceed the applicable quantity specified in K.A.R. 28-35-197a.

(b) Any person who possesses radioactive material received or acquired prior to January 1, 1972 under the general license then provided in K.A.R. 28-35-178(A) shall be exempt from these regulations to the extent the person possesses, uses, or transfers that radioactive material. This exemption does not apply to radium-226.

(c) This regulation shall not authorize the production, packaging or repackaging of radioactive material for purposes of commercial distribution, or the incorporation of radioactive material into products

intended for commercial distribution.

(d) No person shall, for purposes of commercial distribution, transfer radioactive material in the individual quantities specified in K.A.R. 28-35-197a knowing, or having reason to believe, that those quantities of radioactive material will be transferred to a person exempt from these regulations under this regulation or an equivalent regulation of the U.S. nuclear regulatory commission, or an agreement state, except in accordance with a specific license issued by the secretary under K.A.R. 28-35-181r, an equivalent regulation of the United States nuclear regulatory commission, or an agreement state. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-193a. Pre-licensing inspections. The department may request verification of information provided in any application or request additional information that is necessary to make a determination as to whether a license should be granted or denied and whether any special conditions should be attached to the license. This information may be obtained by visiting the facility or location where radioactive materials would be possessed or used, and by discussing details of proposed possession or use of the radioactive material with the applicant or the applicant's designated representatives. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-193b. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996; revoked December 30, 2005.)

28-35-194a. Reciprocal recognition of licenses. (a)(1) Subject to other provisions in this regulation, any person who possesses a specific license issued by the United States nuclear regulatory commission or an agreement state, other than this state, is issued a general license to conduct the activities authorized in the specific license within this state without obtaining a specific license from the secretary, if:

(A) The specific license does not limit the activity authorized to a specified installation or location; and

(B) the person notifies the department in writing at least five days prior to engaging in the activity. The notification shall indicate the location, period, and type of proposed possession and use within the state, and shall be accompanied by a copy of the specific license. If, for a specific case, the five day period would impose an undue hardship, the person may, upon application to the department, obtain permission by the letter or telegram to proceed;

(C) the person complies with all applicable regulations of the secretary and with all the terms and conditions of the specific license, except any term or condition of the license which is inconsistent with these regulations;

(D) the person supplies any information requested by the department; and

(E) the person does not transfer or dispose of radioactive material possessed or used under the general license provided in this regulation except by transfer to a person;

(i) specifically licensed by the department or the United States nuclear regulatory commission to receive the material; or

(ii) who is exempt from the requirements for a license for that material under K.A.R. 28-35-192a, 28-35-192b, 28-35-192c, 18-35-192d, 28-35-192e, 28-35-192f, or 28-35-192g.

(b) Any person who holds a specific license issued by the U.S. nuclear regulatory commission, or an agreement state which authorizes the person to manufacture, transfer, install, or service a device described in K.A.R. 28-35-178b within areas subject to the jurisdiction of the licensing body is issued a general license to manufacture, install, transfer, or service those devices in this state subject to the following conditions.

(1) The person shall satisfy the requirements of K.A.R. 28-35-184a(e)(1) and (2).

(2) The device shall be manufactured, labeled, installed, and serviced in accordance with the provisions of the specific license issued to the person by the United States nuclear regulatory commission or the agreement state.

(3) The person shall assure that any labels required to be affixed to the device, under regulations of the authority which licensed the manufacture of the device, and which bear the statement "Removal of this label is prohibited", are affixed to the device.

(4) The person shall furnish to each general licensee to whom the person transfers the device, or

on whose premises the person installs the device, a copy of the general license issued in K.A.R. 28-35-178b.

(c) The secretary may withdraw, limit, or qualify acceptance of any specific license recognized under this regulation, or any product distributed pursuant to such a license, upon determining that the action is necessary in order to protect health or minimize danger to life or property. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-195a. Intrastate transportation of radioactive materials. (a) Each common or contract carrier shall be deemed to have been issued a general license to transport and store radioactive material in the regular course of its carriage for another, if the transportation and storage are performed in accordance with the regulations of the U.S. department of transportation. Each person who transports and stores radioactive material pursuant to the general license specified in this subsection shall be exempt from the requirements of parts 4 and 10 of these regulations.

(b) Each private carrier shall be deemed to have been issued a general license to transport radioactive material, if the transportation is performed in accordance with the regulations of the U.S. department of transportation. Each person who transports radioactive material under the general license issued in this subsection shall be exempt from the requirements of parts 4 and 10 of these regulations.

(c) Each physician shall be exempt from the requirements of subsection (b) of this regulation to the extent that the physician transports radioactive material for use in the practice of medicine. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended December 30, 2005.)

28-35-196a. Preparation of radioactive material for transport. (a) A licensee shall not deliver any radioactive material to a carrier for transport, or transport radioactive material as a private carrier, unless:

(1) The licensee complies with the applicable requirements of the regulations of the U.S. department of transportation that are appropriate to the mode of transport and that are related to the packing of radioactive material, and to the monitoring, marking and labeling of those packages;

(2) the licensee has established procedures for opening and closing packages in which radioactive material is transported to provide safety and assure that, prior to the delivery to a carrier for transport; and

(3) prior to delivery of a package to a carrier for transport, the licensee has assured that any special instructions needed to safely open the package are sent to, or are available to, the consignee.

(b) The requirements in subsection (a) of this regulation shall not apply to the transportation of licensed material, or to the delivery of licensed material to a carrier for transport, when the transportation is subject to regulations of the U.S. postal service. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-196b. Transportation of radioactive material. (a) No person shall deliver radioactive material to a carrier for transport or transport radioactive material except as authorized in a general or specific license issued by the department unless:

(1) That person's activities are exempted from licensure by Section 28-35-140(b) of these regulations;

(2) each of the packages delivered to a carrier for transport or transported contains radioactive materials bearing a specific activity of less than, or equal to, 0.002 microcurie (74 Bq) per gram; or

(3) the packages delivered to a carrier for transport are subject to the regulations of the U.S. postal service. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-197a. Schedule B; Exempt quantities of radioactive material.

Radioactive Material	Microcuries
Antimony 122 (Sb 122)	100
Antimony 124 (Sb 122)	10
Antimony 125 (Sb 125)	10

Arsenic 73 (As 73)	**100**
Arsenic 74 (As 74)	**10**
Arsenic 76 (As 76)	**10**
Arsenic 77 (As 77)	**100**
Barium 131 (Ba 131)	**10**
Barium 133 (Ba 133)	**10**
Barium 140 (Ba 140)	**10**
Bismuth 210 (Bi 210)	**1**
Bromine 82 (Br 82)	**10**
Cadmium 109 (Cd 109)	**10**
Cadmium 115m (Cd 115m)	**10**
Cadmium 115 (Cd 115)	**100**
Calcium 45 (Ca 45)	**10**
Calcium 47 (Ca 47)	**10**
Carbon 14 (C 14)	**100**
Cerium (Ce 141)	**100**
Cerium 143 (Ce 143)	**100**
Cerium 144 (Ce 144)	**1**
Cesium 129 (Cs 129)	**100**
Cesium 131 (Cs 131)	**1,000**
Cesium 134m (Cs 134m)	**100**
Cesium 134 (Cs 134)	**1**
Cesium 135 (Cs 135)	**10**
Cesium 136 (Cs 136)	**10**
Cesium 137 (Cs 137)	**10**
Chlorine 36 (Cl 36)	**10**
Chlorine 38 (Cl 38)	**10**
Chromium 51 (Cr 51)	**1,000**
Cobalt 57 (Co 57)	**100**
Cobalt 58m (Co 58m)	**10**
Cobalt 58 (Co 58)	**10**
Cobalt 60 (Co 60)	**1**
Copper 64 (Cu 64)	**100**
Dysprosium 165 (Dy 165)	**10**
Dysprosium 166 (Dy 166)	**100**
Erbium 169 (Er 169)	**100**
Erbium 171 (Er 171)	**100**
Europium 152 9.2 h (Eu 152 9.2 h)	**100**
Europium 152 13 yr (Eu 152 13 yr)	**1**
Europium 154 (Eu 154)	**1**
Europium 155 (Eu 155)	**10**
Fluorine 18 (F 18)	**1,000**
Gadolinium 153 (Gd 153)	**10**
Gadolinium 159 (Gd 159)	**100**
Gallium 67 (Ga 67)	**100**
Gallium 72 (Ga 72)	**10**
Germanium 71 (Ge 71)	**100**
Gold 198 (Au 198)	**100**
Gold 199 (Au 199)	**100**
Hafnium 181 (Hf 181)	**10**
Holmium 166 (Ho 166)	**100**
Hydrogen 3 (H 3)	**1,000**

Indium 111 (In 111)	**100**
Indium 113m (In 133m)	**100**
Indium 114m (In 114m)	**10**
Indium 115m (In 115m)	**100**
Indium 115 (In 115)	**10**
Iodine 123 (I 123)	**100**
Iodine 125 (I 125)	**1**
Iodine 126 (I 126)	**1**
Iodine 129 (I 129)	**0.1**
Iodine 131 (I 131)	**1**
Iodine 132 (I 132)	**10**
Iodine 133 (I 133)	**1**
Iodine 134 (I 134)	**10**
Iodine 135 (I 135)	**10**
Iridium 192 (Ir 192)	**10**
Iridium 194 (Ir 194)	**100**
Iron 52 (Fe 52)	**10**
Iron 55 (Fe 55)	**100**
Iron 59 (Fe 59)	**10**
Krypton 85 (Kr 85)	**100**
Krypton 87 (Kr 87)	**10**
Lanthanum 140 (La 140)	**10**
Lutetium 177 (Lu 177)	**100**
Manganese 52 (Mn 52)	**10**
Manganese 54 (Mn 54)	**10**
Manganese 56 (Mn 56)	**10**
Mercury 197m (Hg 197m)	**100**
Mercury 197 (Hg 197)	**100**
Mercury 203 (Hg 203)	**10**
Molybdenum 99 (Mo 99)	**100**
Neodymium 147 (Nd 147)	**100**
Neodymium 149 (Nd 149)	**100**
Nickel 59 (Ni 59)	**100**
Nickel 63 (Ni 63)	**10**
Nickel 65 (Ni 65)	**100**
Niobium 93m (Nb 93m)	**10**
Niobium 95 (Nb 95)	**10**
Niobium 97 (Nb 97)	**10**
Osmium 185 (Os 185)	**10**
Osmium 191m (Os 191m)	**100**
Osmium 191 (Os 191)	**100**
Osmium 193 (Os 193)	**100**
Palladium 103 (Pd 103)	**100**
Palladium 109 (Pd 109)	**100**
Phosphorous 32 (P 32)	**10**
Platinum 191 (Pt 191)	**100**
Platinum 193m (Pt 193m)	**100**
Platinum 193 (Pt 193)	**100**
Platinum 197m (Pt 197m)	**100**
Platinum 197 (Pt 197)	**100**
Polonium 210 (Po 210)	**0.1**
Potassium 42 (K 42)	**10**

Potassium 43 (K 43)	**10**
Praseodymium 142 (Pr 142)	**100**
Praseodymium 143 (Pr 143)	**100**
Promethium 147 (Pm 147)	**10**
Promethium 149 (Pm 149)	**10**
Rhenium 186 (Re 186)	**100**
Rhenium 188 (Re 188)	**100**
Rhodium 103m (Rh 103m)	**100**
Rhodium 105 (Rh 105)	**100**
Rubidium 81 (Rb 81)	**10**
Rubidium 86 (Rb 86)	**10**
Rubidium 87 (Rb 87)	**10**
Ruthenium 97 (Ru 97)	**100**
Ruthenium 103 (Ru 103)	**10**
Ruthenium 105 (Ru 105)	**10**
Ruthenium 106 (Ru 106)	**1**
Samarium 151 (Sm 151)	**10**
Samarium 153 (Sm 153)	**100**
Scandium 46 (Sc 46)	**10**
Scandium 47 (Sc 47)	**100**
Scandium 48 (Sc 48)	**10**
Selenium 75 (Se 75)	**10**
Silicon 31 (Si 31)	**100**
Silver 105 (Ag 105)	**10**
Silver 110m (Ag 110m)	**1**
Silver 111 (Ag 111)	**100**
Sodium 22 (Na 22)	**10**
Sodium 24 (Na 24)	**10**
Strontium 85 (Sr 85)	**10**
Strontium 89 (Sr 89)	**1**
Strontium 90 (Sr 90)	**0.1**
Strontium 91 (Sr 91)	**10**
Strontium 92 (Sr 92)	**10**
Sulphur 35 (S 35)	**100**
Tantalum 182 (Ta 182)	**10**
Technetium 96 (Tc 96)	**10**
Technetium 97m (Tc 97m)	**100**
Technetium 97 (Tc 97)	**100**
Technetium 99m (Tc 99m)	**100**
Technetium 99 (Tc 99)	**10**
Tellurium 125m (Te 125m)	**10**
Tellurium 127m (Te 127m)	**10**
Tellurium 127 (Te 127)	**100**
Tellurium 129m (Te 129m)	**10**
Tellurium 129 (Te 129)	**100**
Tellurium 131m (Te 131m)	**10**
Tellurium 132 (Te 132)	**10**
Terbium 160 (Tb 160)	**10**
Thallium 200 (Ti 200)	**100**
Thallium 201 (Ti 201)	**100**
Thallium 202 (Ti 202)	**100**
Thallium 204 (Ti 204)	**10**

Thulium 170 (Tm 170)	**10**
Thulium 171 (Tm 171)	**10**
Tin 113 (Sn 113)	**10**
Tin 125 (Sn 125)	**10**
Yttrium 93 (Y 93)	**100**
Zinc 65 (Zn 65)	**10**
Zinc 69m (Zn 69m)	**100**
Zinc 69 (Zn 69)	**1,000**
Zirconium 93 (Zr 93)	**10**
Zirconium 95 (Zr 95)	**10**
Zirconium 97 (Zr 97)	**10**

Any radioactive material not listed above other than alpha-emitting radioactive material 0.1
(Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-198a. Schedule C; Exempt concentrations

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

	Co 58		**$1X10^{-3}$**
	Co 60		**$5X10^{-4}$**
Copper (29)	**Cu 64**		**$3X10^{-3}$**
Dysprosium (66)	**Dy 165**		**$4X10^{-3}$**
	Dy 166		**$4X10^{-4}$**
Erbium (68)	**Er 169**		**$9X10^{-4}$**
	Er 171		**$1X10^{-3}$**
Europium (63) (T/2=9.2 Hrs)	**Eu 152**		**$6X10^{-4}$**
	Eu 155		**$2X10^{-3}$**
Fluorine (9)	**F 18**	**$2X10^{-6}$**	**$8X10^{-3}$**
Gadolinium (64)	**Gd 153**	**$2X10^{-3}$**	
	Gd 159		**$8X10^{-4}$**
Gallium (31)	**Ga 72**	**$4X10^{-4}$**	
Germanium (32)	**Ge 71**	**$2X10^{-2}$**	
Gold (79)	**Au 196**	**$2X10^{-3}$**	
	Au 198	**$5X10^{-4}$**	
	Au 199	**$2X10^{-3}$**	
Hafnium (72)	**Hf 181**		**$7X10^{-4}$**
Hydrogen (1)	**H 3**	**$5X10^{-6}$**	**$3X10^{-2}$**
Indium (49)	**In 113m**		**$1X10^{-2}$**
	In 114m		**$2X10^{-4}$**
Iodine (53)	**I 126**	**$3X10^{-9}$**	**$2X10^{-5}$**
	I 131	**$3X10^{-9}$**	**$2X10^{-5}$**
	I 132	**$8X10^{-8}$**	**$6X10^{-4}$**
	I 133	**$1X10^{-8}$**	**$7X10^{-5}$**
	I 134	**$2X10^{-7}$**	**$1X10^{-3}$**
Iridium	**Ir 190**		**$2X10^{-3}$**
	Ir 192	**$4X10^{-4}$**	
	Ir 194	**$3X10^{-4}$**	
Iron (26)	**Fe 55**	**$8X10^{-3}$**	
	Fe 59		**$6X10^{-4}$**
Krypton	**Kr 85m**	**$1X10^{-6}$**	
	Kr 85	**$3X10^{-6}$**	
Lanthanum (57)	**La 140**		**$2X10^{-4}$**
Lead (82)	**Pb 203**	**$4X10^{-3}$**	
Lutetium (71)	**Lu 177**	**$1X10^{-3}$**	
Manganese (25)	**Mn 52**	**$3X10^{-4}$**	
	Mn 54	**$1X10^{-3}$**	
	Mn 56	**$1X10^{-3}$**	
Mercury (80)	**Hg 197m**	**$2X10^{-3}$**	
	Hg 197	**$3X10^{-3}$**	
	Hg 203	**$2X10^{-4}$**	
Molybdenum (42)	**Mo 99**	**$2X10^{-3}$**	
Neodymium (60	**Nd 147**	**$6X10^{-4}$**	
	Nd 149	**$2X10^{-3}$**	
Nickel (28)	**Ni 65**	**$1X10^{-3}$**	
Niobium (Columbium) (41)	**Nb 95**	**$1X10^{-3}$**	
	Nb 97	**$9X10^{-3}$**	
Osmium (76)	**Os 185**	**$7X10^{-4}$**	
	Os 191m	**$3X10^{-2}$**	
	Os 191	**$2X10^{-3}$**	
	Os 193	**$6X10^{-4}$**	

Palladium (46)	**Pd 103**	**$3x10^{-3}$**	
	Pd 109	**$9x10^{-4}$**	
Phosphorus (15)	**P 32**		**$2X10^{-4}$**
Platinum (78)	**Pt 191**	**$1X10^{-3}$**	
	Pt 193m	**$1X10^{-2}$**	
	Pt 197m	**$1X10^{-2}$**	
	Pt 197	**$1X10^{-3}$**	
Polonium (84)	**Po 210**		**$7X10^{-6}$**
Potassium (19)	**K 42**		**$3X10^{-3}$**
Praseodymium (59)	**Pr 142**		**$3X10^{-4}$**
	Pr 143		**$5X10^{-4}$**
Promethium (61)	**Pm 147**		**$2X10^{-3}$**
	Pm 149		**$4X10^{-4}$**
Radium (88)	**Ra 226**		**$1X10^{-7}$**
	Ra 228	**$3X10^{-7}$**	
Rhenium (75)	**Re 183**		**$6X10^{-3}$**
	Re 186		**$9X10^{-4}$**
	Re 188		**$6X10^{-4}$**
Rhodium (45)	**Rh 103m**		**$1X10^{-1}$**
	Rh 105		**$1X10^{-3}$**
Rubidium (37)	**Rb 86**		**$7X10^{-4}$**
Ruthenium (44)	**Ru 97**		**$4X10^{-3}$**
	Ru 103		**$8X10^{-4}$**
	Ru 105		**$1X10^{-3}$**
	Ru 106		**$1X10^{-4}$**
Samarium (62)	**Sm 153**		**$8X10^{-4}$**
Scandium (21)	**Sc 46**		**$4X10^{-4}$**
	Sc 47		**$9X10^{-4}$**
	Sc 48		**$3X10^{-4}$**
Selenium (34)	**Se 75**		**$3X10^{-3}$**
Silicon (14)	**Si 31**		**$9X10^{-3}$**
Silver (47)	**Ag 105**		**$1X10^{-3}$**
	Ag 110m		**$3X10^{-4}$**
	Ag 111		**$4X10^{-4}$**
Sodium (11)	**Na 24**		**$2X10^{-3}$**
Strontium (38)	**Sr 89**		**$1X10^{-4}$**
	Sr 85		**$1X10^{-3}$**
	Sr 91		**$7X10^{-4}$**
	Sr 92		**$7X10^{-4}$**
Sulfur (16)	**S 35**	**$9X10^{-8}$**	**$6X10^{-4}$**
Tantalum (73)	**Ta 182**		**$4X10^{-4}$**
Technetium (43)	**Tc 96m**		**$1X10^{-1}$**
	Tc 96		**$1X10^{-3}$**
Tellurium (52)	**Te 125**		**$2X10^{-3}$**
	Te 127m		**$6X10^{-4}$**
	Te 127		**$3X10^{-3}$**
	Te 129m		**$3X10^{-4}$**
	Te 131m		**$6X10^{-4}$**
	Te 132		**$3X10^{-4}$**
Terbium (65)	**Tb 160**		**$4X10^{-4}$**
Thallium (81)	**Tl 200**		**$4X10^{-3}$**
	Ti 201		**$3X10^{-3}$**

	Ti 202		$1X10^{-3}$
	Ti 204		$1X10^{-3}$
Thulium (69)	Tm 170		$5X10^{-4}$
	Tm 171		$5X10^{-3}$
Tin (50	Sn 113		$9X10^{-4}$
	Sn 125		$2X10^{-4}$
Tungsten (Wolfram) (74)	W 181		$4X10^{-3}$
	W 187		$7X10^{-4}$
Vanadium (23)	V 48		$3X10^{-4}$
Xenon (54)	Xe 131m	$4X10^{-6}$	
	Xe 133	$3X10^{-6}$	
	Xe 135	$1X10^{-6}$	
Ytterbium (70)	Yb 175	$1X10^{-3}$	
Yttrium (39)	Y 90		$2X10^{-4}$
	Y 91m		$3X10^{-2}$
	Y 91		$3X10^{-4}$
	Y 92		$6X10^{-4}$
	Y 93		$3X10^{-4}$
Zinc (30)	Zn 65		$1X10^{-3}$
	Zn 69m		$7X10^{-4}$
	Zn 69		$2X10^{-2}$
Zirconium (40)	Zr 95		$6X10^{-4}$
	Zr 97		$2X10^{-4}$
Beta or Gamma or both emitting radioactive material not listed above with half-life less than 3 years.		$1X10^{-10}$	

NOTE 1: Many radioisotopes disintegrate into isotopes which are also radioactive, In expressing the concentrations in 28-35-198a, Schedule C, the activity state is that of the parent isotope and takes into account the daughters.
NOTE 2: For purposes of 28-35-192b, when a combination of isotopes is involved, the limit for the combination shall be derived as follows: Determine for each isotope in the product the ratio between the concentration present in the product and the exempt concentration established in 28-35-198a, Schedule C, for the specific isotope when not in combination. The sum of those ratios may not exceed "1" (i.e., unity).
[1]Values are given only for those materials normally used as gases.
[2]uCi/gm for solids. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec 11, 1985; effective May 1, 1986.)

28-35-199a. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended Oct. 17, 1994; revoked December 30, 2005.)

28-35-200a. Schedule E; Possession limits authorized under types b & c specific licenses of broad scope.

RADIOACTIVE	Column I	Column II
MATERIAL	CURIES	CURIES
Antimony 122	1	0.01

Antimony 124	**1**	**0.01**
Antimony 125	**1**	**0.01**
Arsenic 73	**10**	**0.1**
Arsenic 74	**1**	**0.01**
Arsenic 76	**1**	**0.01**
Arsenic 77	**10**	**0.1**
Barium 131	**10**	**0.1**
Barium 140	**1**	**0.01**
Beryllium 7	**10**	**0.1**
Bismuth 210	**0.1**	**0.001**
Bromine 82	**10**	**0.1**
Cadmium 109	**1**	**0.01**
Cadmium 115m	**1**	**0.01**
Cadmium 115	**10**	**0.1**
Calcium 45	**1**	**0.01**
Calcium 47	**10**	**0.1**
Carbon 14	**100**	**1.**
Cerium 141	**10**	**0.1**
Cerium 143	**10**	**0.1**
Cerium 144	**0.1**	**0.001**
Cesium 131	**100**	**1.**
Cesium 134m	**100**	**1.**
Cesium 134	**0.1**	**0.001**
Cesium 135	**1**	**0.01**
Cesium 136	**10**	**0.1**
Cesium 137	**0.1**	**0.001**
Chlorine 36	**1**	**0.01**
Chlorine 38	**100**	**1.**
Chromium 51	**100**	**1.**
Cobalt 57	**10**	**0.1**
Cobalt 58m	**100**	**1.**
Cobalt 58	**1**	**0.01**
Cobalt 60	**0.1**	**0.001**
Copper 64	**10**	**0.1**
Dysprosium 165	**100**	**1.**
Dysprosium 166	**10**	**0.1**
Erbium 169	**10**	**0.1**
Erbium 171	**10**	**0.1**
Europium 152 9.2 h	**10**	**0.1**
Europium 152 13 y	**0.1**	**0.001**
Europium 154	**0.1**	**0.001**
Europium 155	**1**	**0.01**
Fluorine 18	**100**	**1.**
Gadolinium 153	**1**	**0.01**
Gadolinium 159	**10**	**0.1**
Gallium 72	**10**	**0.1**
Germanium 71	**100**	**1.**
Gold 198	**10**	**0.1**
Gold 199	**10**	**0.1**
Hafnium 181	**1**	**0.01**
Holmium 166	**10**	**0.1**
Hydrogen 3	**100**	**1.**

Indium 113m	**100**	**1.**
Indium 114m	**1**	**0.01**
Indium 115m	**100**	**1.**
Indium 115	**1**	**0.01**
Iodine 125	**0.1**	**0.001**
Iodine 126	**0.1**	**0.001**
Iodine 129	**0.1**	**0.001**
Iodine 131	**0.1**	**0.001**
Iosine 132	**10**	**0.1**
Iodine 133	**1**	**0.01**
Iodine 134	**10**	**0.1**
Iodine 135	**1**	**0.01**
Iridium 192	**1**	**0.01**
Iridium 194	**10**	**0.1**
Iron 55	**10**	**0.1**
Iron 59	**1**	**0.01**
Krypton 85	**100**	**1.**
Krypton 87	**10**	**0.1**
Lanthanum 140	**1**	**0.01**
Lutetium 177	**10**	**0.1**
Manganese 52	**1**	**0.01**
Manganese 54	**1**	**0.01**
Manganese 56	**10**	**0.1**
Mercury 197m	**10**	**0.1**
Mercury 197	**10**	**0.1**
Mercury 203	**1**	**0.01**
Molybdenum 99	**10**	**0.1**
Neodymium 147	**10**	**0.1**
Neodymium 149	**10**	**0.1**
Nickel 59	**10**	**0.1**
Nickel 63	**1**	**0.01**
Nickel 65	**10**	**0.1**
Niobium 93m	**1**	**0.01**
Niobium 95	**1**	**0.01**
Niobium 97	**100**	**1.**
Osmium 185	**1**	**0.01**
Osmium 191m	**100**	**1.**
Osmium 191	**10**	**0.1**
Osmium 193	**10**	**0.1**
Palladium 103	**10**	**0.1**
Palladium 109	**10**	**0.1**
Phosphorus 32	**1**	**0.01**
Platinum 191	**10**	**0.1**
Platinum 193m	**100**	**1.**
Platinum 193	**10**	**0.1**
Platinum 197m	**100**	**1.**
Platinum 197	**10**	**0.1**
Polonium 210	**0.01**	**0.0001**
Potassium 42	**1**	**0.01**
Praseodymium 142	**10**	**0.1**
Praseodymium 143	**10**	**0.1**
Promethium 147	**1**	**0.01**

Promethium 149	**10**	**0.1**
Radium 226	**0.01**	**0.0001**
Rhenium 186	**10**	**0.1**
Thenium 188	**10**	**0.1**
Rhodium 103m	**1,000**	**10**
Rhodium 105	**10**	**0.1**
Rubidium 86	**1**	**0.01**
Rubidium 87	**1**	**0.01**
Ruthenium 97	**100**	**1.**
Ruthenium 103	**1**	**0.01**
Ruthenium 105	**10**	**0.1**
Ruthenium 106	**0.1**	**0.001**
Samarium 151	**1**	**0.01**
Samarium 153	**10**	**0.1**
Scandium 46	**1**	**0.01**
Scandium 47	**10**	**0.1**
Scandium 48	**1**	**0.01**
Selenium 75	**1**	**0.01**
Silicon 31	**10**	**0.1**
Silver 105	**1**	**0.01**
Silver 110m	**0.1**	**0.001**
Silver 111	**10**	**0.1**
Sodium 22	**0.1**	**0.001**
Sodium 24	**1**	**0.01**
Strontium 85m	**1,000**	**10.**
Strontium 85	**1**	**0.01**
Strontium 89	**1**	**0.01**
Strontium 90	**0.01**	**0.0001**
Strontium 91	**10**	**0.1**
Strontium 92	**10**	**0.1**
Sulphur 35	**10**	**0.1**
Tantalum 182	**1**	**0.01**
Technetium 96	**10**	**0.1**
Technetium 97m	**10**	**0.1**
Technetium 97	**10**	**0.1**
Technetium 99m	**100**	**1.**
Technetium 99	**1**	**0.01**
Tellurium 125m	**1**	**0.01**
Tellurium 127m	**1**	**0.01**
Tellurium 127	**10**	**0.1**
Tellurium 129m	**1**	**0.01**
Tellurium 129	**100**	**1.**
Tellurium 131m	**10**	**0.1**
Tellurium 132	**1**	**0.01**
Terbium 160	**1**	**0.01**
Thallium 200	**10**	**0.1**
Thallium 201	**10**	**0.1**
Thallium 202	**10**	**0.1**
Thallium 204	**1**	**0.01**
Thulium 170	**1**	**0.01**
Thulium 171	**1**	**0.01**
Tin 113	**1**	**0.01**

Tin 125	**1**	**0.01**
Tungsten 181	**1**	**0.01**
Tungsten 185	**1**	**0.01**
Tungsten 187	**10**	**0.1**
Vanadium 48	**1**	**0.01**
Xenon 131m	**1,000**	**10.**
Xenon 133	**100**	**1.**
Xenon 135	**100**	**1.**
Ytterbium 175	**10**	**0.1**
Yttrium 90	**1**	**0.01**
Yttrium 91	**1**	**0.01**
Yttrium 92	**10**	**0.1**
Yttrium 93	**1**	**0.01**
Zinc 65	**1**	**0.01**
Zinc 69m	**10**	**0.1**
Zinc 69	**100**	**1.**
Zirconium 93	**1**	**0.01**
Zirconium 95	**1**	**0.01**
Zirconium 97	**1**	**0.01**
Any radioactive material other than alpha emitting radioactive material not listed above.	**0.1**	**0.001**

(Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-201. Schedule F. (a) Single isotope quantities.

Material	**Microcuries**
Americium-241	**.01**
Antimony-122	**100**
Antimony-124	**10**
Antimony-125	**10**
Arsenic-73	**100**
Arsenic-74	**10**
Arsenic-76	**10**
Arsenic-77	**100**
Barium-131	**10**
Barium-133	**10**
Barium-140	**10**
Bismuth-210	**1**
Bromine-82	**10**
Cadmium-109	**10**
Cadmium-115m	**10**
Cadmium-115	**100**
Calcium-45	**10**
Calcium-47	**10**
Carbon-14	**100**
Cerium-141	**100**
Cerium-143	**100**
Cerium-144	**1**

Cesium-131	**1,000**
Cesium-134m	**100**
Cesium-134	**1**
Cesium-135	**10**
Cesium-136	**10**
Cesium-137	**10**
Chlorine-36	**10**
Chlorine-38	**10**
Chromium-51	**1,000**
Cobalt-58m	**10**
Cobalt-58	**10**
Cobalt-60	**1**
Copper-64	**100**
Dysprosium-165	**10**
Dysprosium-166	**100**
Erbium-169	**100**
Erbium-171	**100**
Europium-152 9.2hr	**100**
Europium-152 13yr	**1**
Europium-154	**1**
Europium-155	**10**
Fluorine-18	**1,000**
Gadolinium-153	**10**
Gadolinium-159	**100**
Gallium-72	**10**
Germanium-71	**100**
Gold-198	**100**
Gold-199	**100**
Hafnium-181	**10**
Holmium-166	**100**
Hydrogen-3	**1,000**
Indium-113m	**100**
Indium-114m	**10**
Indium-115m	**100**
Indium-115	**10**
Iodine-125	**1**
Iodine-126	**1**
Iodine-129	**0.1**
Iodine-131	**1**
Iodine-132	**10**
Iodine-133	**1**
Iodine-134	**10**
Iodine-135	**10**
Iridium-192	**10**
Iridium-194	**100**
Iron-55	**100**
Iron-59	**10**
Krypton-85	**100**
Krypton-87	**10**
Lanthanum-140	**10**
Lutetium-177	**100**
Manganese-52	**10**

Manganese-54	**10**
Manganese-56	**10**
Mercury-197m	**100**
Mercury-197	**100**
Mercury-203	**10**
Molybdenum-99	**100**
Neodymium-147	**100**
Neodymium-149	**100**
Nickel-59	**100**
Nickel-63	**10**
Nickel-65	**100**
Niobium-93m	**10**
Niobium-95	**10**
Niobium-97	**10**
Osmium-185	**10**
Osmium-191m	**100**
Osmium-191	**100**
Osmium-193	**100**
Palladium-103	**100**
Palladium-109	**100**
Phosphorus-32	**10**
Platinum-191	**100**
Platinum-193m	**100**
Platinum-193	**100**
Platinum-197m	**100**
Platinum-197	**100**
Plutonium-239	**.01**
Polonium-210	**.1**
Potassium-42	**10**
Praseodymium-142	**100**
Praseodymium-143	**100**
Promethium-147	**10**
Promethium-149	**10**
Radium-226	**.01**
Rhenium-186	**100**
Rhenium-188	**100**
Rhodium-103m	**100**
Rhodium-105	**100**
Rubidium-86	**10**
Rubidium-87	**10**
Ruthenium-97	**100**
Ruthenium-103	**10**
Ruthenium-105	**10**
Ruthenium-106	**1**
Samarium-151	**10**
Samarium-153	**100**
Scandium-46	**10**
Scandium-47	**100**
Scandium-48	**10**
Selenium-75	**10**
Silicon-31	**100**
Silver-105	**10**

Silver-110m	**1**
Silver-111	**100**
Sodium-24	**10**
Strontium-85	**10**
Strontium-89	**1**
Strontium-90	**.1**
Strontium-91	**10**
Strontium-92	**10**
Sulfur-35	**100**
Tantalum-182	**10**
Technetium-96	**10**
Technetium-97m	**100**
Technetium-97	**100**
Technetium-99m	**100**
Technetium-99	**10**
Tellurium-125m	**10**
Tellurium-127m	**10**
Tellurium-127	**100**
Tellurium-129m	**10**
Tellurium-129	**100**
Tellurium-131m	**10**
Tellurium-132	**10**
Terbium-160	**10**
Thallium-200	**100**
Thallium-201	**100**
Thallium-202	**100**
Thallium-204	**10**
Thorium	**100**
Thulium-170	**10**
Thulium-171	**10**
Tin-113	**10**
Tin-125	**10**
Tungsten-181	**10**
Tungsten-185	**10**
Tungsten-187	**100**
Uranium (natural)[2]	**100**
Uranium-233	**.01**
Uranium-234--235	**.01**
Vanadium-48	**10**
Xenon-131m	**1,000**
Xenon-133	**100**
Xenon-135	**100**
Ytterbium-175	**100**
Yttrium-90	**10**
Yttrium-91	**10**
Yttrium-92	**100**
Yttrium-93	**100**
Zinc-65	**10**
Zinc-69m	**100**
Zinc-69	**1,000**
Zirconium-93	**10**
Zirconium-95	**10**

Zirconium-97	**10**
Any alpha-emitting radionuclide not listed above or mixture of alpha-emitters of unknown composition	**.01**
Any radionuclide other than an alpha-emitting radionuclide that is not listed above or mixtures of beta-emitters of unknown composition	**.1**

[1] Based on an alpha disintegration rate of Th-232, Th-230 and their daughter products.
[2] Based on an alpha disintegration rate of U-238, U-234 and U-235.

(b) Combinations of isotopes. For the purposes of K.A.R. 28-35-180, when a combination of isotopes in known amounts is involved, the limit for the combination shall be derived by determining, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination shall not exceed unity. (Authorized by and implementing K.S.A. 48-1607; effective November 1, 1996.)

28-35-202. Schedule H. Each licensee possessing any of the following quantities of radioactive materials shall comply with K.A.R. 28-35-193b (a). The release fractions listed below shall be used in the consideration of the need for an emergency plan for responding to a release unless other data regarding release fractions in respirable size range is available.

Radioactive material	Release Fraction	Quantity (curies)
Actinium-228	0.001	4,000
Americium-241	0.001	2
Americium-242	0.001	2
Americium-243	0.001	2
Antimony-124	0.01	4,000
Antimony-126	0.01	6,000
Barium-133	0.01	10,000
Barium-140	0.01	30,000
Bismuth-207	0.01	5,000
Bismuth-210	0.01	600
Cadmium-109	0.01	1,000
Cadmium-113	0.01	80
Calcium-45	0.01	20,000
Californium-252	0.001	9(20mg)
Carbon-14	0.01	50,000
Non CO		
Cerium-141	0.01	10,000
Cerium-144	0.01	300
Cesium-134	0.01	2,000
Cesium-137	0.01	3,000
Chlorine-36	0.5	100
Chromium-51	0.01	300,000
Cobalt-60	0.001	5,000
Copper-64	0.01	200,000
Curium-242	0.001	60
Curium-243	0.001	3

Curium-244	**0.001**	**4**
Curium-245	**0.001**	**2**
Europium-152	**0.01**	**500**
Europium-154	**0.01**	**400**
Europium-155	**0.01**	**3,000**
Germanium-68	**0.01**	**2,000**
Gadolinium-153	**0.01**	**5,000**
Gold-198	**0.01**	**30,000**
Hafnium-172	**0.01**	**400**
Hafnium-181	**0.01**	**7,000**
Holmium-166m	**0.01**	**100**
Hydrogen-3	**0.5**	**20,000**
Iodine-125	**0.5**	**10**
Iodine-131	**0.5**	**10**
Indium-114m	**0.01**	**1,000**
Iridium-192	**0.001**	**40,000**
Iron-55	**0.01**	**40,000**
Iron-59	**0.01**	**7,000**
Krypton-85	**1.0**	**6,000,000**
Lead-210	**0.01**	**8**
Manganese-56	**0.01**	**60,000**
Mercury-203	**0.01**	**10,000**
Molybdenum-99	**0.01**	**30,000**
Neptunium-237	**0.001**	**2**
Nickel-63	**0.01**	**20,000**
Niobium-94	**0.01**	**300**
Phosphorus-32	**0.5**	**100**
Phosphorus-33	**0.5**	**1,000**
Polonium-210	**0.01**	**10**
Potassium-42	**0.01**	**9,000**
Promethium-145	**0.01**	**4,000**
Promethium-147	**0.01**	**4,000**
Ruthenium-106	**0.01**	**200**
Samarium-151	**0.01**	**4,000**
Scandium-46	**0.01**	**3,000**
Selenium-75	**0.01**	**10,000**
Silver-110m	**0.01**	**1,000**
Sodium-22	**0.01**	**9,000**
Sodium-24	**0.01**	**10,000**
Strontium-89	**0.01**	**3,000**
Strontium-90	**0.01**	**90**
Sulfur-35	**0.5**	**900**
Technetium-99	**0.01**	**10,000**
Technetium-99m	**0.01**	**400,000**
Tellurium-127m	**0.01**	**5,000**
Tellurium-129m	**0.01**	**5,000**
Terbium-160	**0.01**	**4,000**
Thulium-170	**0.01**	**4,000**
Tin-113	**0.01**	**10,000**
Tin-123	**0.01**	**3,000**
Tin-126	**0.01**	**1,000**
Titanium-44	**0.01**	**100**

Vanadium-48	**0.01**	**7,000**
Xenon-133	**1.0**	**900,000**
Yttrium-91	**0.01**	**2,000**
Zinc-65	**0.01**	**5,000**
Zirconium-93	**0.01**	**400**
Zirconium-95	**0.01**	**5,000**
Any other beta-gamma emitter	**0.01**	**10,000**
Mixed fission products	**0.01**	**1,000**
Mixed corrosion products	**0.01**	**10,000**
Equipment contaminated with radioactive material beta-gamma emissions equivalent to	**0.001**	**10,000**
Irradiated material, in any form which is not solid and noncombustible	**0.01**	**1,000**
Irradiated material, which is solid and noncombustible	**0.001**	**10,000**
Mixed radioactive waste, beta-gamma emissions equivalent to	**0.01**	**1,000**
Packaged mixed waste, beta-gamma[1]	**0.001**	**10,000**
Any other material emitting alpha radiation equivalent to	**0.001**	**2**
Equipment contaminated with radioactive material alpha emissions equivalent to	**0.0001**	**20**
Packaged waste containing material emitting alpha[1] radiation	**0.0001**	**20**
Combinations of radioactive materials listed above[2]		

[1] Waste packaged in type B containers shall not require an emergency plan.
[2] For combinations of radioactive materials, the licensee shall comply with K.A.R. 28-35-193b (a) if the sum of the ratios of the quantity of each radioactive material authorized to the quantity listed for that material in Schedule C exceeds one. (Authorized by and implementing K.S.A. 48-1607; effective November 1, 1996.)

28-35-203 Schedule G - Criteria relating to use of financial tests and parent company guarantees for providing reasonable assurance of funds for decommissioning. (a) Each applicant or licensee providing assurance of the availability of funds for decommissioning based on a parent company guarantee that funds will be available for decommissioning costs based on a demonstration that the parent company passes a financial test shall meet the following standards:

(b) Each licensee or applicant applying to the department for recognition of a parent company guarantee for the purposes of complying with the requirements of 28-35-180a(e)(9)(B) shall be required to show its parent company guarantee meets the following criteria:

(1) Each parent company shall meet two of the following three ratios.

(A) a ratio of total liabilities to net worth which is less than 2.0;

(B) a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities which is greater than 0.1; or

(C) a ratio of current assets to current liabilities which is greater than 1.5.

(2) Each parent company shall have net working capital and tangible net worth that each are equal to a minimum of six times the current decommissioning cost estimates, or the prescribed amount if a certification is used based on the requirements of K.A.R. 28-35-180a.

(3) Each parent company shall have assets located in the United States amounting to at least 90 percent of the company's total assets or at least six times the current decommissioning cost estimates, or the prescribed amount if a certification is used based on the requirements of K.A.R. 28-35-180a.

(4) Each parent company shall have:

(A) A current rating for its most recent bond issuance of AAA, AA, A, or BBB as issued by standard and poor's or Aaa, Aa, A, or Baa as issued by moody's;

(B) A tangible net worth at least six times the current decommissioning cost estimate, or the prescribed amount if a certification is used based on the requirements of K.A.R. 28-35-180a;

(C) A tangible net worth of at least $10 million; and

(D) Assets located in the United States amounting to at least 90 percent of the company's total assets or at least six times the current decommissioning cost estimates, or the prescribed amount if certification is used based on the requirements of K.A.R. 28-35-180a.

(c) The parent company's independent certified public accountant shall compare the data used by the parent company in the financial test, which shall be derived from the independently audited, year end financial statements for the latest fiscal year, with the amounts in such financial statement. If any matters come to the auditor's attention which cause the auditor to believe that the data specified in the financial test should be adjusted and that the company no longer passes the test, the licensee shall notify the department within 90 days of the date the auditor identifies such a matter.

(d) After the initial financial test, the parent company shall pass the test within 90 days after the close of each succeeding fiscal year.

(1) If the parent company no longer meets the requirements of subsection (a) of this Schedule G, the licensee shall notify the department of its intent to establish alternate financial assurance as specified in the regulations.

(2) The notice shall be sent by certified mail within 90 days after the end of the fiscal year for which the year end financial data shows that the parent company no longer meets the financial test requirements.

(3) The licensee shall provide alternate financial assurance within 120 days after the end of such a fiscal year.

(e) Each parent company guarantee obtained by an applicant or licensee shall contain terms which provide the following information.

(1) The parent company guarantee shall remain in force unless the guarantor sends notice of cancellation by certified mail to the licensee and the department. The guarantee shall not be canceled during the 120 days beginning on the date of receipt of the notice of cancellation by both the licensee and the department, as evidenced by the return receipts.

(2) If the licensee fails to provide alternate financial assurance within 90 days after receipt of a notice of cancellation of the parent company guarantee by the licensee and the department, the guarantor shall provide such alternative financial assurance in the name of the licensee.

(3) The parent company guarantee and financial test provisions shall remain in effect until the department has terminated the license.

(4) If a trust is established for decommissioning costs, the trustee and trust shall be acceptable to the department. An acceptable trustee may be an appropriate state or federal government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-204. Decommissioning plan. (a) Each licensee shall submit a decommissioning plan if at least one of the following conditions is met:

(1) The licensee intends to terminate the license using radiological criteria specified in K.A.R. 28-35-205a or K.A.R. 28-35-205b.

(2) A decommissioning plan is otherwise required by these regulations.

(3) A decommissioning plan is required by a license condition.

(4) The procedures and activities necessary to carry out decommissioning of the site or separate building or outdoor area have not been previously approved by the department, and these procedures could increase the potential health and safety impact on workers or on the public, including any of the following types of procedures:

(A) Procedures that would involve techniques not applied routinely during cleanup or maintenance operations;

(B) procedures permitting workers to enter areas not normally occupied where surface contamination and radiation levels are higher than routinely encountered during the operation for which the license was issued;

(C) procedures that could result in greater airborne concentrations of radioactive materials than are present during operation;

(C) procedures that could result in greater releases of radioactive material to the environment than

those associated with the operation for which the license was issued; or

(E) procedures with a potential health and safety impact that could be carried out before approval of the decommissioning plan.

(b) The proposed decommissioning plan for the facility or site, or separate building or outdoor area, shall include the following:

(1) A description of the conditions of the facility or site sufficient to evaluate the acceptability of the plan;

(2) a description of the planned decommissioning operations;

(3) a description of the methods used to ensure the protection of workers and the environment against radiation hazards during decommissioning;

(4) a description of the radiation survey planned to demonstrate compliance with subsection (e) or with K.A.R. 28-35-205; and

(5) an updated, detailed cost estimate of decommissioning, comparison of that estimate with the present funds set aside for decommissioning, and a plan for ensuring the availability of adequate funds for completion of the decommissioning.

(c) For decommissioning plans calling for completion of decommissioning more than 24 months after plan approval, the plan shall include a justification for the delay. The proposed decommissioning plan shall not be approved unless the licensee demonstrates that the decommissioning will be completed as soon as practicable and that the health and safety of the workers and the public will be protected.

(d) Each licensee shall complete the decommissioning of the facility or site as soon as practicable but not more than 24 months following the initiation of decommissioning, unless an alternate schedule addressing the factors specified in subsection (f) is approved.

(e) If decommissioning involves the entire site, the licensee shall request license termination upon completion of the decommissioning operations.

(f) For decommissioning plans calling for the completion of decommissioning more than 24 months after plan approval, the plan shall include a written justification for the decommissioning schedule warranted by consideration of the following:

(1) Whether it is technically feasible to complete decommissioning within the allotted 24-month period;

(2) whether waste disposal capacity is available to allow the completion of decommissioning within the allotted 24-month period;

(3) whether a volume reduction of wastes requiring disposal will be achieved by allowing short-lived radionuclides to decay;

(4) whether a reduction in radiation exposure to workers can be achieved by allowing short-lived

radionuclides to decay; and

(5) whether other site-specific factors exist. These factors may include the regulatory requirements of other government agencies, lawsuits, groundwater treatment operations, monitored natural groundwater restoration, and actions that could result in more environmental harm than deferred cleanup.

(g) Each licensee shall perform the following final steps in decommissioning:

(1) Conduct a radiation survey of the premises where the licensed operations were carried out and submit a report of the results of this survey, unless the licensee demonstrates that the premises are suitable for release in some other manner. Each licensee shall complete the following, as appropriate:

(A) Report the levels of gamma radiation in units of millisieverts or microrems per hour at one meter from surfaces and report the levels of radioactivity, including alpha and beta, in units of megabecquerels, disintegrations per minute, or microcuries per milliliter for water, and becquerels or picocuries per gram for solids including soil and concrete; and

(B) specify the survey instrument or instruments used and certify that each instrument is calibrated and tested.

(2) Each licensee shall certify the disposition of all licensed material, including accumulated wastes, by submitting a completed form specified by the department or the equivalent information to the department. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-205. Termination of a license without restriction. (a) A site shall be considered acceptable for unrestricted use if both of the following conditions are met:

(1) The residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 0.25 millisievert or 25 mrem per year, including the residual radioactivity from groundwater sources of drinking water.

(2) The residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Any detriment, including any deaths from transportation accidents that could result from decontamination and waste disposal, shall be taken into consideration by the secretary.

(b) Each specific license, including any expired license, shall be terminated upon written notice to the licensee if the secretary determines that all of the following conditions are met:

(1) All radioactive material has been properly disposed of.

(2) A reasonable effort has been made to eliminate the residual radioactive contamination, if present.

(3) Documentation has been provided to the department demonstrating one of the following:

(A) A radiation survey has been performed and shows that the premises meet the requirements of this regulation.

(B) The other information submitted by the licensee is sufficient to show that the premises are suitable for release in accordance with this regulation. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-205a. License termination under restricted conditions. A site may be considered by the secretary to be acceptable for license termination under restricted conditions if all of the following conditions are met:

(a)(1) The licensee demonstrates that further reductions in residual radioactivity necessary to comply with the provisions of K.A.R. 28-35-205(a) would result in public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA. The demonstration shall reflect the licensee's consideration of any detriment that could result from decontamination and waste disposal; and

(2) the licensee has made provisions for legally enforceable institutional controls that provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 0.25 millisievert or 25 mrem per year, including that from groundwater sources of drinking water.

(b) The licensee has provided sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out responsibilities for any necessary control and maintenance of the site. Each of the following financial assurance mechanisms shall be acceptable:

(A) Funds placed into an account segregated from the licensee's assets and outside the licensee's administrative control as specified in K.A.R. 28-35-180b;

(B) a surety method, insurance policy, or other guarantee method as described in K.A.R. 28-35-180b;

(C) a statement of intent in the case of federal, state, or local government licensees, as described in K.A.R. 28-35-180b; or

(D) when a governmental entity is assuming custody and ownership of a site, an arrangement that is deemed acceptable by the governmental entity.

(c) The licensee has submitted a decommissioning plan to the department indicating the licensee's intent to decommission in accordance with K.A.R. 28-35-204 and specifying that the licensee intends to decommission by restricting the use of the site. The licensee shall document in the decommissioning plan how the advice of individuals and institutions in the community who could be affected by the decommissioning has been sought and incorporated, as appropriate, following analysis of that advice.

(1) Each licensee proposing to decommission by restricting the use of the site shall seek advice from the affected parties regarding the following matters concerning the proposed decommissioning:

(A) Whether the provisions for institutional controls proposed by the licensee will provide reasonable assurance of the following:

(i) That the TEDE from residual radioactivity distinguishable from background to the average member of the critical population will not exceed the applicable limit specified in part 4 of these regulations;

(ii) that the controls are enforceable; and

(iii) that the controls do not impose undue burdens on the local community or other affected parties;

and

(B) whether or not the licensee has provided sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out the responsibilities for any necessary control and maintenance of the site.

(2) In seeking advice on the issues identified in this subsection, the licensee shall provide for the following:

(A) Participation by representatives of a broad cross section of community interests who could be affected by the decommissioning;

(B) an opportunity for a comprehensive, collective discussion of the issues by the participants represented; and

(C) a publicly available summary of the results of all discussions specified in paragraph (c)(2)(B), including a description of the individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants on the issues.

(d) Residual radioactivity at the site has been reduced so that if the institutional controls were no longer in effect, there is reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and would not exceed either of the following:

(1) 1 millisievert (100 mrem) per year; or

(2) 5 millisieverts (500 mrem) per year if the licensee demonstrates the following:

(A) Further reductions in residual radioactivity necessary to comply with the limit specified in paragraph (d)(1) are not technically achievable, would be prohibitively expensive, or would result in additional public or environmental harm;

(B) provisions for ongoing, enforceable institutional controls exist; and

(C) sufficient financial assurance exists to enable a responsible government entity or independent third party, including a governmental custodian of a site, to carry out periodic rechecks of the site at least every five years to ensure that the institutional controls remain in place as necessary to meet the requirements in this regulation and to assume and carry out the responsibilities for any necessary controls and maintenance of those controls. The financial assurance mechanisms shall be those specified in subsection (b).

(e) (1) If the department receives a decommissioning plan from the licensee or a proposal by the licensee for the release of a site pursuant to this regulation or K.A.R. 28-35-205b, the following shall be notified by the department and solicited for comments:

(A) The local and state governments in the vicinity of the site and any Indian nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning; and

(B) the EPA, if the licensee proposes to release a site pursuant to K.A.R. 28-35-205b.

(2) Subsequent notifications and solicitations for comments of the entities specified in paragraphs (e)(1)(A) and (B) may be made by the department if the secretary deems these actions to be in the public interest.

(3) The notifications specified in this subsection shall be published in the Kansas register and in a forum, which may consist of a local newspaper, letter to a state or local organization, or other appropriate forum, that is readily accessible to individuals in the vicinity of the site, and solicit comments from affected parties. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-205b. Alternate criteria for license termination. (a) A license shall be terminated by the secretary using alternate criteria greater than the dose criteria specified in K.A.R. 28-35-205a only if the licensee provides all of the following information:

(1) Evidence that public health and safety and the environment would continue to be protected and that it is unlikely that the dose from all man-made sources combined, other than medical, could be more than the limit of one millisievert per year or 100 mrem per year specified in part 4 of these regulations, by submitting an analysis of the possible sources of exposure;

(2) restrictions, to the extent practical, on site use according to the provisions of K.A.R. 28-35-205a to minimize exposure at the site;

(3) evidence that doses have been reduced to ALARA levels, taking into consideration any detriment, including any traffic accidents that could result from decontamination and waste disposal; and

(4) a decommissioning plan indicating the licensee's intent to decommission in accordance with this part and specifying that the licensee proposes to decommission by the use of alternate criteria. The licensee shall document in the decommissioning plan how the advice of individuals and institutions in the community who might be affected by the decommissioning has been sought and addressed, as appropriate, following analysis of that advice. In seeking this advice, the licensee shall provide for the following:

(A) Participation by representatives of a broad cross section of community interests who could be affected by the decommissioning;

(B) an opportunity for comprehensive, collective discussions of the issues by the participants represented; and

(C) a publicly available summary of the results of all the discussions specified in paragraph (4)(B) of this subsection, including a description of the individual viewpoints of the participants on the issues and the extent of agreement and disagreement on the issues among the participants.

(b) The use of alternate criteria to terminate a license may be approved by the secretary only after the secretary's consideration of the staff's recommendations that address any comments provided by federal, state, and local governments and any public comments submitted pursuant to K.A.R. 28-35-206. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-206. Applicability of decommissioning requirements following license termination. If, after a site has been decommissioned and associated license has been terminated, new information shows that the requirements specified in these regulations were not met or that the residual radioactivity at the site could result in a significant threat to public health and safety and the environment, then the former licensee shall be required to perform any additional decontamination that is deemed necessary by the secretary. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

PART 4. STANDARDS FOR PROTECTION AGAINST RADIATION

28-35-211a. Persons to whom the standards apply. (a) Except as specifically provided in other parts of these regulations, these regulations shall apply to persons licensed or registered by the department to receive, possess, use, transfer, or dispose of sources of radiation. The limits in these regulations shall not apply to:

(1) doses due to background radiation;

(2) exposure of patients to radiation for the purpose of medical diagnosis or therapy; or

(3) voluntary participation in medical research programs.

(b) Nothing in these regulations shall be construed as limiting actions that may be necessary to protect health and safety. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Oct. 17, 1994.)

28-35-211c. (Authorized by and implementing K.S.A. 48-1603, 48-1607; effective Oct. 17, 1994; revoked December 30, 2005.)

28-35-211d. Radiation protection programs. (a) Each licensee or registrant shall develop, document, and implement a radiation protection program sufficient to ensure compliance with the provisions of these regulations.

(b) Each licensee or registrant shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and public doses that are as low as is reasonably achievable (ALARA).

(c) To implement the ALARA requirements of this regulation and the requirements in K.A.R. 28-35-214a, each licensee or registrant shall establish a constraint on the air emissions of radioactive material to the environment, excluding radon-222 and its daughters, so that the individual member of the public likely to receive the highest dose is not expected to receive a total effective dose equivalent in excess of 10 mrem (0.1 mSv) per year from these emissions. If a licensee or registrant subject to this requirement exceeds this dose constraint, the licensee or registrant shall report the exceedance as specified in K.A.R. 28-35-230a and shall take appropriate corrective action to ensure against recurrence.

(d) Each licensee or registrant shall, at intervals not to exceed 12 months, review the radiation protection program content and implementation. (Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-212a. Occupational dose limits for adults. (a) Each licensee or registrant shall control the occupational dose to individual adults, except for planned special exposures , to the following dose limits:

(1) The annual limit shall be the more limiting of either of the following:

(A) The total effective dose equivalent being equal to 0.05 Sv (5 rem); or

(B) the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 0.50 Sv (50 rem).

(2) The annual limits to the lens of the eye, to the skin, and to the extremities shall be the following:

(A) An eye dose equivalent of 0.15 Sv (15 rem); and

(B) a shallow dose equivalent of 0.50 Sv (50 rem) to the skin or to any extremity.

(b) Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual could receive during the current year and during the individual's lifetime.

(c) The assigned deep dose equivalent and shallow dose equivalent shall be for the portion of the body receiving the highest exposure, as follows:

(1) The deep dose equivalent, eye dose equivalent, and shallow dose equivalent may be assessed from surveys or other radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure or the results of individual monitoring are unavailable.

(2) If a protective apron is worn by medical fluoroscopists performing special and interventional fluoroscopic procedures and monitoring is conducted as specified in K.A.R. 28-35-217a, the use of weighting

factors in determining the effective dose equivalent for external radiation may be approved by the secretary upon receipt of a written request. In no case shall the use of weighting factors be approved unless the request is accompanied by the procedures to be used to ensure that exposures are maintained ALARA and the effective dose equivalent is determined as follows:

(A) If only one individual monitoring device is used and the device is located at the neck outside the protective apron, the reported deep dose equivalent shall be the effective dose equivalent for external radiation.

(B) If only one individual monitoring device is used and the device is located at the neck outside the protective apron, and the reported dose exceeds 25 percent of the limit specified in this regulation, the reported deep dose equivalent value multiplied by 0.3 shall be the effective dose equivalent for external radiation.

(C) If individual monitoring devices are worn, both under the protective apron at the waist and outside the protective apron at the neck, the effective dose equivalent for external radiation shall be assigned the value of the sum of the deep dose equivalent reported for the individual monitoring device located at the waist under the protective apron multiplied by 1.5 and the deep dose equivalent reported for the individual monitoring device located at the neck outside the protective apron multiplied by 0.04.

(3) All individuals who are associated with the operation of an X-ray system shall be subject to the occupational exposure limits and the requirements for the determination of the doses that are specified in this regulation. In addition, each individual shall meet the following requirements:

(A) When protective clothing or devices are worn on portions of the body and one or more monitoring devices are required, at least one monitoring device shall be utilized as follows:

(i) When an apron is worn, the monitoring device shall be worn at the collar outside of the apron;

(ii) the dose to the device, if one is used, shall be recorded as the whole body dose based on the maximum dose attributed to any one critical organ, include the gonads, the blood-forming organs, the head and trunk, or the lens of the eye. If more than one device is used and a record is made of the data, each dose shall be identified with the area where the device was worn on the body;

(4) Exposure of a personnel monitoring device to deceptively indicate a dose delivered to an individual shall be prohibited.

(5) If the individual is exposed during procedures not specifically approved, weighting factors shall not be applied.

(d) Derived air concentration (DAC) and annual limit on intake (ALI) values, in appendix B, table I, published in " appendices to part 4: standards for protection against radiation," which is adopted in K.A.R. 28-35-135a, shall be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits.

(e) Notwithstanding the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to 10 milligrams in a week in consideration of chemical toxicity, in accordance with footnote 3 of appendix B published in " appendices to part 4: standards for protection against radiation" which is adopted in K.A.R. 28-35-135a.

(f) Each licensee or registrant shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-212b. Compliance with requirements for summation of external and internal doses. (a) If the licensee or registrant is required to monitor pursuant to both K.A.R. 28-35-217a (a) and (d), the licensee or registrant shall demonstrate compliance with the dose limits by summing external and internal doses.

(1) If the licensee or registrant is required to monitor pursuant to only K.A.R. 28-35-217a(a) or to K.A.R. 28-35-217a(d), then the summation shall not be required to demonstrate compliance with the dose limits.

(2) The dose equivalents for the lens of the eye, the skin, and the extremities shall not be included in the summation and shall be subject to separate limits.

(b) Any licensee or registrant may demonstrate compliance with the requirements for summation of external and internal doses pursuant to the following:

(1) Intake by inhalation. If the only intake of radionuclides is by inhalation, the total effective dose equivalent limit shall not be deemed to be exceeded if the sum of the deep dose equivalent divided by the total effective dose equivalent limit, and one of the following, does not exceed one:

(A) The sum of the fractions of the inhalation ALI for each radionuclide;

(B) The total number of derived air concentration-hours (DAC-hours) for all radionuclides divided by 2,000; or

(C) the sum of the calculated committed effective dose equivalents to all significantly irradiated organs or tissues (T) calculated from bioassay data using appropriate biological models and expressed as a fraction of the annual limit. For purposes of this requirement, an organ or tissue shall be deemed to be significantly irradiated if, for that organ or tissue, the product of the weighting factors, w_T, and the committed dose equivalent, $H_{T.50}$, per unit intake is greater than 10 percent of the maximum weighted value of H_{50}.

(2) Intake by oral ingestion. If the occupationally exposed individual receives an intake of radionuclides by oral ingestion greater than 10 percent of the applicable oral ALI, the licensee or registrant shall account for this intake and include it in demonstrating compliance with the limits.

(3) Intake through wounds or absorption through skin. The licensee or registrant shall evaluate and, to the extent practical, account for intakes through wounds or skin absorption. The intake through intact skin is included in the calculation of DAC for hydrogen-3 and shall not be required to be evaluated or accounted for pursuant to this subsection. (Authorized by and implementing K.S.A. 48-1607; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-212c. Determination of external dose from airborne radioactive material. (a) When determining the dose from airborne radioactive material, the licensee or registrant shall include the contribution to the deep dose equivalent, eye dose equivalent, and shallow dose equivalent from external exposure to the radioactive cloud.

(b) Airborne radioactivity measurements and DAC values shall not be used as the primary means to assess the deep dose equivalent when the airborne radioactive material includes radionuclides other than noble gases or if the cloud of airborne radioactive material is not relatively uniform. The determination of the deep dose equivalent to an individual shall be based upon measurements using instruments or individual monitoring devices. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, Oct. 17, 1994.)

28-35-212d. Determination of internal exposure. (a) When assessing the dose used to determine compliance with occupational dose equivalent limits, each licensee or registrant shall, when required pursuant to K.A.R. 28-35-217b, take suitable and timely measurements of any of the following:

(1) Concentrations of radioactive materials in the air in work areas;

(2) quantities of radionuclides in the body;

(3) quantities of radionuclides excreted from the body; or

(4) any combination of the measurements specified in paragraphs (a)(1) through (3).

(b)Unless respiratory protective equipment is used, as specified in K.A.R. 28-35-212g, or the assessment of intake is based on bioassays, the licensee or registrant shall assume that an individual inhales radioactive material at the airborne concentration in which the individual is present.

(c) If specific information on the physical and biochemical properties of the radionuclides taken into the body or the behavior of the material in an individual is known, the licensee or registrant may perform the following:

(1) Use that information to calculate the committed effective dose equivalent, and if used, the licensee or registrant shall document that information in the individual's record;

(2) before approval of the secretary, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material; and

(3) separately assess the contribution of fractional intakes of class D, W, or Y compounds of a given radionuclide to the committed effective dose equivalent.

(d) If the licensee or registrant chooses to assess intakes of class Y material using the measurements given in paragraph (a)(2) or (3), the licensee or registrant may delay the recording and reporting of the

assessments for periods up to seven months, unless otherwise required by K.A.R. 28-35-229a or K.A.R. 28-35-230a, in order to make additional measurements basic to the assessments.

(e) If the identity and concentration of each radionuclide in a mixture are known, the fraction of the DAC applicable to the mixture for use in calculating DAC-hours shall be either of the following:

(1) The sum of the ratios of the concentration to the appropriate DAC value, from appendix B published in " appendices to part 4: standards for protection against radiation," as adopted in K.A.R. 28-35-135a, for each radionuclide in the mixture; or

(2) the ratio of the total concentration for all radionuclides in the mixture to the most restrictive DAC value for any radionuclide in the mixture.

(f) If the identity of each radionuclide in a mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

(g) If a mixture of radionuclides in air exists, a licensee or registrant may disregard certain radionuclides in the mixture if all of the following conditions are met:

(1) The licensee or registrant uses the total activity of the mixture in demonstrating compliance with the dose limits in K.A.R. 28-35-212b and in complying with the monitoring requirements in K.A.R. 28-35-217a (d).

(2) The concentration of any radionuclide disregarded is less than 10 percent of its DAC.

(3) The total concentration of all of the radionuclides disregarded in the mixture does not exceed 30 percent.

(h) When determining the committed effective dose equivalent, the following information may be considered.

(1) In order to calculate the committed effective dose equivalent, the licensee or registrant may assume that the inhalation of one ALI, or an exposure of 2,000 DAC-hours, results in a committed effective dose equivalent of 0.05 Sv (5 rem) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

(2) For an ALI and the associated DAC determined by the nonstochastic organ dose limit of 0.50 Sv (50 rem), the intake of radionuclides that would result in a committed effective dose equivalent of 0.05 Sv (5 rem), which is the stochastic ALI, is listed in parentheses in appendix B, table I in " appendices to part 4: standards for protection against radiation," as adopted in K.A.R. 28-35-135a. The licensee or registrant may, as a simplifying assumption, use the stochastic ALI to determine the committed effective dose equivalent. However, if the licensee or registrant uses the stochastic ALI, the licensee or registrant shall also demonstrate that the limit in K.A.R. 28-35-212a(a)(1) (B) is met. (Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-212e. Determination of prior occupational dose. (a) For each individual who could enter the licensee's or registrant's restricted or controlled area and is likely to receive, in a year, an occupational dose requiring monitoring pursuant to K.A.R. 28-35-217a, the licensee or registrant shall perform the following:

(1) Determine the occupational radiation dose received during the current year; and

(2) attempt to obtain the records of lifetime cumulative occupational radiation dose.

(b) Before permitting an individual to participate in a planned special exposure, the licensee or registrant shall determine all of the following:

(1) The internal and external doses from all previous planned special exposures;

(2) all doses in excess of the limits, including the doses received during accidents and emergencies, by the individual; and

(3) all of the lifetime cumulative occupational radiation dose.

(c) In complying with the requirements of this regulation, a licensee or registrant may perform the following:

(1) Accept, as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual, or from the individual's most recent employer for work involving radiation exposure, that discloses the nature and the amount of any occupational dose that the individual received during the current year;

(2) accept, as the record of the lifetime cumulative radiation dose, an up-to-date record on a form prescribed by the department or an equivalent form, signed by the individual and countersigned by an

appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee or registrant; and

(3) obtain reports of the individual's dose equivalent from the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee or registrant, by telephone, telegram, facsimile, electronic mail, or letter. The licensee or registrant shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(d)(1) The licensee or registrant shall record the exposure history on a form prescribed by the department, or on a clear and legible record that includes all the information required on that form. The form or record shall show each period in which the individual received occupational exposure to radiation or radioactive material and shall be signed by the individual who received the exposure. For each period for which the licensee obtains reports, the licensee or registrant shall use the dose shown in the report in preparing the history. For any period in which the licensee or registrant does not obtain a report, the licensee or registrant shall place a notation in the history indicating the periods of time for which data are not available.

(2) A licensee or registrant shall not be required to reevaluate the separate external dose equivalents and internal committed dose equivalents or intakes of radionuclides assessed before January 1, 1994. Although occupational exposure histories obtained and recorded before January 1, 1994 did not include effective dose equivalent, the histories may be used in the absence of specific information on the intake of radionuclides by the individual.

(e) If the licensee or registrant is unable to obtain a complete record of an individual's current and previously accumulated occupational dose, the licensee or registrant shall assume the following:

(1) That, in establishing administrative controls under K.A.R. 28-35-212a(f) for the current year, the allowable dose limit for the individual has been reduced by 12.5 mSv (1.25 rem) for each quarter for which records were unavailable and the individual was engaged in activities that could have resulted in occupational radiation exposure; and

(2) that the individual is not available for planned special exposures.

(f) Each licensee or registrant shall retain the records of exposure history until the secretary terminates each pertinent license or registration requiring this record. Each licensee or registrant shall retain the information used in preparing records of exposure history for three years after the record is made. (Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-212f. Planned Special Exposures (a) A licensee or registrant may authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in K.A.R. 28-35-212a.

(b) The authorization of doses under K.A.R. 28-35-212f(a), called planned special exposure, shall only be permitted if each of the following conditions is satisfied.

(1) The licensee or registrant shall authorize a planned special exposure only in an exceptional ituation when alternatives that might avoid the higher exposure are unavailable or impractical.

(2) The licensee or registrant, and employer if the employer is not the licensee or registrant, shall specifically authorize the planned special exposure, in writing, before the exposure occurs.

(3) Before a planned special exposure, the licensee or registrant shall ensure that each individual involved is:

(A) informed of the purpose of the planned operation;

(B) informed of the estimated doses and associated potential risks and specific radiation levels or other conditions that might be involved in performing the task; and

(C) instructed in the measures to be taken to keep the dose ALARA considering other risks that may be present.

(4) Prior to permitting an individual to participate in a planned special exposure, the licensee or registrant shall ascertain prior doses as required by K.A.R. 28-35-212e during the lifetime of the individual for each individual involved.

(5) Subject to K.A.R. 28-35-212a(b), the licensee or registrant shall not authorize a planned special exposure that would cause an individual to receive a dose from all planned special exposures and all doses in excess of the limits to exceed:

(A) the numerical values of any of the dose limits in K.A.R. 28-35-212a in any year; or

(B) five times the annual dose limits in K.A.R. 28-35-212a during the individual's lifetime.

(6) The licensee or registrant shall maintain records of the conduct of a planned special exposure in accordance with K.A.R. 28-35-227g and shall submit a written report in accordance with K.A.R. 28-35-230c.

(7) The licensee or registrant shall record the best estimate of the dose resulting from the planned special exposure in the individual's record and shall inform the individual, in writing, of the dose within 30 days from the date of the planned special exposure. The dose from planned special exposures shall not be considered in controlling future occupational dose of the individual pursuant to K.A.R. 28-35-212a but shall be included in evaluations required by K.A.R. 28-35-212f(b)(4) and (5). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective Oct. 17, 1994.)

28-35-212g. Respiratory protection and controls to restrict internal exposure in restricted areas. (a) Use of process or other engineering controls. The licensee or registrant shall use, to the extent practicable, process or other engineering controls, such as containment or ventilation, to control the concentrations of radioactive material in air.

(b) Use of other controls. When it is not practicable to apply process or other engineering controls to control the concentrations of radioactive material in air to values below those that define an airborne radioactivity area, the licensee or registrant shall, consistent with maintaining the total effective dose equivalent ALARA, increase monitoring and limit intakes by one or more of the following means:

(1) control of access;

(2) limitation of exposure times;

(3) use of respiratory protection equipment; or

(4) other controls.

(c) Use of individual respiratory protection equipment.

(1) If the licensee or registrant uses respiratory protection equipment to limit intakes pursuant to K.A.R. 28-35-212g(b), the following conditions shall apply.

(A) Except as provided in K.A.R. 28-35-212g(c)(1)(B), the licensee or registrant shall use only respiratory protection equipment that is tested and certified or had certification extended by the national institute for occupational safety and health and the mine safety and health administration (NIOSH/MSHA).

(B) If the licensee or registrant wishes to use equipment that has not been tested or certified by the NIOSH/MSHA or has not had certification extended by the NIOSH/MSHA, or for which there is no schedule for testing extended by the NIOSH/MSHA, or for which there is no schedule for testing or certification, the licensee or registrant shall submit an application for authorized use of that equipment, including a demonstration by testing, or a demonstration on the basis of reliable test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use.

(C) The licensee or registrant shall implement and maintain a respiratory protection program that includes:

(i) air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;

(ii) surveys and bioassays, as appropriate, to evaluate actual intakes;

(iii) testing of respirators for operability immediately prior to each use;

(iv) written procedures regarding selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; supervision and training of personnel; monitoring, including air sampling and bioassays; and recordkeeping; and

(v) determination by a physician prior to initial fitting of respirators, and at least every 12 months thereafter, that the individual user is physically able to use the respiratory protection equipment.

(D) The licensee or registrant shall issue a written policy statement on respirator usage covering:

(i) the use of process or other engineering controls, instead of respirators;

(ii) routine, nonroutine, and emergency use of respirators; and

(iii) length of periods of respirator use and relief from respirator use.

(E) The licensee or registrant shall advise each respirator user that the user may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other

conditions that might require such relief; and

(F) the licensee or registrant shall use respiratory protection equipment within the equipment manufacturer's expressed limitations for type and mode of use and shall provide proper visual, communication, and other special capabilities, such as adequate skin protection, when needed.

(2) When estimating exposure of individuals to airborne radioactive materials, the licensee or registrant may make allowance for respiratory protection equipment used to limit intakes pursuant to K.A.R. 28-35-212g(b), provided that the following conditions, in addition to those in K.A.R. 28-35-212g(c)(1), are satisfied.

(A)(i) The licensee or registrant shall select respiratory protection equipment that provides a protection factor, specified in appendix A protection factor for registrant published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation", effective April 1994", greater than the multiple by which peak concentrations of airborne radioactive materials in the working area are expected to exceed the values specified in appendix B, table I, column 3 published in "Kansas Department of Health and Environment Appendixes to Part 4 Standards for Protection Against Radiation, effective April 1994". However, if the selection of respiratory protection equipment with a protection factor greater than the peak concentration is inconsistent with the goal specified in K.A.R. 28-35-212g(b) of keeping the total effective dose equivalent ALARA, the licensee or registrant may select respiratory protection equipment with a lower protection factor provided that such a selection would result in a total effective dose equivalent that is ALARA.

(ii) The concentration of radioactive material in the air that is inhaled when respirators are worn may be initially estimated by dividing the average concentration in air, during each period of uninterrupted use, by the protection factor. If the exposure is later found to be greater than initially estimated, the corrected value shall be used; if the exposure is later found to be less than initially estimated, the corrected value may be used.

(B) The licensee or registrant shall obtain authorization from the department before assigning respiratory protection factors in excess of those specified in K.A.R. 28-35-232a appendix A. The department may authorize a licensee or registrant to use higher protection factors on receipt of an application that:

(i) describes the situation for which a need exists for higher protection factors; and

(ii) demonstrates that the respiratory protection equipment provides these higher protection factors under the proposed conditions of use.

(3) In an emergency, the licensee or registrant shall use as emergency equipment only respiratory protection equipment that has been specifically certified or had certification extended for emergency use by the NIOSH/MSHA.

(4) The licensee or registrant shall notify the department in writing at least 30 days before the date that respiratory protection equipment is first used pursuant to either K.A.R. 28-35-212g(1) or (2). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective Oct. 17, 1994.)

28-35-213a. Occupational dose limits for minors. The annual occupational dose limit for a minor shall be 10 percent of the annual occupational dose limits specified for an adult worker in K.A.R. 28-35-212a. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept, 20, 1993; amended Oct. 17, 1994.)

28-35-213b. Dose to an embryo or fetus. (a) Each licensee or registrant shall ensure that the dose to an embryo or fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 5 mSv (0.5 rem).

(b) Each licensee or registrant shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman in order to satisfy the limit in subsection (a).

(c) The dose to an embryo or fetus shall be the sum of the following:

(1) The dose to the embryo or fetus from radionuclides in the embryo or fetus and radionuclides in the declared pregnant woman; and

(2) either of the following doses that is more representative of the dose to the embryo or fetus from external radiation:

(A) If multiple measurements have not been made, assignment of the highest deep dose equivalent for the declared pregnant woman shall be the dose to the embryo or fetus as specified in K.A.R. 28-35-212e; or

(B) if multiple measurements have been made, assignment of the deep dose equivalent for the declared pregnant woman from the individual monitoring device that is most representative of the dose to the embryo or fetus shall be the dose of the embryo or fetus. Assignment of the highest deep dose equivalent for the declared pregnant woman to the embryo or fetus shall not be required unless that dose is also the most representative deep dose equivalent for the region of the embryo or fetus.

(d) If by the time the woman declares pregnancy to the licensee or registrant, the dose to the embryo or fetus has exceeded 4.5 mSv (0.45 rem), the licensee or registrant shall be deemed to be in compliance with subsection (a) if the additional dose to the embryo or fetus does not exceed 0.50 mSv (0.05 rem) during the remainder of the pregnancy. (Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-214a. Dose limits for individual members of the public. (a) Each licensee or registrant shall conduct operations so that:

(1) the total effective dose equivalent to individual members of the public from the licensed or registered operation does not exceed 1 mSv (0.1 rem) in a year, exclusive of the dose contribution from the licensee's or registrant's disposal of radioactive material into sanitary sewerage in accordance with K.A.R. 28-35-224a; and

(2) the dose in any unrestricted area from external sources does not exceed 0.02 mSv (0.002 rem) in any one hour.

(b) If the licensee or registrant permits members of the public to have access to controlled areas, the limits for members of the public shall continue to apply to those individuals.

(c) A licensee, registrant, or an applicant for a license or registration may apply for prior department authorization to operate up to an annual dose limit for an individual member of the public of 5 mSv (0.5 rem). This application shall include the following information:

(1) demonstration of the need for and the expected duration of operations in excess of the limit in K.A.R. 28-35-214a(a)(1) or (2);

(2) the licensee's or registrant's program to assess and control dose within the 5 mSv (0.5 rem) annual limit; and

(3) the procedures to be followed to maintain the dose ALARA. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-214b. Compliance with dose limits for individual members of the public. (a) The licensee or registrant shall make or cause to be made surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits for individual members of the public in K.A.R. 28-35-214a.

(b) A licensee or registrant shall show compliance with the annual dose limit in K.A.R. 28-35-214a by:

(1) demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed or registered operation does not exceed the annual dose limit; or

(2) demonstrating that:

(A) the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in appendix B, table II published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation", effective April 1994; and

(B) if an individual were continually present in an unrestricted area, the dose from external sources would not exceed 0.02 mSv (0.002 rem) in an hour and 0.50 msv (0.05 rem) in a year.

(c) Upon approval from the department, the licensee or registrant may adjust the effluent concentration values in appendix B, table II published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation", effective April 1994, for members of the

public, to take into account the actual physical and chemical characteristics of the effluents, including aerosol size distribution, solubility, density, radioactive decay equilibrium, and chemical form. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-216a. Testing for leakage or contamination of sealed sources. (a) Each licensee in possession of any sealed source shall ensure that all of the following requirements are met:

(1) Each sealed source, except as specified in subsection (b) of this regulation, shall be tested for leakage or contamination, and the test results shall be received before the sealed source is put into use, unless the licensee has a certificate from the transferor indicating that the sealed source was tested within six months before transfer to the licensee.

(2) Each sealed source that is not designed to emit alpha particles shall be tested for leakage or contamination at intervals not to exceed six months or at alternative intervals approved by the secretary, an agreement state, a licensing state, or the nuclear regulatory commission.

(3) Each sealed source designed to emit alpha particles shall be tested for leakage or contamination at intervals not to exceed three months or at alternative intervals approved by the secretary, an agreement state, a licensing state, or the nuclear regulatory commission.

(4) For each sealed source required to be tested for leakage or contamination, whenever there is reason to suspect that the sealed source might have been damaged or might be leaking, the licensee shall ensure that the sealed source is tested for leakage or contamination before further use.

(5) Tests for leakage for all sealed sources shall be capable of detecting the presence at 185 Bq (0.005 μ Ci) of radioactive material on a test sample. Test samples shall be taken from the sealed source or from the surfaces of the container in which the sealed source is stored or mounted and on which one might expect contamination to accumulate. For a sealed source contained in a device, test samples shall be obtained when the source is in the "off" position.

(b) The following sealed sources shall be exempt from testing for leakage and contamination:

(1) Sealed sources containing only radioactive material with a half-life of fewer than 30 days;

(2) sealed sources containing only radioactive material as a gas;

(3) sealed sources containing 3.7 Mbq (100 μ Ci) or less of beta-emitting or photon-emitting material or 370 kBq (10 μ Ci) or less of alpha-emitting material;

(4) sealed sources containing only hydrogen-3;

(5) seeds of iridium-192 encased in nylon ribbon; and

(6) sealed sources, except sources used in radiation therapy that are stored, are not being used and are identified as in storage. The sources exempted from this test shall be tested for leakage before any use or transfer to another person, unless the person has been leak-tested within six months before the date of the use or transfer. The sources in storage shall be physically inventoried every six months and listed in the radioactive materials inventory.

(c) Each test for leakage or contamination from sealed sources shall be performed by a person specifically authorized by the secretary, an agreement state, a licensing state, or the nuclear regulatory commission to perform these services.

(d) All test results shall be recorded in units of becquerel or microcurie and maintained for inspection by the department.

(e) If any test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause the source to be decontaminated and repaired or to be disposed of in accordance with department regulations. The licensee shall file a report within five days of the test with the radiation control program, bureau of air and radiation, Kansas department of health and environment, describing the equipment involved, the test results, and the corrective action taken. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended December 30, 2005.)

28-35-217a. Conditions requiring individual monitoring of external and internal occupational dose. (a) Each licensee or registrant shall monitor exposures from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits of these regulations. At a minimum, each licensee

or registrant shall monitor occupational exposure to radiation and shall supply and require the use of individual monitoring devices by the following:

(1) Any adult likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of the limits specified in K.A.R. 28-35-212a;

(2) any minor or declared pregnant woman likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of any of the applicable limits specified in K.A.R. 28-35-213a or K.A.R. 28-35-213b; and

(3) any individual entering a high or very high radiation area.

(b) Except as specified in this regulation, each personnel-monitoring device that requires processing to determine the radiation dose and is utilized by the licensee or registrant to comply with this regulation, with other applicable parts of these regulations, or with conditions specified in a license or a registration shall be processed and evaluated by a dosimetry processor accredited by the "national voluntary laboratory accreditation program " of the national institute of standards and technology, and approved in this accreditation process for each type of radiation that most closely approximates each type of radiation for which the individual wearing the dosimeter is monitored.

(c) The requirements of subsection (b) in this regulation shall not apply to personnel-monitoring devices used to measure the dose to hands and forearms or to feet and ankles.

(d) To determine compliance with K.A.R. 28-35-212d, each licensee or registrant shall monitor the occupational intake of radioactive material by and assess the committed effective dose equivalent to the following:

(1) Any adult likely to receive, in one year, an intake in excess of 10 percent of the applicable ALI in appendix B, table I, columns 1 and 2 in " appendices to part 4: standards for protection against radiation," as adopted in K.A.R. 28-35-135a; and

(2) any minor or declared pregnant woman likely to receive, in one year, a committed effective dose equivalent in excess of 0.50 mSv (0.05 rem). (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-217b. General. (a) Each licensee or registrant shall make, or cause to be made, surveys that:

(1) provide measurements or evaluations demonstrating compliance with these regulations; and

(2) are necessary under the circumstances to evaluate:

(A) radiation levels;

(B) concentrations or quantities of radioactive material; and

(C) the potential radiological hazards that could be present.

(b) The licensee or registrant shall ensure that instruments and equipment used for quantitative radiation measurements, are calibrated at intervals not to exceed 12 months, for the type of radiation measured.

(c) The licensee or registrant shall ensure that adequate precautions are taken to prevent a deceptive exposure of an individual monitoring device. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

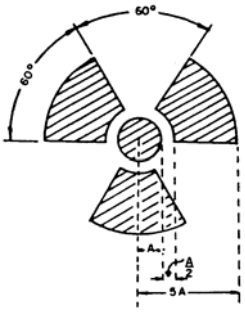
28-35-218a. Bioassays. Where necessary or desirable in order to aid in determining the extent of an individual's exposure to concentrations of radioactive material, a licensee may be required by the department, through license provisions or an order, to make available to the individual appropriate bioassay services and to furnish a copy of the reports of those services to the department. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993.)

28-35-219a. Caution signs and labels.

(a) General.

(1) Except as otherwise authorized by the department, the symbol prescribed by this regulation shall use the conventional radiation caution colors, which are magenta, purple or black on a yellow background. The symbol shall be the conventional three-blade design with the phrases and graphic as follows:

CAUTION (or DANGER)
RADIATION SYMBOL



(A) Cross-hatch area shall be magenta, purple, or black.
(B) Background shall be yellow.

(2) In addition to the contents of signs and labels prescribed in this regulation any licensee or registrant may provide on or near signs and labels any additional information that is appropriate in aiding individuals to minimize exposure to radiation.

(b) Radiation areas. Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the following words:

CAUTION (or DANGER)
RADIATION AREA

(c) High radiation areas.

(1) Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the following words:

CAUTION (or DANGER)
HIGH RADIATION AREA

(2) Each registrant or licensee shall ensure that the entrance or access point to a high radiation area meets one or more of the following conditions:

(A) Is equipped with a control device that, upon entry into the area, causes the level of radiation to be reduced below that at which an individual might receive a deep dose equivalent of 100 millirems (1.0 mSv) in one hour at 30 centimeters from any surface that the radiation penetrates; or

(B) is equipped with a control device that energizes a conspicuous visible or audible alarm signal in such a manner that the individual entering the high radiation area and the licensee or a supervisor of the activity is made aware of the entry; or

(C) is required to be locked except during periods when access to the area is required, with positive control over each individual entry.

(3) The controls required by paragraphs (c)(2) and (d)(2) shall be established so that no individual will be prevented from leaving a high radiation area or a very high radiation area.

(4) If a high radiation area is established for a period of 30 days or less, direct surveillance to prevent unauthorized entry may be substituted for the controls required by paragraph (c)(2) of this regulation.

(5) Any licensee or registrant may apply to the department for approval of methods not included in paragraphs (c)(2), (4), and (6) of this regulation. The proposed alternatives shall be approved by the secretary if the licensee or registrant demonstrates that the alternative methods of control will prevent unauthorized entry into a high radiation area, and that the requirement of paragraph (c)(3) of this regulation is met.

(6) In place of the controls required by this regulation for a high radiation area, the licensee or registrant may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

(7) The licensee or registrant shall not be required to control each entrance or access point to a room or other area that is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with the regulations of the U.S. department of transportation if the following conditions are met:

(A) The packages do not remain in the area longer than three days.

(B) The dose rate at one meter from the external surface of any package does not exceed 0.1 mSv (0.01 rem) per hour.

(8) The licensee or registrant shall not be required to control entrance or access to rooms or other areas in hospitals solely because of the presence of patients containing radioactive material if there are personnel in attendance who are taking the necessary precautions to prevent the exposure of individuals to radiation or radioactive material in excess of the established limits in these regulations and to operate within the ALARA provisions of the licensee's or registrant's radiation protection program.

(9) The registrant shall not be required to control entrance or access to rooms or other areas containing sources of radiation capable of producing a high radiation area as described in this regulation if the registrant has met all the specific requirements for access and control specified in other applicable regulations, part 7 for industrial radiography, part 5 for X-rays in the healing arts, and part 9 for particle accelerators.

(d) Very high radiation areas.

(1) Each very high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the following words:

GRAVE DANGER
VERY HIGH RADIATION AREA

(2) Each registrant or licensee shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to an area in which radiation levels could be encountered at five Gy (500 rad) or more in one hour at one meter from a source of radiation or any surface through which the radiation penetrates, a very high radiation area.

(A) Paragraph (d)(2) shall not apply to rooms or areas in which diagnostic x-ray systems are the only source of radiation, or to non-self-shielded irradiators.

(B) The registrant shall not be required to control entrance or access to rooms or other areas containing sources of radiation capable of producing a very high radiation area, as described in this regulation, if the registrant has met all the specific requirements for access and control specified in other applicable regulations , part 7 for industrial radiography, part 5 for X-rays in the healing arts, and part 9 for particle accelerators.

(3) Control of access to very high radiation areas; irradiators.

(A) Paragraph (d)(3) shall apply to licensees or registrants with sources of radiation in non-self-shielded irradiators and shall not apply to sources of radiation used in teletherapy, in industrial radiography, or in completely self-shielded irradiators in which the source of radiation is both stored and operated within the same shielding radiation barrier and, in the designed configuration of the irradiator, is always physically inaccessible to any individual and cannot create a high level of radiation in an area that is accessible to any individual.

(B) Each area in which there could exist radiation levels in excess of five Gy (500 rad) in one hour at one meter from a source of radiation that is used to irradiate materials shall be equipped with entry control devices that perform the following:

(i) Function automatically to prevent any individual from inadvertently entering a very high radiation area;

(ii) permit deliberate entry into the area only after a control device is actuated that causes the radiation level within the area, from the source of radiation, to be reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in one hour; and

(iii) prevent operation of the source of radiation if the source would produce radiation levels in the area that could result in a deep dose equivalent to an individual in excess of one mSv (0.1 rem) in one hour.

(C) Additional control devices shall be provided so that, upon failure of the entry control devices to function as required in this regulation, both of the following will occur:

(i) The radiation level within the area, from the source of radiation, is reduced below the level at which it would be possible for an individual to receive a deep dose equivalent in excess of one mSv (0.1 rem) in one hour.

(ii) Conspicuous visible and audible alarm signals are generated to make an individual attempting to enter the area aware of the hazard and at least one other authorized individual who is physically present, familiar with the activity, and prepared to render or summon assistance aware of the failure of the entry control devices.

(D) The licensee or registrant shall provide control devices so that, upon the failure or removal of physical radiation barriers other than the sealed sources shielded storage container, both of the following will occur:

(i) The radiation level from the source of radiation is reduced below the level at which it would be possible for an individual to receive a deep dose equivalent in excess of one mSv (0.1 rem) in one hour.

(ii) Conspicuous visible and audible alarm signals are generated to make potentially affected individuals aware of the hazard and to make the licensee, registrant, or at least one other individual who is familiar with the activity and prepared to render or summon assistance aware of the failure or removal of the physical barrier.

(E) If the shield for stored sealed sources is a liquid, the licensee or registrant shall provide the means to monitor the integrity of the shield and to automatically signal the loss of adequate shielding.

(F) Physical radiation barriers that comprise permanent structural components, including walls, that have no credible probability of failure or removal in ordinary circumstances shall not be required to meet the requirements of paragraphs (d)(3)(D) and (E).

(G) Each area shall be equipped with devices that automatically generate conspicuous visible and audible alarm signals to alert personnel in the area before the source of radiation can be put into operation and in time for any individual in the area to operate a clearly identified control device, which shall be installed in the area and which shall prevent the source of radiation from being put into operation.

(H) Each area shall be controlled by the use of any administrative procedures and devices which are necessary to ensure that the area is cleared of personnel before each use of the source of radiation.

(I) Each area shall be checked by a measurement of the radiation to ensure that, before the first individual's entry into the area after any use of the source of radiation, the radiation level from the source of radiation in the area is below the level at which it would be possible for an individual to receive a deep dose equivalent in excess of one mSv (0.1 rem) in one hour.

(J) The entry control devices required in paragraph (d)(3) shall be tested for proper functioning.

(i) Testing shall be conducted before initial operation with the source of radiation on any day, unless operations were continued uninterrupted from the previous day.

(ii) Testing shall be conducted before resuming operation of the source of radiation after any unintentional interruption.

(iii) The licensee or registrant shall submit and adhere to a schedule for periodic tests of the entry control and warning systems.

(K) The licensee or registrant shall not conduct operations, other than those necessary to place the source of radiation in safe condition or to effect repairs on controls, unless the control devices are functioning properly.

(L) Entry and exit portals that are used in transporting materials to and from the irradiation area and that are not intended for use by individuals shall be controlled by those devices and administrative procedures necessary to physically protect and warn against inadvertent entry by any individual through these portals. Exit portals for irradiated materials shall be equipped to detect and signal the presence of any loose radioactive material that is carried toward such an exit and automatically to prevent any loose radioactive material from being carried out of the area.

(4) Licensees, registrants, or applicants for licenses or registrations for sources of radiation subject to paragraph (d)(3) that will be used in a variety of positions or in locations including open fields or forests that make it impracticable to comply with certain requirements of this regulation, including those for the automatic control of radiation levels, may apply to the department for approval of alternative safety measures. Alternative safety measures that are at least equivalent to those specified in paragraph (d)(3) shall be provided. At least one of the alternative measures shall include an entry-preventing interlock control based on a measurement of the radiation that ensures the absence of high radiation levels before an individual can gain access to the area where such sources of radiation are used.

(e)Airborne radioactivity areas. Each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the following words:

CAUTION (or DANGER)
AIRBORNE RADIOACTIVITY AREA

(f) Additional requirements.

Each area or room in which any radioactive material is used or stored in an amount exceeding 10 times the quantity of radioactive material listed in appendix C in "appendices to part 4: standards for protection against radiation," as adopted by reference in K.A.R. 28-35-135a, shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the following words:

CAUTION (or DANGER)
RADIOACTIVE MATERIAL

(g) Containers.

(1) Except as otherwise provided in this subsection, each container of radioactive material shall bear a durable, clearly visible label identifying the radioactive contents.

(2) Each label required by paragraph (g) (1) shall bear the radiation caution symbol and the following words:

CAUTION (or DANGER)
RADIOACTIVE MATERIAL

Each label shall also provide sufficient information to permit the individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures. As appropriate, the label information may include radiation levels, description of the contents, an estimate of the activity, and the date for which the activity is estimated.

(3) The labeling required under subsection (g) (1) of this regulation shall not be required for any of the following:

(A) Containers that do not contain radioactive material in quantities greater than the applicable quantities listed in appendix C in " appendices to part 4: standards for protection against radiation," which is adopted by reference in K.A.R. 28-35-135a;

(B) containers that do not contain radioactive material in concentrations greater than the applicable concentrations listed in appendix B, table I, column 2 in " appendices to part 4: standards for protection against radiation" which is adopted by reference in K.A.R. 28-35-135a;

(C) containers attended by an individual who takes the precautions necessary to prevent the exposure of any individual to radiation or radioactive material in excess of the limits established by these regulations;

(D) containers in transport and packaged and labeled in accordance with the U.S. department of transportation regulations;

(E) containers that are accessible only to individuals authorized to handle or use them or to work in the containers' vicinity, if the contents are identified to those individuals by a readily available written record, including containers in water-filled canals, storage vaults, hot cells , and similar locations; or

(F) manufacturing and process equipment , including piping and tanks.

(4) Before disposing of an empty uncontaminated container in unrestricted areas, each licensee shall remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive material.

(h) Each radiation machine shall be labeled in a manner cautioning individuals that radiation is produced when the machine is being operated. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-220a. Exceptions from posting, labeling, and color requirements. (a) Notwithstanding the provisions of K.A.R. 28-35-219, the posting of a caution sign shall not be required in an area or room containing radioactive material for periods of less than eight hours if both of the following conditions are met:

(1) The material is constantly attended during those periods by an individual who takes the precautions necessary to prevent the exposure of any individual to radiation or radioactive material in excess of the limits established in this part.

(2) The area or room is subject to the licensee's or registrant's control.

(b) Notwithstanding the requirements of K.A.R. 28-35-219a, licensees and registrants shall be allowed to label sources, source holders, or device components containing sources of radiation that are subject to high temperatures, with conspicuously etched or stamped radiation caution symbols without a color requirement.

(c) The posting of a caution sign shall not be required in any room or other area in a hospital that is occupied by patients if either of the following occurs:

(1) A patient being treated with a permanent implant could be released from confinement pursuant to part 6.

(2) A patient being treated with a therapeutic radiopharmaceutical could be released from confinement pursuant to part 6.

(d) The posting of a caution sign shall not be required in any room or area because of the presence of a sealed source if the radiation levels at 30 centimeters from the surface of the sealed source or housing do not exceed 0.05 mSv (0.005 rem) per hour.

(e) The posting of a caution sign shall not be required in any room or area because of the presence of radiation machines used solely for diagnosis in the healing arts, dentistry, or podiatry. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-221a. Procedures for picking up, receiving and opening packages. (a) (1) Each licensee or registrant who expects to receive a package containing quantities of radioactive material in excess of the type A quantities specified in K.A.R. 28-35-221b:

(A) if the package is to be delivered to the licensee's or registrant's facility by the carrier, shall make arrangements to receive the package when it is offered for delivery by the carrier; or

(B) if the package is to be picked up by the licensee or registrant at the carrier's terminal, shall make arrangements to receive notification from the carrier of the arrival of the package, at the time of arrival.

(2) Each licensee or registrant who picks up a package of radioactive material from a carrier's terminal shall pick up the package expeditiously upon receipt of notification from the carrier of its arrival.

(b)(1) Each licensee or registrant, upon receipt of a package of radioactive material, shall monitor the external surfaces of each package labeled with U.S. department of transportation radioactive white I, radioactive yellow II or III labels, as specified in 49 CFR 172.403 and 172.436-440 in effect January 1, 1993, for radioactive contamination caused by leakage of the radioactive contents. Each licensee or registrant shall also monitor for radiation levels on each package containing quantities of radioactive materials that are more

than or equal to the type A quantity defined in K.A.R. 28-35-221b. Each licensee or registrant shall monitor each package known to contain radioactive materials for radioactive contamination and radiation levels if there is evidence of degradation of package integrity. The monitoring shall be performed as soon as practicable after receipt, but not later than three hours after the package is received at the licensee's facility if received during the licensee's normal working hours or three hours from the beginning of the next working day if received after normal working hours. The licensee or registrant, shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the department when:

(A) removable radioactive surface contamination exceeds the limits of K.A.R. 28-35-221b table V of these regulations; or

(B) external radiation levels exceed the limits of K.A.R. 28-35-221b(e) and (f).

(c) Each licensee or registrant shall establish and maintain procedures for safely opening packages in which radioactive material is received and shall assure that these procedures are followed and that due consideration is given to special instructions for the type of package being opened.

(d) Licensees or registrants transferring special form sources in vehicles owned or operated by the licensee or registrant to and from a work site shall be exempt from the contamination monitoring requirements of K.A.R. 28-35-221a, but shall not be exempt from the monitoring requirement in K.A.R. 28-35-221a for measuring radiation levels that ensures that the source is still properly lodged in its shield. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-221b. Appendix A; determination of A_1 and A_2 and B quantities.

(a) Single radionuclides.

(1) For a single radionuclide of known identity, the values of A_1 and A_2 shall be taken from Table I if listed there. The values A_1 and A_2 in Table I shall also be applicable for the radionuclide contained in (α,n) or (γ,n) neutron sources.

(2) For any single radionuclide whose identity is known but which is not listed in Table I, the value of A_1 and A_2 shall be determined according to the following procedure:

(A) If the radionuclide emits only one type of radiation, A_1 shall be determined according to the following method. For radionuclides emitting different kinds of radiation, the value of A_1 shall be the most restrictive value of those determined for each kind of radiation. However, in either case, A_1 shall be no more than 1000 curies (37 TBq). If a parent nuclide decays into a shorter lived daughter with a half-life not greater than 10 days, A_1 shall be calculated for both the parent and the daughter, and the more limiting of the two values shall be assigned to the parent nuclide.

(i) For gamma emitters, A_1 shall be determined by the expression:

$$A_1 = \frac{9}{\Gamma} curies$$

where Γ is the gamma-ray constant, corresponding to the dose in roentgens per curie-hour at one meter, and the number nine results from the choice of one rem per hour at a distance of three meters as the reference dose-equivalent rate.

(ii) For x-ray emitters, A_1 shall be determined by the atomic number of the nuclide:

for $Z \leq 55$, A_1 = 1000 Ci (37 TBq); and

for $Z > 55$, A_1 = 200 Ci (7.4 TBq)

where Z is the atomic number of the nuclide.

(iii) For beta emitters, A_1 shall be determined by the maximum beta energy (E_{max}) according to Table II; and

(iv) For alpha emitters, A_1 shall be determined by the expression:

$$A_1 = 1000\ A_3$$

where A_3 is the value listed in Table III;

(B) A_2 is the more restrictive of the following two values:

(i) The corresponding A_1; and

(ii) The value A_3 obtained from Table III.

(3) For any single radionuclide whose identity is unknown, the value of A_1 shall be taken to be 2 Ci (74 GBq) and the value of A_2 shall be taken to be 0.002 Ci (74 MBq). However, if the atomic number of the radionuclide is known to be less than 82, the value of A_1, shall be taken to be 10 Ci (370 GBq) and the value of A_2 shall be taken to be 0.4 Ci (14.8 GBq).

(b) Mixtures of radionuclides, including radioactive decay chains.

(1) For mixed fission products, the following activity limit shall be assumed if a detailed analysis of the mixture is not carried out.

A_1 = 10 Ci (370 GBq)

A_2 = 0.4 Ci (14.8 GBq)

(2) A single radioactive decay chain shall be considered to be a radionuclide when the radionuclides are present in their naturally occurring proportions and no daughter nuclide has a half-life either longer than ten days or longer than that of the parent nuclide. The activity to be taken into account and the A_1 or A_2 value from table I to be applied are those corresponding to the parent nuclide of that chain. When calculating A_1 or A_2 values, radiation emitted by daughters shall be considered. However, in the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than ten days or greater than that of the parent nuclide, the parent and daughter nuclides shall be considered to be mixtures of different nuclides.

(3) In the case of a mixture of different radionuclides, where the identity and activity of each radionuclide are known, the permissible activity of each radionuclide R_1, R_2. . . R_n is such that F_1, + F_2 + . . . F_n is not greater than unity, where:

$$F_1 = \frac{\text{total activity of } \mathrm{R}_1}{\mathrm{A}_1(R_1)}$$

$$F_2 = \frac{\text{total activity of } \mathrm{R}_2}{\mathrm{A}_1(R_2)}$$

and

$$F_n = \frac{\text{total activity of } \mathrm{R}_{2_n}}{\mathrm{A}_1(R_n)}$$

A_1 (R_1, R_2 . . . R_n) is the value of A_1 or A_2 as appropriate for the nuclide R_1, R_2 . . . R_n.

(4) When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the formula given in paragraph three shall be applied to establish the values of A_1 or A_2 as appropriate. All the radionuclides whose individual activities are not known (their total activity will, however, be known) shall be classed in a single group and the most restrictive value of A_1 or A_2 applicable to any one of them shall be used as the value of A_1 or A_2 in the denominator of the fraction.

(5)Where the identity of each radionuclide is known but the individual activity of none of the radionuclides is known, the most restrictive value of A_1 or A_2 applicable to any one of the radionuclides present shall be adopted as the applicable value.

(6)When the identity of none of the nuclides is known, the value of A_1 shall be taken to be 2 Ci (74 GBq) and the value of A_2 shall be taken to be 0.002 Ci (74 MBq). However, if alpha emitters are known to be absent, the value of A_2 shall be taken to be 0.4 Ci (14.8 GBq).

Table I

A_1 and A_2 Values for Radionuclides

(See Footnotes at end of Table)

Symbol of radionuclide	Element and atomic number	A_1(Ci)	A_2(Ci)	SpecificActivity(Ci/g)
Ac-227	Actinium(89)	1000	0.003	$7.2x10^{1}$
Ac-228		10	4	$2.2x10^{6}$
Aq-105	Silver(47)	40	40	$3.1x10^{4}$
Aq-110m		7	7	$4.7x10^{3}$
Aq-111		100	20	$1.6x10^{5}$
Am-241	Americium(95)	8	0.008	3.2
Am-243		8	0.008	$1.9x10^{-1}$
Ar-37 (compressed or uncompressed)*	Argon (18)	1000	1000	$1.0x10^{5}$
Ar-41 (uncompressed)*		20	20	$4.3x10^{7}$
Ar-41 (compressed)*		1	1	$4.3x10^{7}$
As-73	Arsenic (33)	1000	400	$2.4x10^{4}$
As-74		20	20	$1.0x10^{5}$
As-76		10	10	$1.6x10^{6}$
As-77		300	20	$1.1x10^{6}$
At-211	Astatine (85)	200	7	$2.1x10^{6}$
Au-193	Gold (79)	200	200	$9.3x10^{5}$
Au-196		30	30	$1.2x10^{5}$
Au-198		40	20	$2.5x10^{5}$
AU-199		200	25	$2.1x10^{5}$
Ba-131	Barium (56)	40	40	$8.7x10^{4}$
Ba-133		40	40	$4.0x10^{2}$
Ba-140		20	20	$7.3x10^{4}$
Be-7	Beryllium (4)	300	300	$3.5x10^{5}$
Bi-206	Bismuth (83)	5	5	$9.9x10^{4}$
Bi-207		10	10	$2.2x10^{2}$
Bi-210 (RaE)		100	4	$1.2x10^{5}$
Bi-212		6	6	$1.5x10^{7}$
Bk-249	Berkelium (97)	1000	1	$1.8x10^{3}$
Br-77	Bromine (35)	70	25	$7.1x10^{5}$
Br-82		6	6	$1.1x10^{6}$
C-11	Carbon (6)	20	20	$8.4x10^{8}$
C-14		1000	60	4.6
Ca-45	Calcium (20)	1000	25	$1.9x10^{4}$
Ca-47		20	20	$5.9x10^{5}$
Cd-109	Cadmium (48)	1000	70	$2.6x10^{3}$
Cd-115m		30	30	$2.6x10^{4}$
Cd-115		80	20	$5.1x10^{5}$
Ce-139	Cerium (58)	100	100	$6.5x10^{3}$
Ce-141		300	25	$2.8x10^{4}$
Ce-143		60	20	$6.6x10^{5}$
Ce-144		10	7	$3.2x10^{3}$
Cf-249	California (98)	2	0.002	3.1
Cf-250		7	0.007	$1.3x10^{2}$
Cl-36	Chlorine (17)	300	10	$3.2x10^{-2}$
Cl-38		10	10	$1.3x10^{8}$
Cm-242	Curium (96)	200	0.2	$3.3x10^{3}$
Cm-243		9	0.009	$4.2x10^{1}$
Cm-244		10	0.01	$8.2x10^{1}$

Cm-245		**6**	**0.006**	**$1.0x10^{-1}$**
Cm-246		**6**	**0.006**	**$3.6x10^{-1}$**
Co-56	**Cobalt (27)**	**5**	**5**	**$3.0x10^{4}$**
Co-57		**90**	**90**	**$8.5x10^{3}$**
Co-58m		**1000**	**1000**	**$5.9x10^{6}$**
Co-58		**20**	**20**	**$3.1x10^{4}$**
Co-60		**7**	**7**	**$1.1x10^{3}$**
Cr-51	**Chromium (24)**	**600**	**600**	**$9.2x10^{4}$**
Cs-129	**Cesium (55)**	**40**	**40**	**$7.6X10^{5}$**
Cs-131		**1000**	**1000**	**$1.0x10^{5}$**
Cs-134m		**1000**	**10**	**$7.4x10^{6}$**
Cs-134		**10**	**10**	**$1.2x10^{3}$**
Cs-135		**1000**	**25**	**$8.8x10^{-4}$**
Cs-136		**7**	**7**	**$7.4x10^{4}$**
Cs-137		**30**	**10**	**$9.8x10^{1}$**
Cu-64	**Copper (29)**	**80**	**25**	**$3.8x10^{6}$**
Cu-67		**200**	**25**	**$7.9x10^{5}$**
Dy-165	**Dysprosium (66)**	**100**	**20**	**$8.2x10^{6}$**
Dy-166		**1000**	**200**	**$2.3x10^{5}$**
Er-169	**Erbium (68)**	**1000**	**25**	**$8.2x10^{4}$**
Er-171		**50**	**20**	**$2.4x10^{6}$**
Eu-152m	**Europium (63)**	**30**	**30**	**$2.2x10^{6}$**
Eu-152		**20**	**10**	**$1.9x10^{2}$**
Eu-154		**10**	**5**	**$1.5x10^{2}$**
Eu-155		**400**	**60**	**$1.4x10^{3}$**
F-18	**Fluorine (9)**	**20**	**20**	**$9.3x10^{7}$**
Fe-52	**Iron (26)**	**5**	**5**	**$7.3x10^{6}$**
Fe-55		**1000**	**1000**	**$2.2x10^{3}$**
Fe-59		**10**	**10**	**$4.9x10^{4}$**
Ga-67	**Gallium (31)**	**100**	**100**	**$6.0x10^{5}$**
Ga-68		**10**	**20**	**$4.0x10^{7}$**
Ga-72		**7**	**7**	**$3.1x10^{6}$**
Gd-153	**Gadolinium (64)**	**200**	**100**	**$3.6x10^{3}$**
Gd-159		**300**	**20**	**$1.1x10^{6}$**
Ge-68	**Germanium (32)**	**20**	**10**	**$7.0x10^{3}$**
Ge-71		**1000**	**1000**	**$1.6x10^{5}$**
H-3	**Hydrogen (1) see T-Tritium**			
Hf-181	**Hafnium (72)**	**30**	**25**	**$1.6x10^{4}$**
Hg-197m	**Mercury (80)**	**200**	**200**	**$6.6x10^{5}$**
Hg-197		**200**	**200**	**$2.5x10^{5}$**
Hg-203		**80**	**25**	**$1.4x10^{4}$**
Ho-166	**Holmium (67)**	**30**	**30**	**$6.9x10^{5}$**
I-123	**Iodine (53)**	**50**	**50**	**$1.9x10^{6}$**
I-125		**1000**	**70**	**$1.7x10^{4}$**
I-126		**40**	**10**	**$7.8x10^{4}$**
I-129		**1000**	**2**	**$1.6x10^{-4}$**
I-131		**40**	**10**	**$1.2x10^{5}$**
I-132		**7**	**7**	**$1.1x10^{7}$**
I-133		**30**	**10**	**$1.1x10^{6}$**
I-134		**8**	**8**	**$2.7x10^{7}$**
I-135		**10**	**10**	**$3.5x10^{6}$**

In-111	**Indium (49)**	**30**	**25**	**$4.2x10^5$**
In-113m		**60**	**60**	**$1.6x10^7$**
In-114m		**30**	**20**	**$2.3x10^4$**
In-115m		**100**	**20**	**$6.1x10^6$**
Ir-190	**Iridium (77)**	**10**	**10**	**$6.2x10^4$**
Ir-192		**20**	**10**	**$9.1x10^3$**
Ir-194		**10**	**10**	**$8.5x10^5$**
K-42	**Pottassium (19)**	**10**	**10**	**$6.0x10^6$**
K-43		**20**	**10**	**$3.3x10^6$**
Kr-85m (uncompressed)*	**Krypton (36)**	**100**	**100**	**$8.4x10^6$**
Kr-85m (compressed)*		**3**	**3**	**$8.4x10^6$**
Kr-85 (uncompressed)*		**1000**	**1000**	**$4.0x10^2$**
Kr-85 (compressed)*		**5**	**5**	**$4.0x10^2$**
Kr-87 (uncompressed)*		**20**	**20**	**$2.8x10^7$**
Kr-87 (compressed)*		**0.6**	**0.6**	**$2.8x10^7$**
La-140	**Lanthanum (57)**	**30**	**30**	**$5.6x10^5$**
Lu-177	**Lutetium (71)**	**300**	**25**	**$1.1x10^5$**
MFP	**Mixed Fission Products**	**10**	**0.4**	**---**
Mg-28	**Magnesium (12)**	**6**	**6**	**$5.2x10^6$**
Mn-52	**Manganese (25)**	**5**	**5**	**$4.4x10^5$**
Mn-54		**20**	**20**	**$8.3x10^3$**
Mn-56		**5**	**5**	**$2.2x10^7$**
Mo-99	**Molybdenum (42)**	**100**	**20**	**$4.7x10^5$**
N-13	**Nitrogen (7)**	**20**	**10**	**$1.5x10^9$**
Na-22	**Sodium (11)**	**8**	**8**	**$6.3x10^3$**
Na-24		**5**	**5**	**$8.7x10^6$**
Nb-93m	**Niobium (41)**	**1000**	**200**	**$1.1x10^3$**
Nb-95		**20**	**20**	**$3.9x10^4$**
Nb-97		**20**	**20**	**$2.6x10^7$**
Nd-147	**Neodymium (60)**	**100**	**20**	**$8.0x10^4$**
Nd-149		**30**	**20**	**$1.1x10^7$**
Ni-59	**Nickel (28)**	**1000**	**900**	**$8.1x10^{-2}$**
Ni-63		**1000**	**100**	**$4.6x10^1$**
Ni-65		**10**	**10**	**$1.9x10^7$**
Np-237	**Neptunium (93)**	**5**	**0.005**	**$6.9x10^{-4}$**
Np-239		**200**	**25**	**$2.3x10^5$**
Os-185	**Osmium (76)**	**20**	**20**	**$7.3x10^3$**
Os-191		**600**	**200**	**$4.6x10^4$**
Os-191m		**200**	**200**	**$1.2x10^6$**
Os-193		**100**	**20**	**$5.3x10^5$**
P-32	**Phosphorus (15)**	**30**	**30**	**$2.9x10^5$**
Pa-230	**Protactinium (91)**	**20**	**0.8**	**$3.2x10^4$**
Pa-231		**2**	**0.002**	**$4.5x10^{-2}$**
Pa-233		**100**	**100**	**$2.1x10^4$**
Pb-201	**Lead (82)**	**20**	**20**	**$1.7x10^6$**
Pb-210		**100**	**0.2**	**$8.8x10^1$**
Pb-212		**6**	**5**	**$1.4x10^6$**
Pd-103	**Palladium (46)**	**1000**	**700**	**$7.5x10^4$**
Pd-109		**100**	**20**	**$2.1x10^6$**
Pm-147	**Promethium (61)**	**1000**	**25**	**$9.4x10^2$**

Pm-149		**10**	**20**	**$4.2x10^{5}$**
Po-210	**Polonium (84)**	**200**	**0.2**	**$4.5x10^{3}$**
Pr-142	**Praseodymium (59)**	**10**	**10**	**$1.2x10^{4}$**
Pr-143		**300**	**20**	**$6.6x10^{4}$**
Pt-191	**Platinum (78)**	**100**	**100**	**$2.3x10^{5}$**
Pt-193m		**200**	**200**	**$2.0x10^{5}$**
Pt-197m		**300**	**20**	**$1.2x10^{7}$**
Pt-197		**300**	**20**	**$8.8x10^{5}$**
Pu-238	**Plutonium (94)**	**3**	**0.003**	**$1.7x10^{1}$**
Pu-239		**2**	**0.002**	**$6.2x10^{-2}$**
Pu-240		**2**	**0.002**	**$2.3x10^{-1}$**
Pu-241		**1000**	**0.1**	**$1.1x10^{2}$**
Pu-242		**3**	**0.003**	**$3.9x10^{-3}$**
Ra-223	**Radium (88)**	**50**	**0.2**	**$5.0x10^{4}$**
Ra-224		**6**	**0.5**	**$1.6x10^{5}$**
Ra-226		**10**	**0.05**	**1.0**
Ra-228		**10**	**0.05**	**$2.3x10^{2}$**
Rb-81	**Rubidium (37)**	**30**	**24**	**$8.2x10^{6}$**
Rb-86		**30**	**30**	**$8.1x10^{4}$**
Rb-87		**Unlimited**	**Unlimited**	**$6.6x10^{-8}$**
Rb (natural)		**Unlimited**	**Unlimited**	**$1.8x10^{-8}$**
Re-186	**Rhenium (75)**	**100**	**20**	**$1.9x10^{5}$**
Re-187		**Unlimited**	**Unlimited**	**$3.8x10^{-8}$**
Re-188		**10**	**10**	**$1.0x10^{6}$**
Re (natural)		**Unlimited**	**Unlimited**	**$2.4x10^{-8}$**
Rh-103m	**Rhodium (45)**	**1000**	**1000**	**$3.2x10^{7}$**
Rh-105		**200**	**25**	**$8.2x10^{5}$**
Rn-222	**Radon (86)**	**10**	**2**	**$1.5x10^{5}$**
Ru-97	**Ruthenium (44)**	**80**	**80**	**$5.5x10^{5}$**
Ru-103		**30**	**25**	**$3.2x10^{4}$**
Ru-105		**20**	**20**	**$6.6x10^{6}$**
Ru-106		**10**	**7**	**$3.4x10^{3}$**
S-35	**Sulphur (16)**	**1000**	**60**	**$4.3x10^{4}$**
Sb-122	**Antimony (51)**	**30**	**30**	**$3.9x10^{5}$**
Sb-124		**5**	**5**	**$1.8x10^{4}$**
Sb-125		**40**	**25**	**$1.4x10^{3}$**
Sc-46	**Scandium (21)**	**8**	**8**	**$3.4x10^{4}$**
Sc-47		**200**	**20**	**$8.2x10^{5}$**
Sc-48		**5**	**5**	**$1.5x10^{6}$**
Se-75	**Selenium (34)**	**40**	**40**	**$1.4x10^{4}$**
Si-31	**Silicon (14)**	**100**	**20**	**$3.9x10^{7}$**
Sm-147	**Samarium (62)**	**Unlimited**	**Unlimited**	**$2.0x10^{-8}$**
Sm-151		**1000**	**90**	**$2.6x10^{1}$**
Sm-153		**300**	**20**	**$4.4x10^{5}$**
Sn-113	**Tin (50)**	**60**	**60**	**$1.0x10^{4}$**
Sn-119m		**100**	**100**	**$4.4x10^{3}$**
Sn-125		**10**	**10**	**1.1x10**
Sr-85m	**Strontium (38)**	**80**	**80**	**$3.2x10^{7}$**
Sr-85		**30**	**30**	**$2.4x10^{4}$**
Sr-85m		**50**	**50**	**$1.2x10^{7}$**
Sr-89		**100**	**10**	**$2.9x10^{4}$**

Sr-90		**10**	**0.4**	**$1.5x10^{2}$**
Sr-91		**10**	**10**	**$3.6x10^{6}$**
Sr-92		**10**	**10**	**$1.3x10^{7}$**
T (uncompressed)*	**Tritium (1)**	**1000**	**1000**	**$9.7x10^{3}$**
T (compressed)*		**1000**	**1000**	**$9.7x10^{3}$**
T (activated luminous paint)		**1000**	**1000**	**$9.7x10^{3}$**
T (absorbed on solid carrier)		**1000**	**1000**	**$9.7x10^{3}$**
T (tritiated water)		**1000**	**1000**	**$9.7x10^{3}$**
T (other forms)		**20**	**20**	**$9.7x10^{3}$**
Ta-182	**Tantalum (73)**	**20**	**20**	**$6.2x10^{3}$**
Tb-160	**Terbium (65)**	**20**	**10**	**$1.1x10^{4}$**
Tc-96m	**Technetium (43)**	**1000**	**1000**	**$3.8x10^{7}$**
Tc-96		**6**	**6**	**$3.2x10^{5}$**
Tc-97m		**1000**	**200**	**$1.5x10^{4}$**
Tc-97		**1000**	**400**	**$1.4x10^{-3}$**
Tc-99m		**100**	**100**	**$5.2x10^{6}$**
Tc-99		**1000**	**25**	**$1.7x10^{-2}$**
Te-125m	**Tellurium (52)**	**1000**	**100**	**$1.8x10^{4}$**
Te-127m		**300**	**20**	**$4.0x10^{4}$**
Te-127		**300**	**20**	**$2.6x10^{6}$**
Te-129m		**30**	**10**	**$2.5x10^{4}$**
Te-129		**100**	**20**	**$2.0x10^{7}$**
Te-131m		**10**	**10**	**$8.0x10^{5}$**
Te-132	**7**		**7**	**$3.1x10^{5}$**
Th-227	**Thorium (90)**	**200**	**0.2**	**$3.2x10^{4}$**
Th-228		**6**	**0.008**	**$8.3x10^{2}$**
Th-230		**3**	**0.003**	**$1.9x10^{-2}$**
Th-231		**1000**	**25**	**$5.3x10^{5}$**
Th-232		**Unlimited**	**Unlimited**	**$1.1x10^{-7}$**
Th-234		**10**	**10**	**$2.3x10^{4}$**
Th (natural)		**Unlimited**	**Unlimited**	**$2.2x10^{-7}$**
Th (irradiated)**		**---**	**---**	**---**
Tl-200	**Thallium (81)**	**20**	**20**	**$5.8x10^{5}$**
Tl-201		**200**	**200**	**$2.2x10^{5}$**
Tl-202		**40**	**40**	**$5.4x10^{4}$**
Tl-204		**300**	**10**	**$4.3x10^{2}$**
Tm-170	**Thulium (69)**	**300**	**10**	**$6.0x10^{3}$**
Tm-171		**1000**	**100**	**$1.1x10^{3}$**
U-230	**Uranium (92)**	**100**	**0.1**	**$2.7x10^{4}$**
U-232		**30**	**0.03**	**$2.1x10^{1}$**
U-233		**100**	**0.1**	**$9.5x10^{-3}$**
U-234		**100**	**0.1**	**$6.2x10^{-3}$**
U-235		**100**	**0.2**	**$2.1x10^{-6}$**
U-236		**200**	**0.2**	**$6.3x10^{-5}$**
U-238		**Unlimited**	**Unlimited**	**$3.3x10^{-7}$**
U-(natural)		**Unlimited**	**Unlimited**	**seeTableIV**
U-(enriched) < 20%		**Unlimited**	**Unlimited**	**seeTableIV**
U-(enriched) 20% or greater		**100**	**0.1**	**seeTableIV**
U-(depleted)		**Unlimited**	**Unlimited**	**seeTableIV**

U (irradiated)***		---	---	---
V-48	Vanadium (23)	6	6	$1.7x10^5$
W-181	Tungsten (74)	200	100	$5.0x10^3$
W-185		1000	25	$9.7x10^{-3}$
W-187		40	20	$7.0x10^5$
Xe-127 (uncompressed)*	Xenon (54)	70	70	$2.8x10^4$
Xe-127 (compressed)*		5	5	$2.8x10^4$
Xe-131m (compressed)*		10	10	$1.0x10^5$
Xe-131m (uncompressed)*		100	100	$1.0x10^5$
Xe-133 (uncompressed)*		1000	1000	$1.9x10^5$
Xe-133 (compressed)*		5	5	$1.9x10^5$
Xe-135 (uncompressed)*		70	70	$2.5x10^5$
Xe-135 (compressed)*		2	2	$2.5x10^5$
Y-87	Yttrium (39)	20	20	$4.5x10^1$
Y-90		10	10	$2.5x10^5$
Y-91m		30	30	$4.1x10^7$
Y-91		30	30	$2.5x10^4$
Y-92		10	10	$9.5x10^6$
Y-93		10	10	$3.2x10^6$
Yb-169	Ytterbium (70)	80	80	$2.3x10^5$
Yd-175		400	25	$1.8x10^5$
Zn-65	Zinc (30)	30	30	$8.0x10^3$
Zn-69m		40	20	$3.3x10^6$
Zn-69		300	20	$5.3x10^7$
Zr-93	Zirconium (40)	1000	200	$3.5x10^{-3}$
Zr-95		20	20	$2.1x10^4$
Zr-97		20	20	$2.0x10^6$

* For the purpose of Table I, compressed gas means a gas at a pressure which exceeds the ambient atmospheric pressure at the location where the containment system was closed.

** The values of $A_1$and A_2 must be calculated in accordance with the procedure specified in Appendix A, paragraph II 3., taking into account the activity of the fission products and of the uranium-233 in addition to that of the thorium.

*** The values of A_1 and A_2 must be calculated in accordance with the procedure specified in Appendix A, paragraph II 3., taking into account the activity of the fission products and plutonium isotopes in addition to that of the uranium.

Table II
Relationship Between A_1 and E_{max} for the Beta Emitters

E_{max}(MeV)	A_1(Ci)
< 0.5	1000
0.5 - < 1.0	300
1.0 - < 1.5	100
1.5 - < 2.0	30
>2.0	10

Table III
Relationship Between A_1 and the Atomic Number

of the Radionuclide

A_1

Atomic Number	Half life less than 1000 days	Half live 1000 days to 10^6 years	Half live greater than 10^6 years
1 to 81	3 Ci	0.05 Ci	3 Ci
82 and above	0.002 Ci	0.002 Ci	3 Ci

Table IV
Activity-Mass Relationships for Uranium/Thorium

Thorium and Uranium Enrichment wt % U-235 present	Specific Activity	
	Ci/g	g/Ci
0.45	5.0×10^{-7}	2.0×10^{6}
0.72 (natural)	7.06×10^{-7}	1.42×10^{6}
1.0	7.6×10^{-7}	1.3×10^{6}
1.5	1.0×10^{-6}	1.0×10^{6}
5.0	2.7×10^{-6}	3.7×10^{5}
10.0	4.8×10^{-6}	2.1×10^{5}
20.0	1.0×10^{-5}	1.0×10^{5}
35.0	2.0×10^{-5}	5.0×10^{4}
50.0	2.5×10^{-5}	4.0×10^{4}
90.0	5.8×10^{-5}	1.7×10^{4}
93.0	7.0×10^{-5}	1.4×10^{4}
95.0	9.1×10^{-5}	1.1×10^{4}
Natural Thorium	2.2×10^{-7}	4.6×10^{6}

***The figures for uranium include representative values for the activity of the uranium-234 which is concentrated during the enrichment process. The activity for thorium includes the equilibrium concentration of thorium-228.**

(c) Type B quantity shall mean a quantity of radioactive materials greater than a type A quantity.

(d)The level of removable contamination on the external surfaces of each package shall, when averaged over the surface wiped, not exceed the limits given in table V below at any time during transport. The level of removable radioactive contamination shall be determined by wiping an area of 300 square centimeters of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements shall be taken in the most appropriate locations to yield a representative assessment of the removable contamination levels. Only in the case of packages transported as exclusive use shipment by rail or highway, may the removable radioactive contamination exceed the levels prescribed in table V. In this case, the levels shall not exceed 10 times the levels prescribed in table V.

Table V
Removable External Radioactive Contamination Wipe Limits

	Maximum Permissible Limits	
Contaminant	uCi/cm^2	dpm/cm^2
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than ten days; natural uranium; natural thorium; uranium-235; uranium-238; thorium-232; thorium-228 and thorium-230 when contained in	10^{-5}	22
All other alpha emitting Radionuclides	10^{-6}	2.2

(e) External radiation levels around the package and around the vehicle, if applicable, shall not exceed 200 millirems per hour (2 mSv/hr) at any point on the external surface of the package at any time

during transportation. The transport index shall not exceed 10.

(f) For a package transported in exclusive use by rail, highway or water, radiation levels external to the package may exceed the limits specified in K.A.R. 28-35-221b(d) but shall not exceed any of the following:

(1) 200 millirems per hour (2 mSv/hr) on the accessible external surface of the package unless the following conditions are met, in which case the limit shall be 1000 millirem per hour (10 mSv/hr):

(A) The shipment is made in a closed transport vehicle;

(B) provisions are made to secure the package so that its position within the vehicle remains fixed during transportation; and

(C) there are no loading or unloading operations between the beginning and end of the transportation;

(2) 200 millirems per hour (2 mSv/hr) at any point on the outer surface of the vehicle, including the upper and lower surfaces, or, in the case of a flat-bed style vehicle, with a personnel barrier, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle;

(3) 10 millirems per hour (0.1 mSv/hr) at any point 2 meters from the vertical planes represented by the outer lateral surfaces of the vehicle, or, in the case of a flat-bed style vehicle, at any point 2 meters from the vertical planes projected from the outer edges of the vehicle; and

(4) 2 millirems per hour (0.02 mSv/hr) in any normally occupied positions of the vehicle, except that this provision shall not apply to private motor carriers when persons occupying these positions are provided with special health supervision personnel radiation exposure monitoring devices, and training in accordance with K.A.R. 28-35-333. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-222a. Security and control of sources of radiation. (a) Each licensee or registrant shall secure from unauthorized removal or access all licensed or registered sources of radiation that are stored in controlled or unrestricted areas.

(b) Each licensee or registrant shall control, maintain constant surveillance of, and use devices or administrative procedures to prevent the unauthorized use of all licensed or registered radioactive material that is in an unrestricted area and that is not in storage.

(c) Each registrant shall maintain control of radiation machines that are in a controlled or unrestricted area and that are not in storage. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-223a. Waste disposal; general requirements. (a) A licensee shall not dispose of any radioactive material except by one of the following means:

(1) By transferring the material to an authorized recipient as provided in K.A.R. 28-35-190a;

(2) pursuant to K.A.R. 28-35-214b, 28-35-223a (c)(1), or 28-35-224a; or

(3) by decay in storage.

(b) A person shall be specifically licensed or registered to receive waste containing licensed or registered material from other persons for any of the following:

(1) Treatment before disposal;

(2) treatment or disposal by incineration;

(3) decay in storage;

(4) disposal at a land disposal facility licensed pursuant to these regulations; or

(5) storage until transferred to a storage or disposal facility authorized to receive the waste.

(c)(1) Any person may apply to the secretary for consideration for approval of proposed procedures to dispose of radioactive material in a manner not otherwise authorized in this part. Each applicant shall include a description of the radioactive material, including the following:

(A) The quantities and kinds of radioactive material;

(B) the levels of radioactivity involved; and

(C) the proposed manner and conditions of disposal.

(2) The application, when appropriate, shall also include an analysis and evaluation of pertinent information concerning the following:

(A) A description of the waste containing the licensed or registered material to be disposed of, including the physical and chemical properties that have an impact on risk evaluation, and the proposed manner and conditions of waste disposal;

(B) the nature of the environment, including topographical, geological, meteorological, and hydrological characteristics;

(C) the usage of groundwater and surface waters in the general area;

(D) the nature and location of other potentially affected facilities; and

(E) the procedures to be observed to minimize the risk of unexpected or hazardous exposures.

(3) An application for a license to receive radioactive material from other persons for disposal on land not owned by a state or the federal government shall not be approved by the secretary.

(d) (1) Any licensee may dispose of the following licensed materials without regard to radioactivity:

(A) 0.05 microcuries (1.850 kBq) or less of hydrogen-3 or carbon-14, per gram of medium used for liquid scintillation counting; and

(B) 0.05 microcuries or less of hydrogen-3 or carbon-14, per gram of animal tissue averaged over the weight of the entire animal. Tissue shall not be disposed of under this regulation in a manner that would permit its use either as food for humans or as animal feed.

(2) This regulation shall not exempt any licensee or registrant from the requirement to maintain records showing the receipt, transfer, and disposal of the radioactive material as specified in K.A.R. 28-35-227c.

(3) This regulation shall not exempt any licensee or registrant from the requirement to comply with other applicable federal, state, and local regulations governing any other toxic or hazardous property of waste materials. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-223b. Waste classification (a) Classification of waste for near surface disposal. In classifying radiation waste, consideration shall be given to the concentration of long-lived radionuclides (and their shorter-lived precursors whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. Consideration shall also be given to the concentration of short-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are efficient.

(b) Classes of waste.

(1) "Class A waste" is waste that is segregated from other waste classes at the disposal site. The physical form and characteristics of class A waste shall meet the minimum requirements set forth in K.A.R. 28-35-223c(a). If class A waste also meets the stability requirements set forth in K.S.R. 28-35-223c(b), the requirement that such wastes be separated shall be waived.

(2) "Class B waste" is waste that must meet more rigorous requirements as to waste form to insure stability after disposal. The physical form and characteristics of class B waste shall meet both the minimum and stability requirements set forth in K.A.R. 28-35-223c.

(3) "Class C waste" is waste that must meet more rigorous requirements as to waste form to insure stability and that also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of class C waste shall meet both the minimum and stability requirements set forth in K.S.A. 28-35-223c.

(4) "Waste that is not generally acceptable for near-surface disposal" is waste for which waste form and disposal methods must be different, and in general more stringent, than those specified for class C wastes. In the absence of specific requirements in this part, proposals for disposal of this waste may be submitted to the department for approval.

(c) Classification determined by long-lived radionuclides. If radioactive waste contains only radionuclides listed in Table 1, classification shall be determined as follows:

(1) If the concentration does not exceed 0.1 times the value in Table 1, the waste shall be assigned to Class A.

(2) If the concentration exceeds 0.1 times the value in Table 1, the waste shall be assigned to Class C.

(3) If the concentration exceeds the value in Table 1, the waste shall not be generally acceptable for near-surface disposal.

(4) For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be

determined by the sum of fractions rule described in subsection (g) of this regulation.

(d) Classification determined by short-lived radionuclides.

(1) If the radionuclides are not listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. If a radionuclide is not listed in Table 2, it shall not be considered in determining waste classification.

(2) If the concentration does not exceed the value in Column 1 of table 2, the waste shall be assigned to Class A.

(3) If the concentration exceeds the value in Column 1, Table 2, the waste shall be assigned to Class B.

Table 1

Radionuclide	Concentration Curies/Cubic Meter
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3
Alpha emitting transuranic nuclides	
with half-life greater than 5 years	100*
Pu-241	3,500*
Cm-242	20,000

***Units are nanocuries per gram**

Table 2

	Concentration, Curies/Cubic Meter		
Radionuclide	Column 1	Column 2	Column 3
Total of all nuclides with less than 5 year half-life	700	**	**
H-3	40	**	**
Co-60	700	**	**
Ni-63	3.5	70	700
Ni-63 inactivated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

**** There are no limits established for these radionuclides in Class B or Class C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentration of other nuclides in Table 2 independently determine the waste to be Class C.**

(4)If the concentration exceeds the value in Column 2, Table 2, but does not exceed the value in Column 3, Table 2, the waste shall be assigned to Class C.

(5)If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

(6)For wastes containing mixtures of the nuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule described in subsection (g) of this regulation.

(e)Classification determined by both long- and short-lived radionuclides. If radioactive wastes contains a mixture of radionuclides, some of which are listed in Table 1, and some of which are listed in Table 2, classification shall be determined as follows:

(1)If the concentration of a nuclide listed in Table 1 is less than 0.1 times the value listed in Table 1, the class shall be that determined by the concentration of nuclides listed in Table 2.

(2)If the concentration of a nuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1, the

waste shall be Class C, if the concentration of nuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.

(f)Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If radioactive waste does not contain any nuclides listed in either Table 1 or 2, it shall be assigned to Class A.

(g)The sum of the fractions rule for mixtures of radionuclides. For determining the classification of waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each nuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits shall all be taken from the same column of the same table. The sum of the fractions for the column shall be less that 1.0 if the waste class is to be determined by that column.

(h)Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods. Such methods may include use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-223c. Waste characteristics. (a) The following requirements shall be the minimum requirements for all classes of waste:

(1)Radioactive wastes shall be packaged in conformance with the conditions of the license issued to the site operator to which the waste will be shipped. If the conditions of the site license are more restrictive than the provisions of these regulations, the site license conditions shall govern.

(2)Wastes shall not be packaged for disposal in cardboard or fiberboard boxes.

(3)Liquid waste shall be packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(4)Solid wastes containing liquid shall contain as little free standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume.

(5)Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures, or of explosive reaction with water.

(6)Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This requirement shall not apply to radioactive gaseous waste packaged in accordance with paragraph (8) of this subsection.

(7)Waste shall not be pyrophoric. Pyrophoric materials contained in wastes shall be treated, prepared, and packaged to be nonflammable.

(8)Wastes in a gaseous form shall be packaged at a pressure that does not exceed 1.5 atmospheres at 20°C. Total activity shall not exceed 100 curies per container.

(9)Wastes containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce, to the maximum extent practicable, the potential hazard from the non-radiological materials.

(B)The requirements in this section are intended to provide stability of the waste:

(1)Waste shall have structural stability. A structurally stable waste form shall maintain its physical dimensions and its form, under the expected disposal conditions. Such proposed conditions may include weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors, including radiation effects and chemical changes. Structural stability may be provided by the waste form itself, by processing the waste to a stable form, or by placing the waste in a disposal container or structure that provides stability after disposal.

(2)Notwithstanding the provisions of K.A.R. 28-35-223c (a)(2)and (3), liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free-standing and noncorrosive liquid as reasonably achievable. In no case shall the liquid exceed 1% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form.

(3)Void spaces within the waste and between the waste and its package shall be reduced to the extent practicable. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607;l effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-223d. Labeling. Each package of waste must be clearly labeled to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with K.A.R. 28-35-223b. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-224a. Disposal by release into sanitary sewage systems. (a) A licensee shall not discharge radioactive material into a sanitary sewage system unless the following requirements are met:

(1) The radioactive material shall be readily soluble or readily dispersible biological material, in water.

(2)The quantity of any radioactive material released into the system by the licensee in any month shall not exceed the quantity that, if diluted by the average monthly quantity of sewage released into the sewer by the licensee, would result in an average concentration no greater than the limits specified in appendix B, table III, as published in "appendices to part 4: standards for protection against radiation," which is adopted by reference in K.A.R. 28-35-135a.

(3)If more than one radionuclide is released, the following additional requirements shall be satisfied.

(A)The licensee or registrant shall determine the fraction of the limit in appendix B, table III, as published in "appendices to part 4: standards for protection against radiation" and adopted in K.A.R. 28-35-135a, represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee or registrant into the sewer by the concentration of that radionuclide listed in appendix B, table III, as published in "appendices to part 4: standards for protection against radiation."

(B)The sum of the fractions for each radionuclide required by paragraph (a)(3)(A) shall not exceed one.

(4) The total quantity of licensed or registered radioactive material that the licensee or registrant releases into the sanitary sewerage in a year shall not exceed 185 Gbq (5 Ci) of hydrogen-3, 37 Gbq (1 Ci) of carbon-14, and 37 Gbq (1 Ci) of all other radioactive materials combined.

(b)A licensee shall not discharge radioactive material into an individual sewage disposal system used for the treatment of waste water serving only a single dwelling, office building, industrial plant, or institution except as specifically approved by the secretary pursuant to K.A.R. 28-35- 214a and 28-35-223a(c).

(c)Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this regulation. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-225a. Disposal by burial in soil. A licensee shall not dispose of radioactive material by burial in soil except as specifically approved by the department pursuant to K.A.R. 28-35-223a (b)(c). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-226a. Disposal by incineration. A licensee shall not incinerate radioactive material for the purpose of disposal or preparation for disposal, except as specifically approved by the department pursuant to K.A.R. 28-35-215a and 28-35-223a (b)(c). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-227b. General provisions. (a) Each licensee or registrant shall use the SI units becquerel, gray, sievert and coulomb per kilogram, or the special unit curie, rad, rem, and roentgen, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by these regulations.

(b)Each licensee or registrant shall make a clear distinction among the quantities entered on the records required by these regulations, including total effective dose equivalent, total organ dose equivalent, shallow dose equivalent, eye dose equivalent, deep dose equivalent, or committed effective dose equivalent. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective Oct. 17, 1994.)

28-35-227c. Records of Radiation Protection Programs. (a) Each licensee or registrant shall maintain records of the radiation protection program, including:

(1) the provisions of the program; and

(2) audits and other reviews of program content and implementation.

(b) The licensee or registrant shall retain the records required by K.A.R. 28-35-227c(a)(1) until the department terminates each pertinent license or registration requiring the record. The licensee or registrant shall retain the records required by K.A.R. 28-35-227c(a)(2) for three years after the record is made. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective, Oct. 17, 1994.)

28-35-227d. Records of surveys. (a) Each licensee or registrant shall maintain records showing the results of surveys and calibrations required by K.A.R. 28-35-217b and K.A.R. 28-35-221a(b). Each licensee or registrant shall retain each of these records for three years after the record is made.

(b) Each licensee or registrant shall retain each of the following records until the secretary terminates each pertinent license or registration requiring the record:

(1) Records of the results of surveys to determine the dose from external sources of radiation used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents;

(2) records of the results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose;

(3) records showing the results of air sampling, surveys, and bioassays required pursuant to K.A.R. 28-35-212g; and

(4) records of the results of measurements and calculations used to evaluate the release of radioactive effluents to the environment.

(Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-227e. Records of tests for leakage or contamination of sealed sources. A record of each test for leakage or contamination of sealed sources shall be kept in units of becquerel or microcurie and maintained for inspection by the department for five years after the record is made. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, Oct. 17, 1994.)

28-35-227f. Records of prior occupational dose. Each licensee or registrant shall retain the records of prior occupational dose and exposure history as specified in K.A.R. 28-35-212e on a form approved by the department, until the department terminates each pertinent license requiring this record. Each licensee or registrant shall retain each of the records used in preparing this form for three years after the record is made.

(Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; December 30, 2005.)

28-35-227g. Records of planned special exposures. (a) For each use of the provisions of K.A.R. 28-35-212f for planned special exposures, each licensee or registrant shall maintain records that describe the following:

(1) The exceptional circumstances requiring the use of a planned special exposure;

(2) the name of the management official who authorized the planned special exposure and a copy of the signed authorization;

(3) any actions that were necessary;

(4) the reason why the actions were necessary;

(5) the precautions that were taken to ensure that doses were maintained ALARA;

(6) the expected individual and collective doses ; and

(7) the doses actually received in the planned special exposure.

(b) Each licensee or registrant shall retain the records of a planned special exposure until the department terminates each pertinent license or registration requiring these records.

(Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-227h. Records of individual monitoring results. (a) Each licensee or registrant shall maintain records of the doses received by all individuals for whom monitoring was required pursuant to K.A.R. 28-35-217a and records of the doses received during planned special exposures, accidents, and emergency

conditions. Assessments of dose equivalent and records made using units in effect before January 1, 1994 shall not be required to be changed. These records shall include the following, when applicable:

(1) The deep dose equivalent to the whole body, eye dose equivalent, shallow dose equivalent to the skin, and shallow dose equivalent to the extremities;

(2) the estimated intake of radionuclides;

(3) the committed effective dose equivalent assigned to the intake of radionuclides;

(4) the specific information used to calculate the committed effective dose equivalent pursuant to K.A.R. 28-35-212d(c);

(5) the total effective dose equivalent when required by K.A.R. 28-35-212b; and

(6) the total of the deep dose equivalent and the committed dose to the organ receiving the highest total dose.

(b) Each licensee or registrant shall make entries of the records specified in subsection (a) at least annually.

(c) Each licensee or registrant shall maintain the records specified in subsection (a) either on a form approved by the department, in accordance with the instructions from the department, or in clear and legible records containing all the information required by the department-approved form.

(d) Each licensee or registrant shall maintain the records of dose to each embryo or fetus with the records of dose to the declared pregnant woman. The declaration of pregnancy, including the estimated date of delivery, shall also be kept on file, but may be maintained separately from the dose records.

(e) Each licensee or registrant shall retain each required form or record until the department terminates each pertinent license or registration requiring the record.

(Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-227i. Records of dose to individual members of the public. (a) Each licensee or registrant shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public.

(b) The licensee or registrant shall retain the records required by K.A.R. 28-35-227i (a) until the department terminates each pertinent license or registration requiring the record. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective Oct. 17, 1994.)

28-35-227j. Records of waste disposal. (a) Each licensee or registrant shall maintain records of the disposal of licensed or registered materials made pursuant to K.A.R. 28-35-223a, 28-35-223e, 28-35-224a, 28-35-225a, or 28-35-226a, and disposal by burial in soil, including burials authorized by these regulations before May 1, 1986.

(b) Each licensee or registrant shall retain the records required by subsection (a) until the secretary terminates each pertinent license or registration requiring the record. (Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-227k. Records of testing entry control devices for very high radiation areas. (a) Each licensee or registrant shall maintain records of tests made pursuant to K.A.R. 28-35-219a(d)(3)(J) on entry control devices for very high radiation areas. These records shall include the date, time, and results of each test of function.

(b)The licensee or registrant shall retain the records required by K.A.R. 28-35-227k(a) for three years after the record is made. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective, Oct. 17, 1994.)

28-35-227l. Form of records. (a) Each record required by these regulations shall be legible throughout the specified retention period.

(1)The record shall be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period.

(2)The record may be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period.

(b)Records, including documents, letters, drawings, and specifications, shall include all pertinent information, including any stamps, initials, and signatures.

(c)The licensee shall maintain adequate safeguards against tampering with and loss of records. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective Oct. 17, 1994.)

28-35-228a. Reports of theft or loss of sources of radiation. (a) Each licensee or registrant shall report by telephone, telegraph, electronic mail, or facsimile to the department the theft or loss of the following sources of radiation immediately after the occurrence becomes known to the licensee or registrant:

(1) Stolen, lost, or missing licensed or registered radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in appendix C in "appendices to part 4: standards for protection against radiation," as adopted by reference in K.A.R. 28-35-135a, if an exposure could result to individuals in unrestricted areas; or

(2) a stolen, lost, or missing radiation machine.

(b) The licensee or registrant shall also submit a report, in writing, within 30 days after learning of stolen, lost, or missing sources of radiation described in subsection (a)(1) or (2).

(c) The licensee or registrant shall submit a report, in writing, within 30 days after learning of any stolen, lost, or missing licensed or registered radioactive material in an aggregate quantity greater than 10 times the quantity specified in appendix C in "appendices to part 4: standards for protection against radiation" that is still missing.

(d) Each licensee or registrant required to make a report pursuant to this regulation shall, within 30 days after making the telephone report, make a written report to the department that provides all of the following information:

(1) A description of the licensed or registered source of radiation involved, including, for radioactive material, the kind, quantity, and chemical and physical form and for radiation machines, the manufacturer, model and serial number, and type and maximum energy of radiation emitted;

(2) a description of the circumstances under which the loss or theft occurred;

(3) a statement of the disposition, or probable disposition, of the licensed or registered source of radiation involved;

(4) for exposures of individuals to radiation, the circumstances under which the exposures occurred, and the possible total effective dose equivalent to persons in unrestricted areas;

(5) the actions that have been taken, or will be taken, to recover the source of radiation; and

(6) the procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed or registered sources of radiation.

(e) After filing the written report, the licensee or registrant shall also report to the department, within 30 days of the date the information becomes available, any substantive additional information on the theft or loss that becomes available.

(f) Each licensee or registrant shall prepare any report filed with the department pursuant to this regulation so that the names of individuals who could have received exposure to radiation are stated in a separate and detachable portion of the report. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-229a. Notification of incidents. (a) Immediate notification. Each licensee or registrant shall immediately notify the department by telephone, telegraph, mailgram or facsimile of any incident involving any source of radiation possessed by the licensee or registrant which may have caused or threatens to cause:

(1)(A) a total effective dose equivalent to any individual of 25 rems (250 mSv) or more of radiation;

(B)an eye dose equivalent to any individual of 75 rems (.75 Sv) or more of radiation; or

(C)a shallow dose equivalent to the skin or extremities or a total organ dose equivalent to any individual of 250 rad (2.5 Gy) or more of radiation; or

(2)the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(3) a loss of one working week or more of the operation of any facilities affected; or

(4) damage to property in excess of $200,000.

(b) Twenty-four hour notification. Each licensee or registrant shall, within 24 hours of the discovery of the event notify the department by telephone, telegraph, mailgram or facsimile of any incident involving any source of radiation possessed by the licensee or registrant which may have caused or threatens to cause:

(1)(A) a total effective dose equivalent to any individual exceeding five rems (50 mSv);

(B)an eye dose equivalent exceeding 15 Rem (0.15 Sv); or

(C)a shallow dose equivalent to the skin or to the extremities or a total organ dose equivalent exceeding 50 Rem (0.5 Sv); or

(2) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational ALI. This provision shall not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(3) a loss of one day or more of the operation of any facilities affected; or

(4) damage to property in excess of $2,000.

(c) Each report filed with the department pursuant to this regulation shall be prepared in such a manner that names of individuals who have received excessive doses are stated in a separate and detachable portion of the report.

(d) The provision of K.A.R. 28-35-229a shall not apply to doses that result from planned special exposures, provided such doses are within limits for planned special exposures and are reported pursuant to K.A.R. 28-35-230c. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-230a. Reports of overexposures and excessive levels and concentrations. (a) In addition to any notification required by K.A.R. 28-35-229a, each licensee or registrant shall submit a report to the department, in writing, within 30 days of learning of any of the following occurrences:

(1) Each exposure of an individual to radiation in excess of the applicable standards in K.A.R. 28-35-212a, K.A.R. 28-35-213a, K.A.R. 28-35-213b, K.A.R. 28-35-214a, or the license;

(2) each exposure of an individual to radioactive material in excess of the applicable limits in K.A.R. 28-35-212b (a)(1), K.A.R. 28-35-212b (a)(2), K.A.R. 28-35-213a, K.A.R. 28-35-213b, or K.A.R. 28-35-214a or in the license;

(3) each incident in which levels of radiation or concentrations of radioactive material in a restricted area exceeded any other applicable limit in the license;

(4) any incident for which notification is required by K.A.R. 28-35-229a; and

(5) each incident in which levels of radiation or concentrations of radioactive material in an unrestricted area exceeded 10 times any applicable limit set forth in this part or in the license, whether or not involving excessive exposure of any individual.

(6) For licensees subject to the provisions of the U.S. environmental protection agency's generally applicable environmental radiation standards in 40 CFR part 190, levels of radiation or releases of radioactive material in excess of those standards, or of license conditions related to those standards.

(b) Each report required under this regulation shall describe the extent of exposure of individuals to radiation or to radioactive material, including the following:

(1) The estimate of each individual's dose;

(2) the levels of radiation and concentrations of radioactive material involved;

(3) the cause of the exposure or excessive levels or concentrations; and

(4) the corrective steps taken or planned to ensure against a reoccurrence.

(c) Each report filed with the department under this regulation shall include for each individual exposed the individual's name, social security number, and date of birth, and an estimate of the individual's dose. With respect to the limit for the embyro or fetus specified in K.A.R. 28-35-213b, the identifiers shall be those of the declared pregnant woman. The report shall be prepared so that the identifier is stated in a separate and detachable part of the report. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-230b. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Sept. 20, 1993; amended Oct. 17, 1994; revoked December 30, 2005.)

28-35-230c. Reports of planned special exposures. The licensee or registrant shall submit a written report to the department within 30 days following any planned special exposure conducted in accordance with K.A.R. 28-35-212f, which shall inform the department that a planned special exposure was conducted, indicate the date the planned special exposure occurred and contain the information required by K.A.R. 28-35-227g. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective Oct. 17, 1994.)

28-35-230d. Reports of individual monitoring. (a) This regulation shall apply to each licensee or registrant whose license or registration authorizes the following:

(1) Possession or use sources of radiation for purposes of industrial radiography pursuant to part 3 and part 9 of these regulations;

(2) receipt of radioactive waste from other persons for disposal pursuant to part 3 and part 6 of these regulations; or

(3) possession or use at any time, for processing or manufacturing for distribution, pursuant to K.A.R. 28-35-180 or K.A.R. 28-35-261 through K.A.R. 28-35-263 of these regulations, radioactive material in quantities exceeding any one of the following quantities:

	Activity	
Radionuclide	**Ci**	**GBq**
Cesium-137	**1**	**37**
Cobalt-60	**1**	**37**
Gold-198	**100**	**3,700**
Iodine-131	**1**	**37**
Iridium-192	**10**	**370**
Krypton-85	**1,000**	**37,000**
Promethium-147	**10**	**370**
Technetium-99m	**1,000**	**37,000**

(b) Reports from licensees or registrants who are licensed or registered to use radionuclides not listed on the table in paragraph (a)(3) of this regulation may be required by the secretary as a license condition or by regulation, or order pursuant to this regulation, if the radionuclides are used in quantities sufficient to cause comparable radiation levels.

(c) Each licensee or registrant in a category listed in this regulation shall submit an annual report of the results of individual monitoring conducted by the licensee or registrant for each individual for whom monitoring was required by K.A.R. 28-35-217a during that year.

(1) The licensee or registrant may include additional data for individuals for whom monitoring was provided but not required.

(2) The licensee or registrant shall use a form approved by the department or an electronic medium containing all the information required by the approved form.

(d) The licensee or registrant shall file the report required by this regulation, covering the preceding year, on or before April 30 of each year. The licensee or registrant shall submit the report to the department. (Authorized by and implementing K.S.A. 48-1607; effective Oct. 17, 1994; amended December 30, 2005.)

28-35-230e. Notifications and reports to individuals. (a) When a licensee or registrant is required pursuant to K.A.R. 28-35-230a to report to the department any exposure of an individual to radiation or radioactive material, the licensee or registrant shall also notify the individual.

(b) Notice to the individual shall be transmitted at a time not later than the transmittal to the department, and shall comply with the provisions of K.A.R. 28-35-334 of these regulations. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-230f. Reports of leaking or contaminated sealed sources. If a test for leakage or contamination pursuant to K.A.R. 28-35-216a indicates a sealed source is leaking or contaminated, a report of the test shall be filed within five days with the department describing the equipment involved, the test results and the corrective action taken. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-231a. Vacating installations. (a) Notification. Each licensee, before vacating any installation that could have been contaminated by radioactive material as a result of the licensee's activities, shall notify the department in writing of the intent to vacate, at least 30 days before vacating. Any licensee may be required by the secretary to decontaminate, or have decontaminated, the installation to a degree consistent with subsequent use as an uncontrolled area,.

(b) Decommissioning timeliness.

(1) Each licensee in possession of a nonexempt source of radiation who decides to terminate all activities involving that source of radiation shall notify the department immediately, in writing.

(2)Each licensee responsible for a facility or site that includes a nonexempt source of radiation or that could be contaminated by residual radioactivity shall notify the department, in writing, of the intent to vacate, at least 30 days before vacating or relinquishing possession or control of the facility or site.

(3) Each licensee shall notify the department, in writing, within 60 days of the occurrence of any of the following:

(A) Each licensee or person has decided to permanently cease principal activities at the entire site or in any separate building or outdoor area that contains residual radioactivity rendering the building or outdoor area unsuitable for uncontrolled use in accordance with these regulations;

(B) no principal activities under the license have been conducted for 24 months; or

(C) no principal activities have been conducted for 24 months in any separate building or outdoor era that contains residual radioactivity rendering the building or outdoor area unsuitable for uncontrolled use in accordance with these regulations.

(4) From the date of notification of the department required in subsections (a) and (b) of this regulation, the licensee or person shall perform either one of the following:

(A) Begin decommissioning activities; or

(B) within 12 months of notification, submit a decommissioning plan, if required by K.A.R. 28-35-204, and begin decommissioning upon the approval of that plan.

(5) Coincident with the notification of the department required in subsections (a) and (b) of this regulation, the licensee shall maintain in effect all decommissioning financial assurances established by the licensee in conjunction with a license issuance or renewal or as required by this part. The amount of the financial assurance shall be increased, or may be decreased, in order to cover the detailed cost estimate for decommissioning as specified in K.A.R. 28-35-204.

(6) An alternate schedule may be approved by the secretary for the submission of plans and for the completion of decommissioning required by of this regulation if the secretary determines that both of the following conditions are met:

(A) Is necessary to effectively conduct decommissioning;

(B) presents no undue risks to public health and safety and is otherwise in the public interest.

The schedule for decommissioning shall not commence until the secretary has made a determination on the request. (Authorized by and implementing K.S.A. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended December 30, 2005.)

28-35-231c. Transfer for disposal; manifests. The provisions of 10 CFR 20.2006 as in effect on September 21, 1998, including appendix G to 10 CFR part 20 as in effect on October 10, 2003, are hereby adopted by reference. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

PART 5. USE OF X-RAYS IN THE HEALING ARTS

28-35-241. Applicability. This part shall establish requirements for the diagnostic use of X-rays in medicine, dentistry, osteopathy, chiropractic, podiatry, and veterinary medicine. The provisions of this part shall be in addition to, and not in substitution for, the other applicable provisions of these regulations. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended December 30, 2005.)

28-35-242. General requirements. (a) Waiver of requirements. Compliance with the specific requirements of these regulations relative to an existing machine or installation may be waived by the secretary if the registrant provides an alternative to the requirement that provides radiation protection equal to that prescribed in part 4 of these regulations.

(b) Responsibility to meet requirements. A person shall not make, sell, lease, transfer, lend, or install X-ray or fluoroscopic equipment, or the supplies used in connection with this equipment, unless both of the following conditions are met:

(1) Those supplies and equipment, when properly placed in operation and properly used, will meet the requirements of parts 1,4, and 5, and the applicable regulations under parts 7, 8, and 10 of these regulations.

(2) The person delivers, if applicable, cones or collimators, filters, appropriate timers, and fluoroscopic shutters.

(c) Limitations on human use. An individual shall not be exposed to the useful beam, unless the exposure is for healing arts purposes and each exposure has been authorized by a licensed practitioner of the healing arts, or by an individual licensed to practice dentistry or podiatry within the authority granted to the individual by Kansas licensing laws applying to dentists and podiatrists. Deliberate exposure for the following purposes shall be specifically prohibited under this subsection:

(1) Exposure of an individual for patient positioning, training, demonstration, or other purposes, unless a healing arts purpose exists and a proper prescription has been provided; and

(2) exposure of an individual for the purpose of healing arts screening without the prior written approval of the department, except mammography screening, if the facility is certified to perform mammography by the food and drug administration. Each person requesting approval for healing arts screening shall submit the information outlined in K.A.R. 28-35-255. Each person requesting approval for a healing arts screening shall immediately notify the department if any of the information submitted becomes invalid or outdated. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-242a. Administrative requirements. (a) Radiation safety requirements. Each registrant shall be responsible for directing the operation of each X-ray system under the registrant's administrative control. The registrant or the registrant's agent shall ensure that the requirements of this part, which shall include the following requirements, are met.

(1) An X-ray system not meeting the provisions of these regulations shall not be operated for diagnostic purposes.

(2) Each individual who operates any X-ray system shall be instructed in the safe operating procedures and shall be competent in the safe use of the equipment. This instruction shall include the relevant topics specified in K.A.R. 28-35-256. Any combination of interview, observation, and testing may be used by the secretary to determine compliance. Each individual that operates an X-ray system shall be licensed if required by the board of healing arts.

(3) A chart shall be made available to the operator of each diagnostic X-ray system that specifies, for each examination performed with the system, the following information:

(A) The technique factors to be utilized, taking into account the patient's body part and anatomical size, body part thickness, and age;

(B) the type and size of the film or film-screen combination to be used;

(C) the type and focal distance of the grid to be used, if any;

(D) the source-image receptor distance to be used, except for dental intraoral radiography; and

(E) the type and placement of patient shielding to be used.

(4) The registrant of a facility shall create and make available to all X-ray operators written safety procedures, including patient holding procedures and any restrictions on the operating techniques required for the safe operation of the particular X-ray system. The registrant shall ensure that the operator demonstrates familiarity with these procedures.

(5) Except for patients who cannot be moved out of the room, only the staff, ancillary personnel, and any other individuals required for the medical procedure or training shall be in the room during the radiographic exposure. All of the following requirements shall be met for each individual other than the patient being examined:

(A) Each individual shall be positioned so that no part of the body will be struck by the useful beam unless the body part is protected by not less than 0.5 millimeter of lead-equivalent material.

(B) The X-ray operator, other staff, ancillary personnel, and all other individuals required for the medical procedure shall be protected from the direct scattered radiation by protective aprons or whole-body protective barriers of not less than 0.25 millimeter of lead-equivalent material.

(C) All human patients who cannot be removed from the room shall be protected from the direct scattered radiation by whole-body protective barriers of not less than 0.25 millimeter of lead-equivalent material or shall be positioned so that the nearest portion of the body is at least two meters from both the tube head and the nearest edge of the image receptor.

(6) Gonad shielding of not less than 0.5 millimeter of lead-equivalent material shall be used during radiographic procedures in which the gonads are in the useful beam for all human patients who have not passed the reproductive age, except for cases in which this shielding would interfere with the diagnostic procedure.

(7) If a patient or film requires auxiliary support during a radiation exposure, all of the following safety requirements shall be met:

(A) Mechanical holding devices shall be used when the technique permits the use of these devices. The written safety procedures required by this regulation shall list the individual techniques for which holding devices cannot be utilized.

(B) The written safety procedures required by this regulation shall indicate the requirements for selecting a human holder and the procedure that the holder shall follow.

(C) The human holder shall be instructed in personal radiation safety and shall be protected in accordance with these regulations.

(D) No individual shall be used routinely to hold film or patients.

(E) If the patient holds the film, each portion of the body other than the area of clinical interest struck by the useful beam shall be protected by not less than 0.5 millimeter of lead-equivalent material, except during intraoral examinations.

(F) Each facility shall have a sufficient number of leaded aprons and gloves available to provide protection to all personnel who are involved with X-ray operations and who are otherwise not shielded.

(8) The procedures and auxiliary equipment designed to minimize patient and personnel exposure shall be commensurate with the needed diagnostic information and shall be utilized according to all of the following requirements:

(A) The speed of the screen and film combinations used shall be the fastest speed that is consistent with the diagnostic objective of the examinations. Film cassettes without intensifying screens shall not be used for any routine diagnostic imaging, with the exception of veterinary radiography and standard film packets for intraoral use in dental radiography.

(B) The radiation exposure to the patient shall be the minimum exposure required to produce images of good diagnostic quality.

(C) Portable or mobile X-ray equipment shall be used only for examinations during which transferring the patient or patients to a stationary X-ray installation is impractical.

(D) X-ray systems other than fluoroscopic dental intraoral systems and computed tomography X-ray systems shall not be utilized in any procedure in which the source-to-patient distance is less than 30 centimeters, unless specifically approved by the FDA. Veterinary systems shall not be subject to this limitation.

(E) If grids are used between the patient and the image receptor to decrease the amount of scattered radiation to the film and improve contrast, the grid shall be as follows:

(i) Positioned properly, including the tube side facing the right direction, with the grid centered to

the central ray; and

(ii) if of the focused type, positioned at the proper focal distance for the SIDs being used.

(9) Each individual who is associated with the operation of an X-ray system shall be subject to the requirements of part 4 of these regulations.

(b) Records. Each registrant shall maintain the following minimum information for each X-ray system, for inspection by the department:

(1) The maximum rating of technique factors;

(2) the model and serial numbers of all certifiable components;

(3) the aluminum-equivalent filtration of the useful beam, including any routine variation;

(4) tube rating charts and cooling curves;

(5) records of surveys, calibrations, maintenance, and modifications performed on the X-ray system after the effective date of this regulation, with the name of each person who performed these services;

(6) a scale drawing of the room in which a stationary X-ray system is located, indicating the use of areas adjacent to the room and an estimation of the extent of occupancy by any individuals in these areas. In addition, the drawing shall include one of the following:

(A) The results of a survey for radiation levels present at the operator's position and at pertinent points outside the room at specified test conditions; or

(B) the type of thickness of materials, or lead equivalency, of each system; and

(7) a copy of all correspondence with the department regarding that X-ray system.

(c) X-ray utilization log. Except for veterinary facilities, each registrant shall maintain an X-ray log containing each patient's identifier, the type of each examination, and the date on which each examination was performed. When the patient or film is provided with human auxiliary support, the name of the human holder shall be recorded.

(d) X-ray film-processing facilities and practice.

(1) Each facility using a radiographic X-ray system and analog image receptors shall have available suitable equipment for handling and processing radiographic film in accordance with all of the following requirements:

(A) Each manual film-developing system shall meet all of the following requirements:

(i) The processing tanks shall be constructed of mechanically rigid, corrosion-resistant material. (ii) The temperature of the solutions in the tanks shall be maintained within the range of 60°F to 80°F. All film shall be developed in accordance with the time-temperature relationships recommended by the film manufacturer or, in the absence of these recommendations, with the following time-temperature chart:

Time-Temperature Chart		
Thermometer Reading (Degrees)		Minimum Developing Time (Minutes)
°C	°F	
26.7	80	2
26.1	79	2
25.6	78	2½
25.0	77	2½
24.4	76	3
23.9	75	3

23.3	74	3½
22.8	73	3½
22.2	72	4
21.7	71	4
21.1	70	4½
20.6	69	4½
20.0	68	5
19.4	67	5½
18.9	66	5½
18.3	65	6
17.8	64	6½
17.2	63	7
16.7	62	8
16.1	61	8½
15.6	60	9½

(iii) Devices shall be utilized that indicate the actual temperature of the developer and signal the passage of a preset time appropriate to the developing time required.

(B) Each automatic processor and any other closed processing system shall meet all of the following requirements:

(i) All film shall be developed in accordance with the time-temperature relationships recommended by the film manufacturer. In the absence of these recommendations, the film shall be developed using the following chart:

Developer Temperature		Minimum Immersion Time[a]
°C	°F	Seconds
35.5	96	19
35	95	20
34.5	94	21
34	93	22
33.5	92	23
33	91	24
32	90	25
31.5	89	26
31	88	27
30.5	87	28
30	86	29

29.5	**85**	**30**
[a] ***Immersion time only, no crossover time included.***		

(ii) The specified developer temperature and immersion time shall be posted in the darkroom or on the automatic processor.

(C) Each deviation from any requirements specified in paragraph (e)(1) shall be documented by the registrant in such a manner that the requirements are shown to be met or exceeded.

(2) In addition to the requirements specified in paragraph (e)(1), all of the following requirements shall be met:

(A) Pass boxes, if provided, shall be constructed to exclude light from the darkroom when cassettes are placed in or removed from the boxes and shall incorporate shielding from stray radiation to prevent any exposure of undeveloped film.

(B) The darkroom shall be lighttight and shall use safe lighting so that any film type exposed in a cassette to X-radiation sufficient to produce an optical density measuring from one to two when processed does not exhibit an increase in density greater than 0.1 when exposed in the darkroom for two minutes with all safe lights on. If daylight film-handling boxes are used, these boxes shall prevent any fogging of the film.

(C) Each darkroom typically used by more than one individual shall be equipped with a method to prevent accidental entry while undeveloped film is handled or processed.

(D) All film shall be stored in a cool, dry place and shall be protected from exposure to stray radiation. Film in open packages shall be stored in a lighttight container.

(E) All film cassettes and intensifying screens shall be inspected periodically and shall be cleaned or replaced as necessary to ensure radiographs of good diagnostic quality.

(F) Outdated X-ray film shall not be used for diagnostic radiographs, unless the film has been stored in accordance with the manufacturer's recommendations and a sample of the film passes a sensitometric test for the normal range of the base optical density plus fogging for the film speed.

(G) All film-developing solutions shall be maintained in strength by replenishment or renewal so that full development is accomplished within the time frame specified by the manufacturer. (Authorized by and implementing K.S.A. 48-1607; effective December 30,2005.)

28-35-242b. General requirements for all diagnostic X-ray systems. In addition to meeting the other requirements of this part, each diagnostic X-ray system shall meet the following requirements:

(a) Warning label. The control panel containing the main power switch shall bear this or an equivalent warning statement, which shall be legible and accessible to view: "WARNING: This X-ray unit could be dangerous to patient and operator unless safe exposure factors and operating instructions are observed."

(b) Battery charge indicator. On each battery-powered X-ray generator, a visual means shall be provided on the control panel to indicate whether the battery is in a state of charge for proper operation.

(c) Leakage radiation from the diagnostic source assembly. The leakage radiation from the diagnostic source assembly measured at a distance of one meter in any direction from the source shall not exceed 25.8 µC/kg (100 milliroentgens) in one hour when the X-ray tube is operated at the leakage technique factors specified by the manfacturer. Compliance shall be determined by measuring the leakage radiation averaged over an area of 100 square centimeters, with no linear dimension greater than 20 centimeters.

(d) Radiation from components other than the diagnostic source assembly. The radiation emitted by a component other than the diagnostic source assembly shall not exceed 0.5 µC/kg (2 milliroentgens) in one hour at five centimeters from an accessible surface of the component in an assembled X-ray system operated under any design conditions. Compliance shall be determined by measuring the radiation averaged over an area of 100 square centimeters, with no linear dimension greater than 20 centimeters.

(e) Beam quality.

(1) Half-value layer.

(A) The half-value layer of a given X-ray tube potential shall not be less than the values shown in table I in this paragraph. Linear interpolation and extrapolation may be used if necessary to determine the half-value layer at an X-ray tube potential that is not listed in table I.

Table I		
OperatingRange (kilovoltspeak)	**Measured potential (kilovoltspeak)**	**Half-valuelayer (millimeters of aluminum)**
Below 50	**30**	**0.3**
	40	**0.4**
	49	**0.5**
50 through 70	**50**	**1.2**
	60	**1.3**
	70	**1.5**
Above 70	**71**	**2.1**
	80	**2.3**
	90	**2.5**
	100	**2.7**
	110	**3.0**
	120	**3.2**
	130	**3.5**
	140	**3.8**
	150	**4.1**

(B) For capacitor energy storage equipment, compliance shall be determined with the system fully charged and set at 10 mAs for each exposure.

(C) The required minimal half-value layer of the useful beam shall include the filtration contributed by all materials that are permanently located between the source and the patient.

(2) Filtration controls. For each X-ray system that has variable kVp and variable filtration for the useful beam, a device shall link the kVp selector with the filter or filters and shall prevent an exposure, unless the minimum amount of filtration necessary to produce the required HVL is in the useful beam for the given kVp that has been selected.

(f) Multiple tubes. If two or more radiographic tubes are controlled by one exposure switch, each tube that has been selected shall be clearly indicated before initiation of the exposure. This indication shall be both on the X-ray control panel and at or near the tube housing assembly that has been selected.

(g) Mechanical support of the tube head. The tube housing assembly supports shall be adjusted so that the tube housing assembly remains stable during each exposure, unless tube housing movement is a designed function of the X-ray system.

(h) Technique indicators.

(1) The technique factors to be used during each exposure shall be indicated before the exposure begins. If automatic exposure controls are used, the technique factors that are set before the exposure shall be indicated.

(2) The requirements of paragraph (h)(1) may be met by permanent marking on equipment that has fixed technique factors. The indication of technique factors shall be visible from the operator's position, except in the case of spot films made by the fluoroscopist.

(i) Maintaining compliance. All diagnostic X-ray systems and their associated components used on humans and certified pursuant to the federal X-ray equipment performance standard in 21 CFR part 1020 shall be maintained in compliance with the applicable requirements of that standard.

(j) Locks. All position-locking, holding, and centering devices that are on X-ray system components and systems shall function as intended and shall be maintained according to each manufacturer's recommendations. (Authorized by and implementing K.S.A. 48-1607; effective Decemeber 30, 2005.)

28-35-243. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective Decemeber 30, 2005.)

28-35-243a. Fluoroscopic X-ray systems. Each fluoroscopic X-ray system used shall be image-

intensified and shall meet the following requirements:

(a) Limitation of useful beam.

(1) Primary barrier.

(A) The fluoroscopic imaging assembly shall be provided with a primary protective barrier that intercepts the entire cross section of the useful beam at any SID.

(B) The X-ray tube used for fluoroscopy shall not produce X-rays unless the barrier is in position to intercept the entire useful beam.

(2) Fluoroscopic beam limitation.

(A) For certified fluoroscopic systems with or without a spot film device, neither the length nor the width of the X-ray field in the plane of the image receptor shall exceed that of the visible area of the image receptor by more than three percent of the SID. The sum of the excess length and the excess width shall be no greater than four percent of the SID.

(B) For uncertified fluoroscopic systems with a spot film device, the X-ray beam with the shutters fully opened during fluoroscopy or spot filming shall be no larger than the largest spot- film size for which the device is designed. Measurements shall be made at the minimum SID available but at a distance of not less than 20 centimeters from the tabletop to the film plane.

(C) For uncertified fluoroscopic systems without a spot film device, the requirements of this regulation shall apply.

(D) Other requirements for fluoroscopic beam limitation shall include the following:

(i) A means shall be provided to permit further limitation of the field. Beam-limiting devices manufactured after May 22, 1979 and incorporated in equipment with a variable SID or a visible area of greater than 300 square centimeters, or both, shall be provided with a means for stepless adjustment of the X-ray field.

(ii) All equipment with a fixed SID and a visible area of 300 square centimeters or less shall be provided either with stepless adjustment of the X-ray field or with a means to further limit the X-ray field size, at the plane of the image receptor, to 125 square centimeters or less.

(iii) If provided, stepless adjustment shall, at the greatest SID, provide continuous field sizes from the maximum attainable to a field size of five centimeters by five centimeters or less.

(iv) For equipment manufactured after February 25, 1978, if the angle between the image receptor and beam axis is variable, a means shall be provided to indicate when the axis of the X-ray beam is perpendicular to the plane of the image receptor.

(v) For noncircular X-ray fields used with circular image receptors, the error in alignment shall be determined along the length and width dimensions of the X-ray field that pass through the center of the visible area of the image receptor.

(3) Spot-film beam limitation. Each spot-film device shall meet the following requirements:

(A) A means shall be provided between the source and the patient for adjustment of the X-ray field size in the plane of the film, to the size of that portion of the film that has been selected on the spot film selector. This adjustment shall be automatically accomplished except when the X-ray field size in the plane of the film is smaller than that of the selected portion of the film. For spot-film devices manufactured after June 21, 1979, if the X-ray field size is less than the size of the selected portion of the film, the means for adjustment of the field size shall be only at the operator's option.

(B) Neither the length nor the width of the X-ray field in the plane of the image receptor shall differ from the corresponding dimensions of the selected portion of the image receptor by more than three percent of the SID when adjusted for full coverage of the selected portion of the image receptor. The sum of the length and width differences, without regard to sign, shall not exceed four percent of the SID.

(C) It shall be possible to adjust the X-ray field size in the plane of the film to a size smaller than the selected portion of the film. The minimum field size at the greatest SID shall be equal to or less than five centimeters by five centimeters.

(D) The center of the X-ray field in the plane of the film shall be aligned with the center of the selected portion of the film to within two percent of the SID.

(E) For spot-film devices manufactured after February 25, 1978, if the angle between the plane of the image receptor and beam axis is variable, a means shall be provided to indicate when the axis of the X-ray beam is perpendicular to the plane of the image receptor, and compliance shall be determined with the beam axis indicated to be perpendicular to the plane of the image receptor.

(4) Override. Each method used to override any of the automatic X-ray field size adjustments required in paragraphs (a)(2) and (3) shall meet the following requirements:

(A) Be designed for use only if system failure occurs;

(B) incorporate a signal visible at the fluoroscopist's position that indicates whenever the automatic field size adjustment is overridden; and

(C) be clearly and durably labeled with the following, or equivalent wording:

FOR X-RAY FIELD
LIMITATION SYSTEM FAILURE

(b) Activation of the fluoroscopic tube. All X-ray production in the fluoroscopic mode shall be controlled by a device that requires continuous manual activation by the fluoroscopist during the entire time of any exposure. When recording serial fluoroscopic images, the fluoroscopist shall be able to terminate the X-ray exposure or exposures at any time, but a means may be provided to permit completion of any single exposure of the series in process.

(c) Exposure rate limits.

(1) Allowable limits for the entrance exposure rate.

(A) Fluoroscopic equipment that is provided with an automatic exposure rate control shall not be operable at any combination of tube potential and current that will result in an exposure rate in excess of 2.6 mC/kg (10 roentgens) per minute at the point where thecenter of the useful beam enters the patient, except under either of the following conditions:

(i) When fluoroscopic images are being recorded; or

(ii) when an optional high-level control is provided. When provided, the X-ray system shall not be operable at any combination of tube potential and current that will result in an exposure rate in excess of 1.3 mC/kg (5 roentgens) per minute at the point where the center of the useful beam enters the patient, unless the high-level control is activated. A special means of activation of high-level controls shall be required. The high-level control shall be operable only when continuous manual activation is provided by the operator. A continuous signal audible to the fluoroscopist shall indicate that the high-level control is being employed.

(B) Fluoroscopic equipment that is not provided with an automatic exposure rate control shall not be operable at any combination of tube potential and current that will result in an exposure rate in excess of 1.3 mC/kg (5 roentgens) per minute at the point where the center of the useful beam enters the patient, except during either of the following:

(i) When fluoroscopic images are being recorded; or

(ii) when an optional high-level control is activated. A special means of activation of the high-level control shall be required. The high-level control shall be operable only when continuous manual activation is provided by the operator. A continuous signal audible to the fluoroscopist shall indicate that the high-level control is being employed.

(C) Fluoroscopic equipment that is provided with both an automatic exposure rate control mode and a manual mode shall not be operable at any combination of tube potential and current that will result in an exposure rate in excess of 2.6 mC/kg (10 roentgens) per minute in either mode at the point where the center of the useful beam enters the patient, except under either of the following conditions:

(i) When fluoroscopic images are being recorded; or

(ii) when the mode or modes have an optional high-level control. The mode or modes shall not be operable at any combination of tube potential and current that will result in an exposure rate in excess of 1.3 mC/kg (5 roentgens) per minute at the point where the center of the useful beam enters the patient, unless the high-level control is activated. A special means of activating of the high-level control shall be required. The high-level control shall be operable only when continuous manual activation is provided by the operator. A continuous signal audible to the fluoroscopist shall indicate that the high-level control is being employed.

(D) Fluoroscopic equipment manufactured after May 19, 1995 that can exceed 1.3 mC/kg (5 roentgens) per minute shall be equipped with an automatic exposure rate control. All entrance exposure rate limits shall be 2.6 mC/kg (10 roentgens) per minute with an upper limit of 5.2 mC/kg (20 roentgens) per minute when the high-level control is activated.

(E) Compliance with the requirements of this subsection shall be determined as follows:

(i) If the source is below the X-ray table, the exposure rate shall be measured at one centimeter above the tabletop or cradle.

(ii) If the source is above the X-ray table, the exposure rate shall be measured at 30 centimeters

above the tabletop with the end of the beam-limiting device or spacer positioned as closely as possible to the point of measurement.

(iii) For any fluoroscopy system capable of changing the X-ray beam orientation, which is also known as a C-arm system, the exposure rate shall be measured at 30 centimeters from the input surface of the fluoroscopic imaging assembly. The source may be positioned at any available SID, if the end of the beam-limiting device or spacer is no closer than 30 centimeters from the input surface of the fluoroscopic imaging assembly.

(iv) For a lateral-type fluoroscope, the exposure rate shall be measured at a point that is 15 centimeters from the centerline of the X-ray table and in the direction of the X-ray source, with the end of the beam-limiting device or spacer positioned as closely as possible to the point of measurement. A moveable tabletop shall be positioned as closely as possible to the lateral X-ray source, with the end of the beam-limiting device or spacer no closer than 15 centimeters to the centerline of the X-ray table.

(2) Periodic measurements of the entrance exposure rate shall be taken by a qualified expert for both the typical and the maximum values according to all of the following requirements:

(A) The measurements shall be taken annually and after any maintenance of the system that might affect the exposure rate.

(B) The results of these measurements shall be posted at a location where any fluoroscopist has ready access to the results while using the fluoroscope and in the record required by this regulation. The measurement results shall be stated in coulombs per kilogram (roentgens) per minute and shall include the technique factors used in determining the results. The name of the individual performing the measurements and the date on which the measurements were performed shall be included in the results.

(C) The conditions under which periodic measurements of the entrance exposure rate are taken shall meet the following requirements:

(i) Each measurement shall be made under the conditions that meet the requirements of this regulation.

(ii) The kVp, mA, and other selectable parameters shall be adjusted to those settings typical in clinical use for a patient with an abdomen that is 23 cm thick.

(iii) Each X-ray system that incorporates any automatic exposure rate controls shall have sufficient attenuative material placed in the useful beam to produce milliamperage and kilovoltage that meet the requirements of this regulation.

(D) The conditions under which periodic measurements of the maximum entrance exposure are taken shall meet the following requirements:

(i) The measurement shall be made under the conditions that meet the requirements of this regulation.

(ii) The kVp, mA, and other selectable parameters shall be adjusted to those settings that produce the maximum entrance exposure rate.

(iii) Each X-ray system that incorporates automatic exposure rate controls shall have sufficient attentuative material placed in the useful beam to produce the maximum entrance exposure rate of the system.

(d) Barrier-transmitted radiation rate limits.

(1) The exposure rate due to transmission through the primary protective barrier with the attenuation block in the useful beam, combined with radiation from the image intensifier, if provided, shall not exceed 0.5 μ C/kg (2 milliroentgens) per hour at 10 centimeters from any accessible surface of the fluoroscopic imaging assembly beyond the plane of the image receptor for each mC/kg (4 roentgens) per minute of entrance exposure rate.

(2) Measuring compliance of barrier transmission.

(A) The exposure rate due to transmission through the primary protective barrier combined with radiation from the image intensifier shall be determined by measuring the radiation averaged over an area of 100 square centimeters, with no linear dimension greater than 20 centimeters.

(B) If the source is below the tabletop, the measurement shall be taken with the input surface of the fluoroscopic imaging assembly positioned at 30 centimeters above the tabletop.

(C) If the source is above the tabletop and the SID is variable, the measurement shall be taken with the end of the beam-limiting device or spacer placed as close to the tabletop as possible, but not closer than 30 centimeters.

(D) All movable grids and compression devices shall be removed from the useful beam during the measurement.

(e) Indication of potential and current. During fluoroscopy and cinefluorography, the kV and the mA shall be continuously indicated.

(f) Source-to-skin distance (SSD). Unless otherwise approved by the food and drug administration, the SSD shall not be less than the following:

(1) 38 centimeters on stationary fluoroscopic systems manufactured on or after August 1, 1974;

(2) 35.5 centimeters on stationary fluoroscopic systems manufactured before August 1, 1974;

(3) 30 centimeters on all mobile fluoroscopes; and

(4) 20 centimeters for all mobile fluoroscopes when used for specific surgical applications.

(g) Fluoroscopic timer.

(1) A method shall be provided to preset the cumulative amount of time during which the fluoroscopic X-ray tube is on. The maximum cumulative amount of time during which the fluoroscopic X-ray tube is on shall not exceed five minutes without resetting the timing device.

(2) A signal audible to the fluoroscopist shall indicate the completion of any preset cumulative time. The signal shall continue to sound while X-rays are produced until the timing device is reset.

(h) Control of scattered radiation.

(1) Each fluoroscopic table, when combined with the medical procedures performed, shall be such that no unprotected part of the body of any staff member or ancillary individual shall be exposed to unattenuated scattered radiation that originates from under the table. The attenuation required shall be not less than 0.25 millimeter lead-equivalent.

(2) The equipment configuration and operating procedures used shall prevent any portion of the body of any staff member or ancillary individual, except the extremities, from being exposed to the unattenuated scattered radiation emanating from above the tabletop, unless either of the following conditions is met:

(A) The individual is at least 120 centimeters from the center of the useful beam.

(B) The radiation has passed through not less than 0.25 millimeter of lead-equivalent material including drapes, a bucky-slot cover panel, and self-supporting curtains, in addition to any lead equivalency provided by any protective apron.

(3) Exemptions to paragraph (h)(2) may be granted by the secretary if a sterile field does not permit the use of the normal protective barriers. If the use of prefitted sterilized covers for the barriers is practical, an exemption shall not be granted. Exceptions shall be automatically granted for the following fluoroscopic procedures only if a sterile field does not permit the use of the normal protective barriers:

(A) Angiograms;

(B) arthrograms;

(C) biliary drainage procedures;

(D) fluoroscopic biopsy procedures;

(E) myelograms;

(F) percutaneous cholangiograms;

(G) percutaneous nephrostomies;

(H) sinograms or fistulograms; and

(I) T-tube cholangiograms.

(i) Spot-film exposure reproducibility. Each fluoroscopic system equipped with a spot- film mode shall meet the exposure reproducibility requirements of K.A.R. 28-35-244a when operating in the spot-film mode.

(j) Radiation therapy simulation systems. Each radiation therapy simulation system shall be exempt from the requirements of subsection (c) of this regulation. In addition, this type of system shall be exempt from the following:

(1) The requirements of subsections (a) and (d) of this regulation, if the system is designed and used so that no individual other than the patient is in the X-ray room when the system is producing X-rays; and

(2) the requirements of subsection (g) of this regulation, if the system is provided with a means of indicating the cumulative time that an individual patient has been exposed to X-rays.

Procedures shall be established to require that the cumulative time be reset between examinations.

(Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-244. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective Decemeber 30, 2005.)

28-35-244a. Radiographic systems other than fluoroscopic, dental intraoral, or computed tomography X-ray systems. (a) Beam limitation, except for mammographic systems. Each registrant shall ensure that the useful beam is collimated to the area of clinical interest. This requirement shall be deemed to have been met if a positive beam-limiting device meeting the manufacturer's specifications and the requirements of this regulation has been used or if evidence of collimation is shown on at least three sides or three corners of the film, including projections from the shutters of the collimator, cone cutting at the corners, and borders at the film's edge.

(1) General-purpose stationary and mobile X-ray systems including veterinary systems, other than portable systems, installed after the effective date of these regulations.

(A) Each registrant shall use only X-ray systems provided with the means for independent stepless adjustment of at least two dimensions of the X-ray field.

(B) Each registrant shall ensure that a method is provided for visually defining the perimeter of the X-ray field. The total misalignment of the edges of the visually defined field with the respective edges of the X-ray field along either the length or width of the visually defined field shall not exceed two percent of the distance from the source to the center of the visually defined field when the surface upon which the visually defined field appears is perpendicular to the axis of the X-ray beam.

(C) An exemption from paragraphs (a)(1)(A) and (B) may be granted by the secretary for noncertified X-ray systems if the registrant submits a written application for the exemption and that application meets the following conditions:

(i) Demonstrates that it is impractical to comply with paragraphs (a)(1)(A) and (B); and

(ii) demonstrates that the purpose of paragraphs (a)(1)(A) and (B) will be met by other methods.

(2) Additional requirements for stationary general-purpose X-ray systems. In addition to the requirements of paragraph (a)(1), each registrant shall ensure that all stationary general- purpose X-ray systems, both certified and noncertified, meet all of the following requirements:

(A) A method shall be provided to indicate when the axis of the X-ray beam is perpendicular to the plane of the image receptor, to align the center of the X-ray field with respect to the center of the image receptor to within two percent of the SID, and to indicate the SID to within two percent.

(B) The beam-limiting device shall indicate numerically the field size in the plane of the image receptor to which the device is adjusted.

(C) The indication of the field size dimensions and SID shall be specified in inches or centimeters, or both, and shall be such that aperture adjustments result in X-ray field dimensions in the plane of the image receptor that correspond to X-ray field dimensions indicated by the beam-limiting device to within two percent of the SID when the beam axis is indicated to be perpendicular to the plane of the image receptor.

(3) X-ray systems designed for one size of image receptor. Radiographic equipment designed for only one size of image receptor at a fixed SID shall be provided with the means to limit the field at the plane of the image receptor to dimensions no greater than those of the image receptor and to align the center of the X-ray field with the center of the image receptor to within two percent of the SID, or shall be provided with the means to both adjust the size of and align the X-ray field so that the X-ray field at the plane of the image receptor does not extend beyond any edge of the image receptor.

(4) X-ray systems other than those described in this subsection and veterinary systems installed before the effective date of this regulation and all portable veterinary X-ray systems.

(A) A means shall be provided to limit the X-ray field in the plane of the image receptor so that the field does not exceed each dimension of the image receptor by more than two percent of the SID when the axis of the X-ray beam is perpendicular to the plane of the image receptor.

(B) A means shall be provided to align the center of the X-ray field with the center of the image receptor to within two percent of the SID, or the means shall be provided to both adjust the size of and align the X-ray field so that the X-ray field at the plane of the image receptor does not extend beyond any edge of the image receptor. Compliance shall be determined with the axis of the X-ray beam perpendicular to the plane of the image receptor.

(C) The requirements of paragraphs (a)(4)(A) and (B) may be met with a system that meets the

requirements for a general-purpose X-ray system as specified in paragraph (a)(1) or, when alignment means are also provided, may be met with either of the following:

(i) An assortment of removable, fixed-aperture, beam-limiting devices sufficient to meet the requirements for each combination of image receptor size and SID for which the system is designed, with each such device having clear and permanent markings to indicate the image receptor size and SID for which the system is designed; or

(ii) a beam-limiting device having multiple fixed apertures sufficient to meet the requirements for each combination of image receptor size and SID for which the system is designed. Permanent, clearly legible markings shall indicate the image receptor size and SID for which each aperture is designed and shall indicate which aperture is in position for use.

(b) Radiation exposure control.

(1) Exposure initiation. A means shall be provided to initiate the radiation exposure by a deliberate action on the part of the operator, including the depression of a switch. Radiation exposure shall not be initiated without such an action. In addition, it shall not be possible to initiate an exposure when the timer is set to a "zero" or "off" position if either position is provided.

(2) Exposure indication. A means shall be provided for visual indication observable at or from the operator's protected position whenever X-rays are produced. In addition, a signal audible to the operator shall indicate that the exposure has terminated.

(3) Exposure termination. A means shall be provided to terminate the exposure at a preset time interval, preset product of current and time, a present number of pulses, or a preset radiation exposure to the image receptor. Except for dental panoramic systems, termination of each exposure shall cause the automatic resetting of the timer to its initial setting or to "zero."

(A) Manual exposure control. An X-ray control shall be incorporated into each X-ray system so that each exposure can be terminated by the operator at any time, except for either of the following:

(i) During any exposure of one-half second or less; or

(ii) during serial radiography, when a means shall be provided to permit the completion of any single exposure of the series in process.

(B) Automatic exposure controls. When an automatic exposure control is provided, all of the following requirements shall be met:

(i) The mode of operation selected shall be indicated on the control panel.

(ii) If the X-ray tube potential is equal to or greater than 50kVp, the minimum exposure time for field emission equipment rated for pulsed operation shall be equal to or less than a time interval equivalent to two pulses.

(iii) The minimum exposure time for all equipment other than that specified in paragraph (b)(2)(B) shall be equal to or less than one-sixtieth of a second or the time interval required to deliver 5 mAs, whichever is greater.

(iv) Either the product of the peak X-ray tube potential, current, and exposure time shall be limited to not more than 60 kWs per exposure, or the product of the X-ray tube current and exposure time shall be limited to not more than 600 mAs per exposure. However, when the X-ray tube potential is less than 50 kVp, the product of the X-ray tube current and exposure time shall be limited to not more than 2,000 mAs per exposure.

(v) A visible signal shall indicate when an exposure has been terminated at the limits required by paragraph (b)(2)(D), and manual resetting shall be required before further automatically timed exposures can be made.

(4) Exposure duration or timer linearity. For systems that provide for the independent selection of exposure time settings, the average ratios (X_1) of exposure to the indicated timer setting, in units of C $kg^{-1}s^{-1}$ (mR/s), obtained at any two clinically used timer settings shall not differ by more than 0.10 times their sum. This calculation is written as follows:

$$(X_{-1} - X_2) \leq 0.1\ (X_{-1} + X_2)$$

where X_{-1} and X_2 are the average C $kg^{-1}s^{-1}$ (mR/s) values.

(5) Exposure control location. The X-ray exposure control shall be placed so that the operator can view the patient while making any exposure.

(6) Operator protection, except for veterinary systems.

(A) Stationary systems. Each stationary X-ray system shall be required to have the X-ray control

permanently mounted in a protected area so that the operator is required to remain in that protected area during the entire exposure.

(B) Mobile and portable systems. Each mobile and each portable X-ray system shall meet the following requirements:(i) If used for one week or more at the same location, including a room or a suite, meet the requirements of paragraph (b)(6)(A); or

(ii) if used for less than one week at the same location, be provided with either a protective barrier that is at least two meters or 6.5 feet high for operator protection during exposures or a means to allow the operator to be at least 2.7 meters or 9 feet from the tube housing assembly during the exposure.

(7) Operator protection for veterinary systems. All stationary, mobile, or portable X-ray systems used for veterinary work shall be provided with either a protective barrier that is at least two meters or 6.5 feet high for operator protection during exposures or a means to allow the operator to be at least 2.7 meters or nine feet from the tube housing assembly during exposures.

(c) Source-to-skin distance. Each mobile or portable radiographic system shall be provided with the means to limit the source-to-skin distance to equal to or greater than 30 centimeters, except for veterinary systems or systems specifically approved by the FDA.

(d) Exposure reproducibility. When all technique factors are held constant, including control panel selections associated with automatic exposure control systems, the coefficient of variation of exposure for both manual and automatic exposure control systems shall not exceed 0.05. This requirement shall apply to all clinically used techniques.

(e) Radiation from capacitor energy storage equipment in standby status. The radiation emitted from the X-ray tube when the system is fully charged and the exposure switch or timer is not activated shall not exceed a rate of 0.5 µC/kg (2 milliroentgens) per hour at five centimeters from any accessible surface of the diagnostic source assembly, with the beam-limiting device fully open.

(f) Accuracy. Deviation of the measured technique factors from the indicated values of kVp and exposure time shall not exceed the limits specified for each system by its manufacturer. In the absence of manufacturer's specifications, the deviation shall not exceed 10 percent of the indicated value for kVp and 20 percent for exposure time.

(g) mA and mAs linearity. The following requirements shall apply when the equipment is operated with a power supply as specified by the manufacturer for any fixed X-ray tube potential within the range of 40 percent to 100 percent of the maximum rated mA or mAs.

(1) Equipment that provides for the independent selection of X-ray tube current (mA). The average ratios (X_{-1}) of exposure to the indicated milliampere-seconds product C kg^{-1} mAs^{-1} (or mR/mAs) obtained at any two consecutive tube current settings shall not differ by more than 0.10 times their sum. This calculation is written as follows:

$$(X_{-1} - X_2) \leq 0.10\ (X_{-1} + X_2)$$

where X_{-1} and X_2 are the average values obtained at each of two consecutive tube current settings, or at two settings differing by no more than a factor of two when the tube current selection is continuous.

(2) Equipment that has a combined X-ray tube current-exposure time product (mAs) selector, but not a separate tube current (mA) selector. The average ratios (X_{-1}) of exposure to the indicated milliampere-seconds product, in units of C kg^{-1} mAs^{-1} (or mR/mAs), obtained at any two consecutive mAs selector settings shall not differ by more than 0.10 times their sum. This calculation is written as follows:

$$(X_{-1} - X_2) \leq 0.10\ (X_{-1} + X_2)$$

where X_{-1} and X_2 are the average values obtained at each of two mAs selector settings, or at two settings differing by no more than a factor of two when the mAs selector provides continuous selection.

(3) Measuring compliance. Determination of compliance shall be based on 10 exposures taken within one hour, at each of the two settings specified by this subsection. These two settings may include any two focal spot sizes, unless one is equal to or less than 0.45 millimeters and the other is greater than 0.45 millimeters. For purposes of this requirement, focal spot size shall mean the nominal focal spot size specified by the X-ray tube manufacturer.

(h) Additional requirements applicable to certified systems only. Diagnostic X-ray systems incorporating one or more certified components shall be required to meet the following additional requirements that relate to that certified component or components.

(1) Beam limitation for stationary and mobile general-purpose X-ray systems.

(A) A means of stepless adjustment of the size of the X-ray field shall be provided. The minimum

field size at an SID of 100 centimeters shall be equal to or less than five centimeters by five centimeters.

(B) If a light localizer is used to define the X-ray field, the localizer shall provide an average illumination of not less than 160 lux or 15 foot-candles at 100 centimeters or at the maximum SID, whichever is less. The average illumination shall be based on measurements made in the approximate center of each quadrant of the light field. Radiation therapy simulation systems manufactured on and after May 27, 1980 shall be exempt from this requirement.

(C) The edge of the light field at 100 centimeters or at the maximum SID, whichever is less, shall have a contrast ratio, when corrected for ambient lighting, of not less than four for beam-limiting devices designed for use on stationary equipment and a contrast ratio of not less than three for beam-limiting devices designed for use on mobile equipment. The contrast ratio shall be defined as I_1/I_2 where I_1 is the illumination at three millimeters from the edge of the light field toward the center of the field, and I_2 is the illumination at three millimeters from the edge of the light field away from the center of the field. Compliance shall be determined by using a measuring instrument that has an aperture of one millimeter in diameter.

(2) Beam limitation and alignment on stationary general-purpose X-ray systems equipped with positive beam limitation (PBL). If PBL is being used, all of the following requirements shall be met:

(A) The PBL shall prevent the production of X-rays when either of the following occurs:

(i) The length or width of the X-ray field in the plane of the image receptor differs, except as permitted by paragraph (h)(2)(C), from the corresponding image receptor dimensions by more than three percent of the SID.

(ii) The sum of the length and width differences as stated in paragraph (h)(2)(A)(i), without regard to sign, exceeds four percent of the SID.

(B) Compliance with paragraph (h)(2)(A) shall be determined when the equipment indicates that the beam axis is perpendicular to the plane of the image receptor. Compliance shall be determined no sooner than five seconds after insertion of the image receptor.

(C) The PBL system shall be capable of operation, at the discretion of the operator, so that the size of the field can be made smaller than the size of the image receptor through stepless adjustment of the field size. The minimum field size at an SID of 100 centimeters shall be equal to or less than five centimeters by five centimeters.

(D) The PBL system shall be designed so that if a change in image receptor does not cause an automatic return to PBL function as described in paragraph (h)(2)(A), then any change of image receptor size or SID shall cause the automatic return to PBL function.

(3) Beam limitation for portable X-ray systems. Beam limitation for each portable X-ray system shall meet the beam limitation requirements in paragraph (a)(1) or (h)(2).

(i) Tube stands for portable X-ray systems. A tube stand or other mechanical support shall be used for portable X-ray systems, so that the X-ray tube housing assembly does not need to be handheld during exposures. (Authorized by and implementing K.S.A. 48-1607; effectiveDecember 30, 2005.)

28-35-247. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective Decemeber 30, 2005.)

28-35-247a. Intraoral dental radiographic systems. In addition to K.A.R. 28-35-242a and 28-35-242b, this regulation shall apply to all X-ray equipment and the associated facilities used for dental radiography. The requirements for extraoral dental radiographic systems shall be those requirements specified in K.A.R. 28-35-244a. Each registrant shall use only systems meeting the requirements of this regulation.

(a) Source-to-skin distance (SSD). X-ray systems designed for use with an intraoral image receptor shall be provided with a means to limit the SSD to not less than either of the following:

(1) 18 centimeters if operable above 50 kVp; or

(2) 10 centimeters if operable at 50 kVp only.

(b) kVp limitations. Dental X-ray machines with a nominal fixed kVp of less than 50 kVp shall not be used to make diagnostic dental radiographs of humans.

(c) Beam limitation. Each radiographic system designed for use with an intraoral image receptor shall be provided with a means to limit the X-ray beam so that the beam at the minimum SSD is containable in a circle with a diameter of no more than seven centimeters.

(d) Radiation exposure control.

(1) Exposure initiation.

(A) A means shall be provided to initiate the radiation exposure by a deliberate action on the part of the operator, including the depression of a switch. Radiation exposure shall not be initiated without such an action.

(B) When the timer is set to a "zero" or "off" position, if either position is provided, an exposure shall not be possible.

(2) Exposure indication. A means shall be provided for a visual indication observable at or from the operator's protected position whenever X-rays are produced. In addition, a signal audible to the operator shall indicate that the exposure has terminated.

(3) Exposure termination.

(A) A means shall be provided to terminate each exposure at a preset time interval, a preset product of current and time, a preset number of pulses, or a preset radiation exposure to the image receptor.

(B) An X-ray exposure control shall be incorporated into each X-ray system so that each exposure can be terminated by the operator at any time, except for exposures of one-half second or less.

(C) Each termination of an exposure shall cause the automatic resetting of the timer to its initial setting or to "zero."

(4) Exposure duration or timer linearity. For each system that provides for the independent selection of exposure time settings, the average ratios (X_1) of exposure to the indicated timer setting, in units of C kg^{-1} s^{-1} (mR/s), obtained at any two clinically used time settings shall not differ by more than 0.10 times their sum. The linearity is calculated using the following equation:

$$(X_1 - X_2) \leq 0.10\ (X_1 + X_2)$$

where X_1 and X_2 are the average ratios of exposure to the indicated timer setting.

(5) Exposure control location and operator protection.

(A) Each stationary X-ray system shall be required to have the X-ray exposure control permanently mounted in a protected area so that the operator is required to remain in that protected area during the entire exposure.

(B) Each mobile or portable X-ray system used for one week or longer in the same location, including a room or suite, shall meet the requirements of this regulation.

(C) Each mobile or portable X-ray system used for less than one week in the same location shall be provided either with a protective barrier that is at least two meters (6.5 feet) high for operator protection or with the means to allow the operator to be at least 2.7 meters (9 feet) from the tube housing assembly while making exposures.

(e) Reproducibility. When the equipment is operated with an adequate power supply as specified by the manufacturer, the estimated coefficient of variation of radiation exposures shall be no greater than 0.05 for any specific combination of selected technique factors.

(f) mA and mAs linearity. The requirements specified in this subsection shall apply when the equipment is operated with a power supply as specified by the manufacturer for any fixed X-ray tube potential within the range of 40 percent to 100 percent of the maximum rated mA or mAs.

(1) Equipment that provides for the independent selection of X-ray tube current (mA). The average ratios (X_1) of exposure to the indicated milliampere-seconds product, in units of C kg^{-1} mAs^{-1} (or mR/mAs), obtained at any two consecutive tube current settings shall not differ by more than 0.10 times their sum. The linearity is calculated using the following equation:

$$X_1 - X_2 \leq 0.10\ (X_1 + X_2)$$

where X_1 and X_2 are the average values obtained at each of two consecutive tube current settings, or at two settings differing by no more than a factor of two if the tube current selection is continuous.

(2) Equipment that has a combined X-ray tube current-exposure time project (mAs) selector but not a separate tube current (mA) selector. The average ratios (X_1) of exposure to the indicated milliampere-seconds product, in units of C kg^{-1} mAs^{-1} (or mR/mAs), obtained at any two consecutive mAs selector settings shall not differ by more than 0.10 times their sum. The linearity is calculated using the following equation:

$$X_1 - X_2\ \mu\ 0.10\ (X_1 + X_2)$$

where X_1 and X_2 are the average values obtained at any two mAs selector settings, or at two settings differing by no more than a factor of two if the mAs selector provides continuous selection.

(3) Measuring compliance. Determination of compliance shall be based on 10 exposures taken within

one hour, at each of two settings. These two settings may include any two focal spot sizes, unless one is equal to or less than 0.45 millimeters and the other is greater than 0.45 millimeters. For purposes of this regulation, "focal spot size" shall mean the nominal focal spot size specified by the X-ray tube manufacturer.

(g) Accuracy. The deviation of technique factors from the indicated values for kVp and exposure time, if time is independently selectable, shall not exceed the limits specified for that system by its manufacturer. In the absence of manufacturer's specifications, the deviation shall not exceed 10 percent of the indicated value for kVp and 20 percent for time.

(h) Administrative controls.

(1) Patient-holding and film-holding devices shall be used when the techniques permit.

(2) The tube housing and the position indication device (PID) shall not be handheld during an exposure.

(3) Each X-ray system shall be operated so that the useful beam at the patient's skin does not exceed the requirements of this regulation.

(4) Dental fluoroscopy without image intensification shall not be used. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-248a. Computed tomography (CT) X-ray systems. (a) Definitions. In addition to the definitions in part 1 of these regulations, the following definitions shall be applicable to this regulation:

(1) "Computed tomography dose index" and "CTDI" mean the integral from -7T to +7T of the dose profile along a line perpendicular to the tomographic plane divided by the product of the normal tomographic section thickness and the number of tomograms produced in a single scan, as follows:

$$\overline{CTDI} = \frac{1}{nT}\int_{-7T}^{+7T} D(z)dz$$

where:

z	**=**	**Position along a line perpendicular to the tomographic plane;**
D(z)	**=**	**dose at position z;**
T	**=**	**nominal tomographic section thickness;**
n	**=**	**number of tomograms produced in a single scan.**

This definition assumes that the dose profile is centered around z=0 and that, for a multiple tomogram system, the scan increment between adjacent scans is nT.

(2) "Contrast scale" and" CS" mean the change in the linear attenuation coefficient per CTN relative to water, as follows:

$$\overline{CS} = \frac{\mu_x - \mu_w}{\overline{CTN}_x - \overline{CTN}_w}$$

where:

μ_x	**=**	**Linear attenuation coefficient of the material of interest;**
μ_w	**=**	**linear attenuation coefficient of water;**
$\overline{CTN}_x$	**=**	**average CTN of the material of interest;**
$\overline{CTN}_w$	**=**	**average CTN of water.**

(3) "CT conditions of operation" means all selectable parameters governing the operation of a CT X-ray system including nominal tomographic section thickness, filtration, and technique factors.

(4) "CT gantry" means the tube housing assemblies, beam-limiting devices, and detectors and the supporting structures and frames that hold these components.

(5) "CT number" and "CTN" mean the number used to represent the X-ray attenuation associated with each elemental area of the CT image, as follows:

$$\overline{CTN} = \frac{k(\mu_x - \mu_w)}{\mu_w}$$

where:

k = A constant, which is normally 1,000 when the Houndsfield scale of CTN is used;

μ_x = linear attenuation coefficient of the material of interest; and

μ_w = linear attenuation coefficient of water.

(6) "Dose profile" means the dose as a function of position along a line.

(7) "Elemental area" means the smallest area within a tomogram for which the X-ray attenuation properties of a body are depicted.

(8) "Multiple tomogram system" means a computed tomography X-ray system that obtains X-ray transmission data simultaneously during a single scan to produce more than one tomogram.

(9) "Noise" means the standard deviation of the fluctuations in CTN expressed as a percentage of the attenuation coefficient of water. Noise is estimated using the following equation:

$$S_n = \frac{100 \cdot \overline{CS} \cdot s}{\mu_w}$$

where:

$\overline{CS}$ = Linear attenuation coefficient of the material of interest;

μ_w = linear attenuation coefficient of water; and

s = standard deviation of the CTN of picture elements in a specified area of the CT image.

(10) "Nominal tomographic section thickness" means the full width at half-maximum of the sensitivity profile taken at the center of the cross-sectional volume over which the X-ray transmission data are collected.

(11) "Picture element" means an elemental area of a tomogram.

(12) "Reference plane" means a plane that is displaced from and parallel to the tomographic plane.

(13) "Scan" means the complete process of collecting X-ray transmission data for the production of a tomogram. Data can be collected simultaneously during a single scan for the production of one or more tomograms.

(14) "Scan increment" means the amount of relative displacement of the patient with respect to the CT X-ray system between successive scans measured along the direction of the displacement.

(15) "Scan sequence" means a preselected set of two or more scans performed consecutively under preselected CT conditions of operation.

(16) "Scan time" means the period of time between the beginning and the end of X-ray transmission data accumulation for a single scan.

(17) "Single tomogram system" means a CT X-ray system that obtains X-ray transmission data during a scan to produce a single tomogram.

(18) "Tomographic plane" means the geometric plane that is identified as corresponding to the output tomogram.

(19) "Tomographic section" means the volume of an object whose X-ray attenuation properties are imaged in a tomogram.

(b) Requirements for equipment.

(1) Termination of exposure.

(A) A means shall be provided to terminate the X-ray exposure automatically by either de-energizing the X-ray source or shuttering the X-ray beam if equipment failure affecting data collection occurs. This termination shall occur within an interval that limits the total scan time to no more than 110 percent of its

preset value through the use of either a backup timer or devices that monitor equipment function.

(B) A visible signal shall indicate when the X-ray exposure has been terminated as specified in paragraph (b)(1)(A).

(C) Each operator shall be able to terminate the X-ray exposure at any time during a scan, or series of scans under CT X-ray systems control, of greater duration than one-half second.

(2) Tomographic plane indication and alignment.

(A) For any single tomogram system, a means shall be provided to permit the visual determination of the tomgraphic plane or a reference plane offset from the tomographic plane.

(B) For any multiple tomogram system, a means shall be provided to permit the visual determination of the location of a reference plane. This reference plane can be offset from the location of the tomographic planes.

(C) If a device using a light source is used, the light source shall provide illumination levels sufficient to permit the visual determination of the location of the tomographic plane or reference plane under ambient light conditions of up to 500 lux.

(3) Beam-on and shutter-status indicators and control switches.

(A) The CT X-ray control and gantry shall provide a visual indication whenever X-rays are produced and, if applicable, whether the shutter is open or closed.

(B) Each emergency button or switch shall be clearly labeled as to its function.

(4) Indication of CT conditions of operation. The CT X-ray system shall be designed so that the CT conditions of operation to be used during a scan or a scan sequence shall be indicated before the initiation of a scan or a scan sequence. This requirement may be met by permanent markings on equipment that has all or some of these conditions of operation at fixed values. An indication of the CT conditions of operation shall be visible from any position from which scan initiation is possible.

(5) Extraneous radiation. When data are not being collected for image production, the radiation adjacent to the tube port shall not exceed the levels permitted in these regulations.

(6) Maximum surface CTDI identification. The angular position where the maximum surface CTDI occurs shall be identified to allow for the reproducible positioning of a CT dosimetry phantom.

(7) Additional requirements applicable to CT X-ray systems containing a gantry manufactured after September 3, 1985.

(A) The total error in the indicated location of the tomographic plane or reference plane shall not exceed five millimeters.

(B) If the X-ray production period is less than one-half second, the indication of X-ray production shall be actuated for at least one-half second. Indicators at or near the gantry shall be discernible from any point external to the patient opening where insertion of any part of the human body into the primary beam is possible.

(C) The deviation of the indicated scan increment versus the actual increment shall not exceed plus or minus one millimeter for any mass weighing from 0 to 100 kilograms and resting on the support device. The patient-support device shall be adjusted in increments from a typical starting position to the maximum distance or 30 centimeters, whichever is less, and then returned to the starting position. Measurement of actual versus indicated scan increment may be taken anywhere along this range of positions.

(D) Premature termination of the X-ray exposure by the operator shall necessitate the resetting of the CT conditions of operation before the initiation of another scan.

(c) Facility design requirements.

(1) Aural communication. Provision shall be made for two-way aural communication between the patient and the operator at the control panel.

(2) Viewing systems.

(A) Windows, mirrors, closed-circuit television, or an equivalent shall be provided to permit continuous observation of the patient during irradiation and shall be located so that the operator can observe the patient from the control panel.

(B) If the primary viewing system is an electronic means, an alternate viewing system, which may be electronic, shall be available for use if the primary viewing system fails.

(d) Surveys, calibrations, spot checks, and operating procedures.

(1) Surveys.

(A) All CT X-ray systems installed after the effective date of this regulation and those systems not

previously surveyed shall have a survey performed by, or under the direction of, a qualified expert. In addition, the surveys shall be performed after each change in the facility or equipment that might cause a significant increase in radiation hazard.

(B) Each registrant shall obtain a written report of the survey from the qualified expert. The registrant shall make a copy of the report available to the department upon request.

(2) Radiation calibrations.

(A) The calibration of the radiation output of the CT X-ray system shall be performed by, or under the direction of, a qualified expert who is physically present at the facility during the calibration.

(B) The calibration of each CT X-ray system shall be performed at the intervals specified by a qualified expert and after any change or replacement of components that, in the opinion of the qualified expert, could cause any change in the radiation output.

(C) The calibration of the radiation output of each CT X-ray system shall be performed with a calibrated dosimetry system. The calibration of the system shall be traceable to a national standard. The dosimetry system shall have been calibrated within the preceding two years.

(D) One or more CT dosimetry phantoms shall be used in determining the radiation output of a CT X-ray system. Each phantom shall meet all of the following requirements and conditions of use:

(i) Each CT dosimetry phantom shall consist of right-circular cylinders of polymethyl methacrylate with a density of 1.19 plus or minus 0.01 grams per cubic centimeter. Each phantom shall be at least 14 centimeters in length and shall have a diameter of 32.0 centimeters for testing CT X-ray systems designed to image any section of the body and 16.0 centimeters for systems designed to image the head or for whole-body scanners operated in the head-scanning mode.

(ii) Each CT dosimetry phantom shall provide a means for the placement of one or more dosimeters along the axis of rotation and along a line parallel to the axis of rotation at 1.0 centimeter from the outer surface and within the phantom. A means for the placement of dosimeters or alignment devices at other locations may be provided.

(iii) The effect on the doses measured due to the removal of phantom material to accommodate dosimeters shall be accounted for, through appropriate corrections to the reported data by inclusion in the statement of maximum deviation for the value obtained using the phantom.

(iv) All dose measurements shall be performed with the CT dosimetry phantom placed on the patient couch or support device without additional attenuation materials present.

(E) Calibration shall be required for each type of head, body, or whole-body scan performed at the facility.

(F) Calibration shall meet all of the following requirements:

(i) The dose profile along the center axis of the CT dosimetry phantom for the minimum, maximum, and midrange values of the nominal tomographic section thickness used by the registrant shall be measurable. If fewer than three nominal tomographic thicknesses can be selected, the dose profile determination shall be performed for each available nominal tomographic section thickness.

(ii) The CTDI along the two axes shall be measured. The CT dosimetry phantom shall be oriented so that the measurement point at 1.0 centimeter from the outer surface and within the phantom is in the same angular position within the gantry as the point of maximum surface CTDI identified. The CT conditions of operation shall correspond to typical values used by the registrant.

(iii) The required spot checks shall be made.

(G) The calibration procedures shall be in writing. Records of all calibrations performed shall be maintained for inspection by the department.

(3) Spot checks.

(A) The spot check procedures shall be in writing and shall have been developed by a qualified expert.

(B) The spot check procedures shall incorporate the use of a CT dosimetry phantom that has a capability of providing an indication of contrast scale, noise, nominal tomographic section thickness, and the resolution capability of the system for low-contrast and high-contrast objects, and of measuring the mean CTN for water or other reference material.

(C) All spot checks shall be included in the calibration and shall be made at time intervals and under system conditions specified by a qualified expert.

(D) The spot checks shall include acquisition of images obtained with the CT dosimetry phantom or

phantoms using the same processing mode and CT conditions of operation that are used to perform calibrations. The images shall be retained in two forms as follows, until a new calibration is performed:

(i) Photographic copies of the images obtained from the image display device; and

(ii) images stored in digital form on a storage medium compatible with the CT X-ray system.

(E) Written records of the spot checks performed shall be maintained for inspection by the department.

(4) Operating procedures.

(A) The CT X-ray system shall not be operated except by an individual who has been specifically trained in its operation.

(B) Information shall be available at the control panel regarding the operation and calibration of the system. This information shall include the following:

(i) The dates of the latest calibration and spot checks and the location within the facility where the results of those tests can be obtained;

(ii) instructions on the use of the CT dosimetry phantom or phantoms, including the schedule of spot checks appropriate for the system, the allowable variations for the indicated parameters, and the results of at least the most recent spot checks conducted on the system;

(iii) the distance in millimeters between the tomographic plane and the reference plane, if a reference plane is utilized; and

(iv) a current technique chart available at the control panel that specifies, for each routine examination, the CT conditions of operation and the number of scans per examination. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-249. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-250a. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-251. Veterinary medicine radiography. (a) Equipment.

(1) One or more diaphragms or cones shall be provided for collimating the useful beam to the area of clinical interest.

(2) A device shall be provided to terminate the exposure at a preset time.

(3) A dead-man type of exposure switch shall be provided, together with an electrical cord of sufficient length so that the operator can stand outside of the useful beam and at least two meters or six feet from the animal during each X-ray exposure.

(b) Structural shielding. All wall, ceiling, and floor areas shall be equivalent to, or provided with the shielding or applicable protective barriers that are necessary to ensure compliance with K.A.R. 28-35-212a and K.A.R. 28-35-214a.

(c) Operating procedures.

(1) The operator shall stand outside of the useful beam and away from the animal during each radiographic exposure.

(2) No individual other than the operator shall be in the X-ray room while exposures are being made unless the individual's assistance is required.

(3) When an animal must be held in position during radiography, mechanical supporting or restraining devices shall be used if practical. If the animal must be held by an individual, that individual shall be protected with appropriate shielding devices, which may include protective gloves and an apron, and shall be positioned so that no part of the individual's body will be struck by the useful beam. The thickness of each shielding device used shall be the same as that required by K.A.R. 28-35-242a (a)(5) and (7). The exposure of any individual who consistently assists with restraining animals during radiography shall be monitored. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-252. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-253. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-254. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-255. Healing arts screening. Each person who wants to conduct a healing arts screening program shall be required to obtain the secretary's written approval before initiating the program. Each person requesting that the secretary approve a healing arts screening program shall submit the following information and evaluations:

(a) The name and address of the applicant and, if applicable, the names and addresses of the applicant's agents within this state;

(b) the diseases or conditions for which the X-ray examinations are to be used in diagnoses;

(c) a detailed description of the X-ray examinations proposed in the screening program;

(d) a description of the population to be examined in the screening program, including age, sex, physical condition, and any other relevant information;

(e) an evaluation of any known alternate methods not involving ionizing radiation that could achieve the goals of the screening program and the reason why these methods are not used instead of the X-ray examinations;

(f) an evaluation by a qualified expert of the X-ray system or systems to be used in the screening program. The evaluation by the qualified expert shall show that each system meets all requirements of these regulations;

(g) a description of the quality control program for diagnostic film;

(h) a copy of the technique chart for the X-ray examination procedures to be used;

(i) the qualifications of each individual who would be operating each X-ray system;

(j) the qualifications of the individual who would be supervising the operators of the X-ray systems. The extent of supervision and the method of work performance evaluation shall be specified;

(k) the name and address of the individual who would interpret each radiograph;

(l) a description of all procedures to be used in advising each individual screened and the individual's private practitioner of the healing arts of the results of the screening procedure and any further medical needs indicated;

(m) a description of all procedures to be used for the retention or disposition of the radiographs and other records pertaining to each X-ray examination; and

(n) a specification of the proposed frequency of screening and the proposed duration of the entire screening program. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-256. Training for X-ray system operators. The following subjects shall be included in the training of X-ray equipment operators, as applicable:

(a) Familiarization with the following:

(1) Identification of controls;

(2) the function of each control; and

(3) how to use technique charts;

(b) radiation protection using the following:

(1) Collimation;

(2) filtration;

(3) gonad shielding and, if used, other patient protection devices;

(4) restriction of X-ray tube radiation to the image receptor;

(5) personnel protection; and

(6) grids;

(c) film processing, including the following:

(1) Film speed as related to the patient's exposure to radiation;

(2) film processing parameters; and

(3) a quality assurance program;

(d) emergency procedures, which shall include the termination of exposure if an automatic timing device fails;

(e) the proper use of personnel dosimetry, if required; and

(f) understanding the units of radiation. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

PART 6. USE OF RADIOACTIVE MATERIALS IN THE HEALING ARTS

28-35-261. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-262. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-263. Revoked. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-264. General requirements. The provisions of 10 CFR part 35, as in effect on May 2, 2005, are hereby adopted by reference, with the changes specified in this regulation.
(a) For the purposes of part 6, "byproduct material" shall mean all radioactive material regulated by the department.
(b) All reports required by this regulation shall be submitted to the department.
(c) The following sections shall be deleted:
(1) 10 CFR 35.1, "purpose and scope";
(2) 10 CFR 35.2, "definitions," except that the definitions of the following terms shall be retained:
(A) "Authorized medical physicist";
(B) "authorized nuclear pharmacist";
(C) "authorized user";
(D) "prescribed dose"; and
(E) "radiation safety officer";
(3) 10 CFR 35.8, "information collection requirements: OMB approval";
(4) 10 CFR 35.18, "license issuance";
(5) 10 CFR 35.19, "specific exemptions";
(6) 10 CFR 35.26 (a)(1), "radiation protection program changes";
(6) 10 CFR 35.4001, "violations"; and
(8) 10 CFR 35.4002, "criminal penalties."
(d) Wherever the following CFR references occur within 10 CFR part 35, these references shall be replaced with the specified references to regulations and parts in this article:
(1) "10 CFR 19.12" shall be replaced with "K.A.R. 28-35-333, 'instructions to workers.'"
(2) "10 CFR part 20" shall be replaced with "part 4, 'standards for protection against radiation.'"
(3) "10 CFR 20.1101" shall be replaced with "K.A.R. 28-35-211d, 'radiation protection programs.'"
(4) "10 CFR 20.1301(a)(1) and 20.1301(c)" shall be replaced with "K.A.R. 28-35-214a."
(5) "10 CFR 20.1501" shall be replaced with "K.A.R. 28-35-217b."
(6) "10 CFR part 30" shall be replaced with "part 3, 'licensing of sources of radiation.'"
(7) "10 CFR 32.72" shall be replaced with " K.A.R. 28-35-181m, 'specific licenses to manufacture and distribute radiopharmaceuticals containing radioactive material for medical use under group licenses,' and K.A.R. 28-35-181n, 'specific licenses to manufacture and distribute generators or reagent kits for preparation of radiopharmaceuticals containing radioactive material.'"
(8) "10 CFR 32.74" shall be replaced with "K.A.R. 28-35-181o, 'specific licenses to manufacture and distribute sources and devices for use as a calibration or reference source, or for certain medical uses.'"
(9) "10 CFR 33.13" shall be replaced with "K.A.R. 28-35-182b, 'qualifications for a type A specific license of broad scope.'"
(e) Wherever the following terms occur within 10 CFR part 35, these terms shall be replaced with "department":
(1) "Commission";
(2) "NRC operation center"; and
(3) "NRC regional office."
(f) The following changes shall be made to the sections specified:
(1) 10 CFR 35.6(b)(1) and (c)(1) shall be replaced with the following text:
"Obtain review and approved of the research as specified in 45 CFR 46.111, 'criteria for IRB approval of research'; and".

(2) 10 CFR 35.6(b)(2) and (c)(2) shall be replaced with the following text:

"Obtain informed consent from the human research subject as specified in 45 CFR 46.116, 'general requirements for informed consent.'"

(3) 10 CFR 35.10, subsection (a) shall be deleted.

(4) In 10 CFR 35.10(d), the date "October 24, 2002" shall be replaced with "the effective date of these regulations," and in 10 CFR 35.10(b) and (c), the date "October 25, 2005" shall be replaced with "two years from the effective date of these regulations."

(5) 10 CFR 35.12(b)(1) and (c)(1)(i) shall be replaced with the following text: "submitting a form specified by the department that includes the facility diagram, equipment, and training and experience qualifications of the radiation safety officer, authorized users, authorized physicists, and authorized pharmacists."

(6) In 10 CFR 35.57(a)(1) and (b)(1), the date "October 24, 2002" shall be replaced with "the effective date of these regulations."

(7) In 10 CFR 35.57(a)(2) and (b)(2), the date "April 29, 2005 " shall be replaced with "the effective date of these regulations."

(8) In 10 CFR 35.432(a), the date "October 24, 2002 " shall be replaced with "the effective date of these regulations."

(9) In 10 CFR 35.3045, the footnote shall be deleted, and in subsection (a) the words "or any radiation-producing device" shall be added before the words "results in."

(10) 10 CFR 35.3047(d) shall be replaced with the following text: "The licensee shall submit a written report to the department within 15 days after discovery of a dose to the embryo or fetus, or nursing child that requires a report in paragraphs (a) or (b) in this section."

(11) In 10 CFR 35.3067, the phrase "with the department" shall be inserted after the word "report" in the first sentence, and the second sentence shall be deleted. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

PART 7. SPECIAL REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHIC OPERATIONS

28-35-274. Applicability . (a) The regulations in this part shall apply to all persons who utilize sources of radiation for industrial radiography, except those persons who are licensed or registered in the state of Kansas to engage in the practice of the healing arts, dentistry, podiatry, or veterinary medicine. The requirements of this part shall be in addition to, and not in substitution for, the other requirements of these regulations.

(b) The requirements of K.A.R. 28-35-275, K.A.R. 28-35-277a, K.A.R. 28-35-279, K.A.R. 28-35-280, K.A.R. 28-35-287, and K.A.R. 28-35-291 shall apply to sealed radioactive sources only. The requirements of the other regulations in this part shall apply to both radiation machines and sealed radioactive sources. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1601 and K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-275. Limits on levels of radiation for radiographic exposure devices and storage containers. Radiographic exposure devices measuring less than four inches from the sealed source storage position to any exterior surface of the device shall have no radiation level in excess of 50 milliroentgens per hour at six inches from any exterior surface of the device. Radiographic exposure devices measuring four or more inches from the sealed source storage position to any exterior surface of the device, and all storage containers for sealed sources or outer containers for radiographic exposure devices, shall have no radiation level in excess of 200 milliroentgens per hour at any exterior surface, or in excess of 10 milliroentgens per hour at one meter from any exterior surface. The radiation level emanating from a device or container shall be measured with the sealed source in the shielded position. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-276. Locking sources of radiation. (a) Each radiographic exposure device shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The exposure device or its container, or both, shall be kept locked when not under the direct surveillance of a radiographer or a radiographer's assistant except at permanent radiographic installations as specified in K.A.R. 28-35-285. In addition, during radiographic operations the sealed source assembly shall be secured in the shielded position each time the source is returned to that position.

(b) Each sealed source storage container and source changer shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. Storage containers and source changers shall be kept locked when containing sealed sources except when under the direct surveillance of a radiographer or a radiographer's assistant or when being transported.

(c) The control panel of each radiation machine shall be equipped with a lock that prevents the unauthorized use of an X-ray system or the accidental production of radiation. Each radiation machine shall be kept locked with the key removed at all times, except when the machine is under the direct visual surveillance of a radiographer or a radiographer's assistant.

(d) Storage precautions. All locked radiographic exposure devices, storage containers, and source changers shall be physically secured to prevent tampering or removal by unauthorized personnel. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-277. Revoked. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended December 30, 2005.)

28-35-277a. Conducting industrial radiographic operations. (a) If radiography is performed at a location other than a permanent radiographic installation, the radiographer shall be accompanied by at least one other qualified radiographer or an individual who has at a minimum met the requirements specified in K.A.R. 28-35-289. The additional qualified individual shall observe the operations and shall be capable of providing immediate assistance to prevent unauthorized entry. Radiography shall not be performed if only one qualified individual is present.

(b) All radiographic operations shall be conducted in a permanent radiographic installation unless

otherwise specifically authorized by the secretary.

(c) Except when physically impossible, collimators shall be used in industrial radiographic operations that use radiographic exposure devices that allow the source to be moved out of the device.

(d)Any licensee or registrant may conduct lay-barge, offshore-platform, or underwater radiography only if the licensee's or registrant's procedures have been approved by the secretary, the nuclear regulatory commission, or another agreement state. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-278. Radiation survey instruments. (a) Each licensee or registrant shall maintain calibrated and operable radiation survey instruments to make physical radiation surveys as required by this part. The instrumentation required by this subsection shall have a range capable of measuring two milliroentgens per hour through one roentgen per hour.

(b) Each radiation survey instrument shall be calibrated as follows:

(1) At energies appropriate for use;

(2) at intervals not to exceed six months and after each instrument servicing;

(3) with a demonstrated accuracy within plus or minus 20 percent ; and

(4) (A) For linear scale instruments, at two points located approximately one-third and two-thirds of full scale on each scale;

(B) for logarithmic scale instruments, at midrange of each decade and at two points of at least one decade; and

(C) for digital instruments, at three points between two and 1,000 mrem per hour.

(c) Each licensee or registrant shall maintain records of the calibrations specified in this regulation for two years after the calibration date. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-279. Leak testing, repair, tagging, opening, modification, and replacement of sealed sources. (a) The replacement of any sealed source fastened to, or contained in, a radiographic exposure device, leak testing, repair, tagging, opening, and any other action involving a sealed source shall be performed only by persons specifically authorized to do so by the department, the United States nuclear regulatory commission, or an agreement state.

(b) Each sealed source shall be tested for leakage at intervals not to exceed six months. In the absence of a certificate from a transferor that a leak test has been made within the six-month period before transfer, the sealed source shall not be put into use until leak tested.

(c)The leak test shall be capable of detecting the presence of 0.005 microcuries of removable contamination. Leak tests shall be performed by wiping appropriate accessible surfaces and measuring the level of transferred contamination on the wipes. Records of leak test results shall be kept in units of microcuries and maintained for two years.

(d) If any leak test reveals the presence of 0.005 microcuries or more of removable radioactive material, the sealed source shall be considered to be leaking. The licensee shall immediately withdraw the equipment involved from use and shall cause the equipment to be decontaminated and repaired, or to be disposed of, in accordance with these regulations . Within five days after obtaining results of any leak test indicating a leaking source, the licensee shall file a report with the department describing the equipment involved, the test results, and the corrective action taken, if any.

(e) (1) Each exposure device using depleted uranium (DU) shielding and an S- tube configuration shall be tested for DU contamination at least each 12 months. The test shall be capable of detecting the presence of 0.005 microcuries of radioactive material on the test sample and shall be performed by a person specifically authorized to perform the test by the department, the nuclear regulatory commission, or another agreement state. The records of each DU contamination test shall be retained for two years.

(2) If the test reveals the presence of DU contamination, the exposure device shall be removed from use until an evaluation of any degeneration of the S-tube is made. If the evaluation reveals that the S-tube is worn through, the device shall not be used again. DU-shielded devices shall not be required to be tested for DU contamination while in storage and not in use. Before using or transferring the device, the device shall be tested for DU contamination if the interval of storage exceeded 12 months. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended

May 1, 1985; amended December 30, 2005.)

28-35-280. Quarterly inventory. Each licensee shall conduct a quarterly inventory to account for all sealed sources and for all devices containing depleted uranium received or possessed by the licensee. The licensee shall maintain these inventory records for two years following the date of the inventory and shall include the following information:

(a) The quantities and kinds of sources and devices containing depleted uranium inventoried;

(b) the location of the sources and devices containing depleted uranium at the time of inventory; and

(c) the date on which the inventory was conducted. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-281. Utilization logs. (a) Each licensee or registrant shall maintain a log for each source of radiation, which shall contain the following information:

(1) The make and model number, or a detailed description, of the source of radiation or storage container to which the log pertains;

(2) the name and signature of the radiographer to whom the source or container is assigned;

(3) the plant or site where the source or container is used;

(4) the date or dates when the source or container is used; and

(5) the voltage, current, and exposure time for each radiographic exposure made with a radiation machine.

(b) Each licensee or registrant shall retain the logs required by this regulation for three years. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-282. General requirements. (a) Each radiographer's assistant shall be under the personal supervision of a radiographer when using any radiographic exposure device, any associated equipment, or a sealed source, or while conducting radiation surveys to determine that the sealed source has returned to the shielded position or that the radiation machine is shut off after each exposure. The personal supervision shall include the following:

(1) The radiographer's physical presence at the site where the sources of radiation are being used;

(2) the availability of the radiographer to provide immediate assistance, if required; and

(3) the radiographer's direct observation of the assistant's performance of the operations.

(b) Each licensee or registrant shall conduct an internal audit program to ensure that the agency's radioactive material license conditions and the licensee's or registrant's operating and emergency procedures are followed by each radiographer and radiographer's assistant. These internal audits shall be performed at least quarterly, and each radiographer shall be audited at least quarterly. A record of each internal audit shall be maintained for departmental inspection for two years after the date of the audit. (Authorized by and implementing K.S.A. 48-1607; effective Jan 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-282a. Inspection and maintenance of radiation machines, radiographic exposure devices, transport and storage containers, associated equipment, source changers, and survey instruments. (a) Each licensee or registrant shall perform visual and operability checks on the survey meters, radiation machines, radiographic exposure devices, each transport and storage container, and any associated equipment and source changers before each day's use, or each work shift, to ensure that all of the following conditions are met:

(1) The equipment is in good working condition.

(2) The sources are shielded.

(3) The required labeling is present.

(b) Survey instrument operability shall be performed by using check sources or other appropriate means.

(c) If equipment problems are found, the equipment shall be removed from service until repaired.

(d) Each licensee or registrant shall have written procedures for and shall perform inspections and routine maintenance on the radiation machines, radiographic exposure devices, source changers, associated equipment, transport and storage containers, and survey instruments.
The inspections and maintenance shall occur at least every three months or before the next use to ensure the proper functioning of components important to safety. If equipment problems are found, the equipment shall be removed from service until repaired.

(e) The licensee's inspection and maintenance program shall include procedures to ensure that type B packages are shipped and maintained in accordance with the certificate of compliance or other type of approval.

(f) Each licensee or registrant shall maintain records of inspection, equipment problems, and any maintenance performed under this regulation for three years. These records shall indicate the following:

(1) The date of the check or inspection;

(2) the name of the inspector;

(3) the equipment modified;

(4) any problems found; and

(4) any repairs needed and any maintenance and equipment problems found. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-282b. Permanent radiographic installations. (a) Each entrance that is used for access by personnel to the high-radiation area in a permanent radiographic installation shall have either of the following:

(1) An entrance control of the type described in K.A.R. 28-35-219a that causes the radiation level upon entry into the area to be reduced; or

(2) both conspicuous visible and audible warning signals to warn of the presence of radiation. The visible signal shall be actuated by radiation whenever the source is exposed or the machine is energized. The audible signal shall be actuated whenever an attempt is made to enter the installation while the source is exposed or the machine is energized.

(b) The alarm system shall be tested for proper operation with a radiation source each day before the installation is used for radiographic operations. The test shall include a check of both the visible and audible signals. Entrance control devices that reduce the radiation level upon entry as specified in paragraph (a) (1) shall be tested monthly.

(c) If an entrance control device or an alarm is operating improperly, the device or alarm shall be immediately labeled as defective and repaired within seven calendar days. The facility may continue to be used during this seven-day period, if the licensee or registrant implements the continuous surveillance requirements of K.A.R. 28-35-285 and uses an alarming ratemeter.

(d) The test records for entrance controls and audible and visual alarms shall be maintained for three years. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-282c. Labeling, storage, and transportation. (a) The licensee shall not use a source changer or storage container to store radioactive material unless the source changer or the storage container has securely attached to it a durable, legible, and clearly visible label that meets the following requirements:

(1) Bears the standard trefoil radiation caution symbol in conventional colors, which shall include magenta, purple, and black on a yellow background;

(2) has a minimum diameter of 25 mm; and

(3) displays the following wording:

CAUTION [or "DANGER"]
RADIOACTIVE MATERIAL
NOTIFY CIVIL AUTHORITIES [or "NAME OF COMPANY"]

(b) The licensee shall not transport radioactive material unless the material is packaged and the package is labeled, marked, and accompanied with appropriate shipping papers in accordance with U.S. department of transportation regulations.

(c) Radiographic exposure devices, source changers, storage containers, and radiation machines shall

be physically secured to prevent tampering or removal by unauthorized personnel. The licensee shall store all radioactive material in a manner that will minimize danger from explosion or fire.

(d) The licensee shall lock and physically secure all transport packages containing radioactive material in the transporting vehicle to prevent accidental loss, tampering, and unauthorized removal.

(e)The licensee's name and the name of the city or town where the main business office is located shall be prominently displayed by affixing a durable, clearly visible label on each side of any vehicle used to transport radioactive material or radiation machines for temporary use at a job site. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-282d. Radiation safety officer. Each radiation safety officer shall ensure that radiation safety activities are being performed in accordance with approved procedures and regulatory requirements in the daily operation of the licensee's or registrant's program.

(a) The minimum qualifications, training, and experience for a radiation safety officer for industrial radiography shall be the following:

(1) Completion of the training and testing requirements of K.A.R. 28-35-289;

(2) 2,000 hours of hands-on experience as a qualified radiographer in industrial radiographic operations; and

(3) formal training in the establishment and maintenance of a radiation protection program.

(b) Alternatives to the requirements specified in subsection (a) may be considered by the secretary if the radiation safety officer has training and experience in the field of ionizing radiation and, in addition, has adequate formal training with respect to the establishment and maintenance of a radiation safety protection program.

(c) The specific duties and authorities of the radiation safety officer shall include the following:

(1) Establishing and overseeing all operating, emergency, and ALARA procedures as required by part 4 of these regulations and reviewing the procedures regularly to ensure that the procedures conform to the department's regulations and to the license or registration conditions;

(2) overseeing and approving the training program for radiographic personnel to ensure that appropriate and effective radiation protection practices are taught;

(3) ensuring that required radiation surveys and leak tests are performed and documented in accordance with these regulations, including any corrective measures when levels of radiation exceed established limits;

(4) ensuring that personnel monitoring devices are calibrated, if applicable, and used properly, that records are kept of the monitoring results, and that timely notifications are made as required by part 4 of these regulations; and

(5) ensuring that operations are conducted safely and for implementing corrective actions including terminating operations.

(d)Each licensee and registrant shall have two years after the effective date of this regulation to meet the requirements of K.A.R. 28-35-282a and K.A.R. 28-35-282b. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-283. Operating and emergency procedures. (a) At a minimum, the operating and emergency procedures of each licensee or registrant shall include instructions in the following areas:

(1) The proper handling and use of sources of radiation, so that no person is likely to receive a radiation exposure in excess of the limits specified in part 4 of these regulations;

(2) the methods of, and occasions for, conducting radiation surveys;

(3) the methods of controlling access to areas where radiography is being performed;

(4) the methods of, and occasions for, locking and securing sources of radiation, transport containers, storage containers, and exposure devices;

(5) personnel monitoring and the use of personnel-monitoring equipment, including steps that shall be taken immediately by radiography personnel if a pocket dosimeter is found to be off-scale;

(6) transporting sources of radiation to field locations, including packing sources of radiation in a vehicle, posting signs or placards on a vehicle in which a source of radiation is to be transported, and controlling sources of radiation during transportation;

(7) the procedures for minimizing the exposure of individuals if an accident, including a source

disconnect, transport accident, or loss of a source of radiation, occurs;

(8) source recovery procedures if the licensee will perform source recoveries;

(9) the procedures for notifying the appropriate persons if an accident occurs;

(10) the maintenance of records; and

(11) the inspection, maintenance, and operability checking of radiographic exposure devices, storage containers, transport containers, radiation machines, survey instruments, and alarming ratemeters.

(b) Each licensee shall maintain a copy of the current operating and emergency procedures until the department terminates the license. A copy of all superceded operating and emergency procedures shall be maintained for three years after the procedures have been superceded. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-284. Personnel monitoring. (a) The licensee or registrant shall not permit any individual to act as a radiographer or a radiographer's assistant unless, at all times during radiographic operations, each individual wears on the trunk of the body a personnel-monitoring device (PMD) as specified in K.A.R. 28-35-217a, a direct reading dosimeter, and an alarming ratemeter. At permanent radiographic installations where other appropriate alarming or warning devices are in routine use and during radiographic operations using radiation machines, the use of an alarming ratemeter shall not be required.

(1) Each pocket ion-chamber dosimeter shall have a range from zero to 200 mrem and shall be recharged at the start of each work shift. Electronic personal dosimeters may be used in place of only pocket ion-chamber dosimeters.

(2) Each PMD shall be assigned to and worn by only one individual.

(3) Each PMD shall be exchanged at least monthly.

(4) After replacement, each PMD shall be returned to the supplier for processing within 14 calendar days after the end of the monitoring period, or as soon as practicable. In circumstances that make it impossible to return each PMD within 14 calendar days, these circumstances shall be documented and available for review by the department.

(b) Direct reading dosimeters, including pocket ion-chamber dosimeters and electronic personal dosimeters, shall be read and the exposures shall be recorded at the beginning and end of each work shift, and records shall be maintained for two years.

(c) All pocket ion-chamber dosimeters and electronic personal dosimeters shall be checked at least each 12 months for the proper response to and the accurate measurement of radiation, and records shall be maintained for two years. An acceptable reading on each dosimeter shall be within plus or minus 30 percent of the true radiation exposure.

(d) If an individual's pocket ion-chamber dosimeter is found to be off-scale or if an electronic personal dosimeter reads greater than 200 mrem, the individual's PMD shall be sent for processing within 24 hours. In addition, the individual shall not resume any work associated with the use of sources of radiation until a determination of the amount of individual's radiation exposure is made. This determination shall be made by the radiation safety officer or the radiation safety officer's designee. The results of this determination shall be included in the records.

(e) If an individual's PMD is lost or damaged, the individual shall cease work immediately until a replacement PMD is provided and the exposure is calculated for the time period from issuance to loss or damage of the PMD. The results of the calculated exposure and the time period during which the PMD was lost or damaged shall be included in the records.

(f) Each licensee or registrant shall ensure that each alarming ratemeter meets the following requirements:

(1) Is checked to ensure that the alarm functions properly before using at the start of each shift;

(2) is set to give an alarm signal at a preset dose rate of 500 mrem per hour, with an accuracy of plus or minus 20 percent of the true radiation dose rate;

(3) requires a special means to change the preset alarm function; and

(4) is calibrated at least each 12 months for the accurate measurement of radiation.

(g) Records of personnel-monitoring procedures. Each licensee or registrant shall maintain the following exposure records:

(1) Direct reading dosimeter readings and yearly operability checks for two years after the record is

made;

(2) records of alarm ratemeter calibrations for two years after the record is made;

(3) PMD results received from the accredited NVLAP processor until the department terminates the license; and

(4) records of exposure estimates as a result of any direct reading dosimeter that reads off-scale or any lost or damaged personnel-monitoring equipment, until the department terminates the license. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-285. Surveillance. During each radiographic operation, the radiographer or radiographer's assistant shall maintain direct visual surveillance of the operation to protect against unauthorized entry into the high-radiation area, except under either of the following circumstances:

(a) If the high-radiation area is equipped with a control device or an alarm system as specified in K.A.R. 28-35-219a; or

(b) if the high-radiation area is locked to protect against unauthorized or accidental entry. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-287. Radiation surveys and survey records. (a) No radiographic operation shall be conducted unless calibrated and operable radiation survey instruments, as specified in K.A.R. 28-35-278, are available and used at each site where radiographic exposures are made.

(b) A survey using a radiation survey instrument shall be made after each radiographic exposure to determine that the sealed source has been returned to its shielded position. The entire circumference of the radiographic exposure device shall be surveyed. If the radiographic exposure device has a source guide tube, the survey shall include the guide tube.

(c) Before securing in a storage area any radiographic exposure device, storage container, or source changer in the manner specified in K.A.R. 28-35-276, a survey using a radiation survey instrument shall be made to determine that each sealed source is in the shielded position.

(d) A record shall be kept of each survey performed for two years to comply with this regulation.

(2) (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-288. Special requirements and exemptions for enclosed radiography. (a) Each licensee or registrant shall ensure that each system for enclosed radiography that is designed to allow the admittance of any individual meets the following:

(1) Meets all applicable requirements of this part and K.A.R. 28-35-214a if the system is not a certified cabinet X-ray system;

(2) meets all applicable requirements of this part and has been certified by the FDA as compliant with the requirements specified in 21 CFR 1020.40, if the system is a certified cabinet X-ray system; and

(3) is evaluated, at intervals not to exceed one year, to ensure compliance with the applicable requirements specified in paragraphs (1) or (2) of this subsection. A record of each evaluation

shall be maintained for two years after the evaluation.

(b)Each cabinet X-ray system designed to exclude any individual shall be exempt from the requirements of K.A.R. 28-35-276, K.A.R. 28-35-278, K.A.R. 28-35-281, K.A.R. 28-35-282, K.A.R. 28-35-283, K.A.R. 28-35-284, K.A.R. 28-35-285, K.A.R. 28-35-286, and K.A.R. 28-35-289 with the following exceptions:

(1) Operating personnel shall be provided with personnel-monitoring equipment as specified in K.A.R. 28-35-217a.

(2) A registrant shall not permit any individual to operate a cabinet x-ray system until that individual has received a copy of and instruction in the operating procedures for the unit and has demonstrated competence in its use. A record that demonstrates compliance with this paragraph shall be

maintained for inspection by the department until disposition is authorized by the department.

(3) A test for proper operation of each high-radiation area control device or alarm system, where applicable, shall be conducted and recorded as specified in K.A.R. 28-35-288(e).

(c) Each permanent radiographic installation having any high-radiation area entrance control of the type specified in K.A.R. 28-35-219a shall also meet the following requirements:

(1) Each entrance that is used for personnel access to the high-radiation area in a permanent radiographic installation shall have both a visible and an audible warning signal to warn of the presence of radiation.

(2) The visible signal shall be activated by radiation whenever the source is exposed. The audible signal shall be activated if an attempt is made to enter the installation while the source is exposed.

(e) The control device or alarm system shall be tested for proper operation at the beginning of each period of use. A record of each test shall be prepared quarterly or before the first use after the end of the quarter. Each record shall be maintained for inspection by the department until the secretary authorizes disposal of the record. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended December 30, 2005.)

28-35-289. Training requirements.

(a) The licensee or registrant shall not permit any individual to act as a radiographer until the individual has completed either of the following:

(1) At least 40 hours of training in the subjects specified in subsection (g) of this regulation;

(2) on-the-job training consisting of hands-on experience under the supervision of a radiographer and certification through a radiographer certification program by a certifying entity as specified in K.A.R. 28-35-292; and

(3) (A) On-the-job training that includes at least two months or 320 hours of active participation in the performance of industrial radiography utilizing radioactive material;

(B) on-the-job training that includes at least one month or 160 hours of active participation in the performance of industrial radiography utilizing radiation machines; or

(C) if the individual will be performing industrial radiography utilizing radioactive material and radiation machines, both segments of the on-the-job training specified in paragraphs (a)(1)(C)(i) and (ii).

(b) The licensee or registrant shall not permit any individual to act as a radiographer until the individual meets the following requirements:

(1) Has received the following:

(A) A copy of and instruction in the requirements contained in this part;

(B) a copy of the applicable portions of parts 4 and 10 of these regulations;

(C) the license or registration under which the radiographer will perform industrial radiography; and

(D) a copy of the licensee's or registrant's operating and emergency procedures;

(2) has demonstrated an understanding of the material listed in paragraphs (b)(1) (A) through (D) by successful completion of a written or oral examination;

(3) has received training in the use of the registrant's radiation machines, or the licensee's radiographic exposure services and sealed sources, in the daily inspection of devices and associated equipment and in the use of radiation survey instruments; and

(4) has demonstrated an understanding of the use of the equipment specified in paragraph (b)(3) by successful completion of a practical examination.

(c) The licensee or registrant shall not permit any individual to act as a radiographer's assistant until the individual meets the following requirements:

(1) Has received the following:

(A) A copy of and instruction in the requirements contained in this part;

(B) a copy of the applicable portions of parts 4 and 10 of these regulations;

(C) the license or registration under which the radiographer's assistant will perform industrial radiography; and

(D) a copy of the licensee's or registrant's operating and emergency procedures;

(2) has demonstrated an understanding of the material listed in paragraphs (c)(1) (A) through (D) by successful completion of a written or oral examination;

(3) under the personal supervision of a radiographer, has received training in the use of the registrant's radiation machines, or the licensee's radiographic exposure devices and sealed sources, in the daily inspection of devices and associated equipment and in the use of radiation survey instruments; and

(4) has demonstrated an understanding of the use of the equipment specified in paragraph (c)(3) by successful completion of a practical examination.

(d) Each radiographer and radiographer's assistant shall receive the annual refresher safety training at least every 12 months.

(e) The radiation safety officer or designee shall conduct an inspection program of the job performance of each radiographer and radiographer's assistant to ensure that the department's regulations, the license or registration requirements, and the operating and emergency procedures are followed. Alternatives may be considered by the secretary if the individual serves as both radiographer and radiation safety officer. In those operations in which a single individual serves as both radiographer and radiation safety officer and performs all radiography operations, an inspection program shall not be required. The inspection program shall include the following:

(1) Observation of the performance of each radiographer and radiographer's assistant during an actual industrial radiographic operation, at least every six months; and

(2) a provision that, if a radiographer or a radiographer's assistant has not participated in an industrial radiographic operation for more than six months since the last inspection, the radiographer shall demonstrate knowledge of the training requirements of paragraph (b)(3) and the radiographer's assistant shall demonstrate knowledge of the training requirements of paragraph (c)(3) by a practical examination before these individuals are allowed to participate in a radiographic operation.

(f) Each licensee or registrant shall maintain the following:

(1) Records of the training of each radiographer and radiographer's assistant. These records shall include radiographer certification documents and verification of certification status, copies of written tests, dates of oral and practical examinations, the names of individuals conducting and receiving the oral and practical examinations, a list of the subjects tested, and the results of the oral and practical examinations; and

(2) records of annual refresher safety training and semiannual inspections of job performance for each radiographer and each radiographer's assistant. These records shall list the topics discussed during the refresher safety training, the date or dates on which the annual refresher safety training was conducted, and the names of the instructors and attendees. For inspections of job performance, the records shall also include a list showing the items checked and any noncompliance observed by the radiation safety officer.

(g) The training of each licensee or registrant shall include information about the following:

(1) Fundamentals of radiation safety, including the following:

(A) The characteristics of gamma radiation and X-radiation;

(B) the units of radiation dose and activity;

(C) the hazards of exposure to radiation;

(D) the levels of radiation from different sources of radiation; and

(E) the methods of controlling radiation dose using time, distance, and shielding;

(2) radiation detection instruments, including the following:

(A) The use, operation, calibration, and limitations of radiation survey instruments;

(B) survey techniques; and

(C) the use of personnel-monitoring equipment;

(3) the equipment to be used, including the following:

(A) The operation and control of radiographic exposure equipment, remote handing equipment, and storage containers, including pictures or models of source assemblies;

(B) the operation and control of radiation machines;

(C) the storage, control, and disposal of sources of radiation; and

(D) inspection and maintenance of equipment;

(4) the requirements of state and federal regulations; and

(5) case histories of accidents in radiography. (Authorized by and implementing K.S.A. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended December 30, 2005.)

28-35-290. Reports of incidents or of lost or stolen sources. (a) Each licensee or registrant shall

provide a written report of all events involving radiography devices and licensed material as specified in K.A.R. 28-35-184b, K.A.R. 28-35-228a, K.A.R. 28-35-229a, and K.A.R. 28-35-230a.

(b) In addition to the requirements in subsection (a), each licensee or registrant shall provide a written report to the department within 30 days after the occurrence of any of the following incidents involving radiographic equipment:

(1) Unintentional disconnection of the source assembly from the control cable;

(2) inability to retract the source assembly to its fully shielded position and secure the source assembly in this position; or

(3) failure of any component that is critical to safe operation of the device to perform its intended function.

(c) Each licensee or registrant shall include the following information with each report submitted under subsection (b):

(1) A description of the equipment problem;

(2) a description of the cause of each incident, if known;

(3) the name of the manufacturer and the model number of the equipment involved in the incident;

(4) the place, time, and date of incident;

(5) a description of the actions taken to establish normal operations;

(6) a description of all corrective actions taken or planned to prevent reoccurrence; and

(7) a description of the qualifications of the personnel involved in the incident.

(d) Each report of overexposure submitted pursuant to these regulations that involves failure of the safety components of radiography equipment shall also include the information specified in subsection (c).

(e) Each licensee or registrant conducting radiographic operations or storing sources of radiation at any location not listed on the license or registration for a period in excess of 180 days in a calendar year shall notify the department before exceeding the 180 days. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996; amended December 30, 2005.)

28-35-291. Performance requirements for radiography equipment. (a) Each radiographic exposure device and all associated equipment shall have been certified by the NRC as compliant with the requirements specified in "radiological safety for design and construction of apparatus for gamma radiography," published by the American national standards institute as NBS handbook 136, issued January 1981, ANSI N432-1980 standards. As an alternative, any licensee or applicant may submit an engineering analysis demonstrating that testing previously performed on similar individual radiography components is adequate to support a finding that the previous testing is an acceptable substitute for that described in the N432-1980 standards.

(b) In addition to the requirements specified in subsection (a), the licensee shall ensure that each radiographic exposure device and all associated equipment meet the following requirements.

(1) Each user of a radiographic exposure device shall attach to the device a durable, legible, clearly visible label bearing the following information:

(A) The chemical symbol and mass number of the radionuclide in the device;

(B) the radioactive activity level and the date on which this activity was last measured;

(C) the model number and serial number of the sealed source;

(D) the manufacturer of the sealed source; and

(E) the licensee's name, address, and telephone number.

(2) Each radiographic exposure device intended for use as a type B transport container shall have been certified by the NRC as compliant with the applicable requirements of 10 C.F.R. 71.51 .

(3) The licensee shall not modify any exposure device or associated equipment in a manner that compromises the design safety features of the system.

(c) In addition to the requirements specified in subsections (a) and (b), the licensee shall ensure that each radiographic exposure device and the associated equipment that allows the source to be moved out of the device for routine operation meet the following requirements.

(1) The coupling between the source assembly and the control cable shall be designed so that the source assembly cannot become disconnected if cranked outside the guide tube. The coupling shall be designed to prevent an unintentional disconnection under normal conditions and reasonably foreseeable abnormal conditions.

(2) The device shall automatically secure the source assembly when the source assembly is cranked

back into the fully shielded position in the device. A deliberate operation on the exposure device shall be required to release the source assembly.

(3) The outlet fitting, lock box, and drive cable fittings on each radiographic exposure device shall be equipped with safety plugs or covers, which shall be installed during storage and transportation to protect the source assembly from water, mud, sand, and other foreign matter.

(4) Each sealed source or source assembly shall have attached to it or engraved on it a durable, legible, visible label with these words: "DANGER RADIOACTIVE." The label shall not interfere with the safe operation of the exposure device or the associated equipment.

(5) Each sealed source that is not fastened to, or contained in, a radiographic exposure device shall have a durable tag permanently attached to the sealed source. The tag shall measure at least one square inch and shall bear the radiation symbol described in K.A.R. 28-35-219a and, at a minimum, the following instructions: "Danger-Radioactive Material-Do Not Handle-Notify Civil Authorities If Found."

(6) The guide tube shall have passed the crushing tests for the control tube as specified in ANSI N432-1980 standards and a kinking resistence test that closely approximates the kinking forces likely to be encountered during use.

(7) Guide tubes shall be used when moving the source out of the device.

(8) An exposure head or similar device shall be used to prevent the source assembly from passing out of the end of the guide tube during radiographic operations.

(9) The guide tube exposure head connection shall be able to withstand the tensile test for control units specified in ANSI N432-1980 standards.

(10) Each source changer shall provide a system for ensuring that the source can not accidentally be withdrawn from the changer when connecting or disconnecting the drive cable to or from a source assembly.

(d) Each licensee shall ensure that all newly manufactured radiographic exposure devices and the associated equipment acquired after January 10, 1995 meet the requirements of this regulation .

(e) Each licensee shall ensure that all radiographic exposure devices and associated equipment used by the licensee after January 10, 1995 meet the requirements of this regulation .

(f) Any licensee may use equipment in industrial radiographic operations that does not comply with section 8.9.2(c) of the endurance test in ANSI N432-1980 standards, if prototype equipment has been tested using a torque that an individual using the radiography equipment can realistically exert on the lever or crankshaft of the drive mechanism. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996; amended December 30, 2005.)

28-35-292. Location of documents and records. (a) Each licensee or registrant shall maintain copies of records required by this part and other applicable parts of these regulations.

(b) Each licensee or registrant shall also maintain current copies of the following documents or records sufficient to demonstrate compliance at each applicable field station and each temporary job site:

(1) The license or registration authorizing the use of sources of radiation;

(2) a copy of parts 1, 4, 5, and 10 of these regulations;

(3) the utilization logs for each source of radiation dispatched from that location;

(4) the records of any equipment problems identified in daily checks of equipment;

(5) the records of alarm systems and entrance control checks, if applicable;

(6) the records of all dosimeter readings;

(7) the operating and emergency procedures;

(8) evidence of the latest calibration of the radiation survey instruments in use at the site;

(9) evidence of the latest calibrations of alarming ratemeters and operability checks of dosimeters;

(10) the survey records for the period of operation at the site;

(11) the shipping papers for the transportation of radioactive materials; and

(12) when operating under reciprocity pursuant to part 3 of these regulations, a copy of the applicable state license or registration, or nuclear regulatory commission license authorizing the use of sources of radiation. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-293. Requirements for an independent certifying organization. (a) Each independent certifying organization shall be required to meet the following conditions in order to be recognized by the

secretary:

(1) Be an organization, including a society or association, whose members participate in, or have an interest in, the field of industrial radiography;

(2) make membership in the organization available to the general public nationwide. Membership shall not be restricted because of race, color, religion, sex, age, national origin, or disability;

(3) have a certification program that is open to nonmembers as well as members;

(4) be an incorporated, nationally recognized organization that is involved in setting national standards of practice within its fields of expertise;

(5) have an adequate staff, a viable system for financing its operations, and a policy-making and decision-making review board;

(6) have a set of written organizational bylaws and policies that provide adequate assurance of lack of conflict of interest and a system for monitoring and enforcing those bylaws and policies;

(7) have a committee, whose members shall carry out their responsibilities impartially, to review and approve the certification guidelines and procedures and to advise the organization's staff in implementing the certification program;

(8) have a committee, whose members shall carry out responsibilities impartially, to reviewcomplaints against certified individuals and to determine appropriate sanctions;

(9) have written procedures describing all aspects of the organization's certification program and maintain records of the current status of each individual's certification and the administration of the organization's certification program;

(10) have procedures to ensure that certified individuals are provided due process with respect to the administration of its certification program, including the process of becoming certified and any sanctions imposed against certified individuals;

(11) have procedures for proctoring examinations, including qualifications for proctors. These procedures shall ensure that the individuals proctoring each examination are not employed by the same company or corporation, or by a wholly owned subsidiary of the company or corporation, as that of any of the examinees;

(12) exchange information about certified individuals with the nuclear regulatory commission, other independent certifying organizations, and agreement states and allow periodic review of the organization's certification program and related records; and

(13) provide a description to the nuclear regulatory commission of the organization's procedures for choosing examination sites and for providing an appropriate examination environment.

(b) Each certification program recognized by the secretary shall meet the following requirements:

(1) Require applicants for certification to meet the following requirements:

(A) Receive training in the topics specified in K.A.R. 28-35-289 or in equivalent state or nuclear regulatory commission regulations; and

(B) satisfactorily complete a written examination covering the topics specified in paragraph (b)(1)(A);

(2) require each applicant for certification to provide documentation demonstrating that the applicant meets the following requirements:

(A) Receives training in the topics specified in K.A.R. 28-35-289 or in equivalent state or nuclear regulatory commission regulations;

(B) has satisfactorily completed a minimum period of on-the-job training as specified in K.A.R. 28-35-289; and

(C) receives verification by a state licensee or registrant or a nuclear regulatory commission licensee that the applicant has demonstrated the capability of independently working as a radiographer;

(3) include procedures to ensure that all examination questions are protected from wrongful disclosure;

(4) include procedures for denying an application and for revoking, suspending, and reinstating a certification;

(5) provide a certification period of at least three years and not more than five years;

(6) include procedures for renewing certifications and, if the procedures allow renewals without examination, require evidence of recent full-time employment and annual refresher training; and

(7) provide a timely response to inquiries from members of the public about an individual's

certification status; and

(8) have requirements for written examinations that meet the following requirements:

(A) Are designed to test an individual's knowledge and understanding of the topics specified in K.A.R. 28-35-289 or in equivalent state or nuclear regulatory commission regulations;

(B) are written in a multiple-choice format; and

(C) have test items drawn from a question bank containing psychometrically valid questions based December 30, 2005.)

PART 8. RADIATION SAFETY REQUIREMENTS FOR ANALYTICAL X-RAY EQUIPMENT

28-35-296. Purpose and scope. This part provides special requirements for analytical x-ray equipment. The requirements of this part are in addition to, and not in substitution for applicable requirements in other parts of these regulations. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-297. Equipment requirements. (A) Safety device. A device which prevents the entry of any portion of an individual's body into the primary x-ray beam path or which causes the beam to be shut off upon entry into its path shall be provided on all open-beam configurations. A licensee and/or registrant may apply to the department for an exemption from the requirement of a safety device. Such application shall include: (1) a description of the various safety devices that have been evaluated, (2) the reason each of these devices cannot be used, and (3) a description of the alternative methods that will be employed to minimize the possibility of an accidental exposure, including procedures to assure that operators and others in the area will be informed of the absence of safety devices.

(B) Warning devices. Open-beam configurations shall be provided with a readily discernible indication of: (1) x-ray tube status (on-off) located near the radiation source housing, if the primary beam is controlled in this manner; and/or (2) shutter status (open-closed) located near each port on the radiation source housing, if the primary beam is controlled in this manner. Warning devices shall be labeled so that their purpose is easily identified. On equipment installed after January 1, 1976, warning devices shall have fail-safe characteristics.

(C) Ports. Unused ports on radiation source housings shall be secured in the closed position in a manner which will prevent casual opening.

(D) Labeling. All analytical x-ray equipment shall be labeled with a readily discernible sign or signs bearing the radiation symbol and the words: (1) "CAUTION—HIGH INTENSITY X-RAY BEAM," or words having a similar intent, on the x-ray source housing: (2) "CAUTION RADIATION—THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED," or words having a similar intent, near any switch that energizes an x-ray tube; or (3) "CAUTION—RADIOACTIVE MATERIAL," or words having a similar intent, on the source housing if the radiation source is a radionuclide.

(E) Shutters. On open-beam configurations installed after January 1, 1976, each port on the radiation source housing shall be equipped with a shutter that cannot be opened unless a collimator or a coupling has been connected to the port.

(F) Warning lights. An easily visible warning light labeled with the words "X-RAY ON" or words having a similar intent, shall be located: (1) near any switch that energizes an x-ray tube and shall be illuminated only when the tube is energized; or (2) in the case of a radioactive source, near any switch that opens a housing shutter, and shall be illuminated only when the shutter is open. On equipment installed after January 1, 1976, warning lights shall have fail-safe characteristics.

(G) Radiation source housing. Each x-ray tube housing shall be so constructed that with all shutters closed the leakage radiation measured at a distance of five (5) centimeters from its surface is not capable of producing a dose in excess of 2.5 millirem in one hour at any specified tube rating.

(H) Generator cabinet. Each x-ray generator shall be supplied with a protective cabinet which limits leakage radiation measured at a distance of five (5) centimeters from its surface such that it is not capable of producing a dose in excess of 0.25 millirem in one hour. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-298. Area requirements. (a) Radiation levels. The local components of an analytical X-ray system shall be located and arranged and shall include sufficient shielding or access control so that no radiation levels exist in any area surrounding the local component group that could result in a dose to an individual present therein in excess of the dose limits specified in K.A.R. 28-35-214a. For systems utilizing X-ray tubes, these levels shall be met at each specified tube rating.

(b) Surveys. Radiation surveys, as specified in K.A.R. 28-35-139 (a), of all analytical X-ray systems sufficient to show compliance with K.A.R. 28-35-298 (a) shall be performed as follows:

(1) At the time of installation of the equipment;

(2) following any change in the initial arrangement, number, or type of local components in the

system;

(3) following any maintenance requiring the disassembly or removal of a local component in the system;

(4) during the performance of maintenance and alignment procedures if the procedures require the presence of a primary X-ray beam when any local component in the system is disassembled or removed;

(5) any time a visual inspection of the local components in the system reveals an abnormal condition; and

(6) whenever personnel-monitoring devices show a significant increase over the previous monitoring period or the readings are approaching the limits specified in these regulations.

(c) Posting. Each area or room containing analytical X-ray equipment shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words "CAUTION-X-RAY EQUIPMENT," or words having a similar meaning. (Authorized by and implementing K.S.A. 48-1607; effective May 1, 1976; amended December 30, 2005.)

28-35-299. Operating requirements. (a) Procedures. Normal operating procedures shall be written and available to all analytical X-ray equipment workers. No person shall be permitted to operate analytical X-ray equipment in any manner other than that specified in the normal operating procedures unless the person has obtained the prior written approval of the radiation safety officer.

(b) Bypassing. No person shall bypass a safety device unless the person has obtained the prior written approval of the radiation safety officer. If a safety device is bypassed, a readily discernible sign bearing the words "SAFETY DEVICE NOT WORKING," or words having a similar meaning, shall be placed on the radiation source housing.

(c) Repair or modification of X-ray tube systems. Except as specified in subsection (b), no operation involving the removal of covers, shielding materials, or tube housings or any modifications to shutters, collimators, or beam stops shall be performed without ascertaining that the tube is off and will remain off until safe conditions have been restored. The main switch, rather than interlocks, shall be used for each routine shutdown in preparation for repairs.

(d) Radioactive source replacement, testing, or repair. Radioactive source housings shall be opened for source replacement, leak testing, or other maintenance or repair procedures only by individuals authorized to specifically conduct these procedures under a license issued by the U.S. nuclear regulatory commission, an agreement state, or a licensing state. (Authorized by and implementing K.S.A. 48-1607; effective May 1, 1976; amended December 30, 2005.)

28-35-300. Personnel requirements. (A) Instruction. No person shall be permitted to operate or maintain analytical x-ray equipment unless such person has received instruction in and demonstrated competence as to: (1) Identification of radiation hazards associated with the use of the equipment;

(2) Significance of the various radiation warning and safety devices incorporated into the equipment, or the reasons they have not been installed on certain pieces of equipment and the extra precautions required in such cases;

(3) Proper operating procedures for the equipment;

(4) Symptoms of an acute localized exposure; and

(5) Proper procedures for reporting an actual or suspected exposure.

(B)Personnel monitoring. Finger or wrist dosimetric devices shall be provided to and shall be used by:

(1) Analytical x-ray equipment workers using systems having an open-beam configuration and not equipped with a safety device; and

(2) Personnel maintaining analytical x-ray equipment if the maintenance procedures require the presence of a primary x-ray beam when any local component in the analytical x-ray system is disassembled or removed. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

PART 9. RADIATION SAFETY REQUIREMENTS FOR PARTICLE ACCELERATORS

28-35-308. Applicability. (a) This part, which establishes procedures for the registration and the use of particle accelerators, shall be in addition to, and not a substitute for, other applicable provisions of these regulations.

(b) In addition to the requirements of this part, all registrants shall be subject to the requirements of parts 1, 2, 4, and 10. Registrants engaged in industrial radiographic operations shall be subject to the requirements of part 7, and registrants engaged in the healing arts shall be subject to the requirements of parts 5, 6, and 12 of these regulations. Registrants engaged in the production of radioactive material shall be subject to the requirements of part 3. (Authorized by and implementing K.S.A. 48-1607; effective May 1, 1976; amended December 30, 2005.)

28-35-309. Registration requirements. No person shall receive, possess, use, transfer, own, or acquire a particle accelerator except as authorized in a registration issued pursuant to these regulations or as other wise provided for in these regulations. The general procedures for registration of particle accelerator facilities are included in part 2 of these regulations. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-310. General requirements for the issuance of a registration for particle accelerators. In addition to the requirements of part 2, the registrant shall: (A) Be qualified by reason of training and experience to use the accelerator in question for the purpose intended in accordance with this part and part 4 and part 10 of these regulations and in such a manner as to minimize danger to public health and safety or property;

(B) The registrant's proposed equipment, facilities, operating and emergency procedures shall be adequate to protect health and minimize danger to public health and safety or property;

(C) The use of the particle accelerator shall not be inimical to the health and safety of the public and the users shall satisfy any applicable special requirement in regulation 28-35-311 of this regulation;

(D) The registrant shall appoint a radiation safety officer;

(E) The registrant and/or his staff shall have substantial experience in the use of particle accelerators for the intended uses;

(F) The registrant shall establish a radiation safety committee to approve, in advance, proposals for uses of particle accelerators, whenever deemed necessary by the department; and

(G) The registrant shall have an adequate training program for particle accelerator operators. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-311. Human use of particle accelerators. In addition to the requirements set forth in part 2, the registrant shall: (A) Whenever deemed necessary by the department, the registrant shall appoint a medical committee of at least three (3) members to evaluate all proposals for research, diagnostic, and therapeutic use of a particle accelerator. Membership of the committee should include physicians expert in internal medicine, hematology, therapeutic radiology, and a person experienced in depth dose calculations and protection against radiation;

(B) The individuals designated as the users shall have substantial training and experience in deep therapy techniques or in the use of particle accelerations to treat humans; and

(C) The user must be a physician. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-312. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 7, 1976; revoked December 30, 2005.)

28-35-313. Limitations. (A) No registrant shall permit any person to act as a particle accelerator operator until such person: (1) Has been instructed in radiation safety and shall have demonstrated an understanding thereof;

(2) Has received copies of and instruction in this part and the applicable requirements of part 4 and part 10, pertinent operating conditions and the registrant's operating and emergency procedures, and

shall have demonstrated understanding thereof; and

(3) Has demonstrated competence to use the particle accelerator, related equipment, and survey instruments which will be employed in his assignment.

(B) Either the radiation safety committee or the radiation safety officer shall have the authority to terminate the operations at a particle accelerator facility if such action is deemed necessary to protect health and minimize danger to public health and safety or property. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-314. Shielding and safety design requirements. (a) An expert qualified in shielding and safety design requirements shall be consulted in the design of each particle accelerator installation and shall perform a radiation survey when the accelerator is first capable of producing radiation.

(b) Each particle accelerator installation shall be provided with the primary barriers or secondary barriers , or both, necessary to ensure compliance as specified in K.A.R. 28-35-212a and K.A.R. 28-35-214a. (Authorized by and implementing K.S.A. 48-1607; effective May 1, 1976; amended December 30, 2005.)

28-35-315. Particle accelerator controls and interlock systems. (A) Instrumentation, readouts and controls on the particle accelerator control console shall be clearly identified and easily discernible.

(B) All entrances into a target room or other high radiation area shall be provided with interlocks that shut down the machine under conditions of barrier penetration.

(C) When an interlock system has been tripped, it shall only be possible to resume operation of the accelerator by manually resetting controls at the position where the interlock has been tripped, and lastly at the main control console.

(D) Each safety interlock shall be on a circuit which shall allow its operation independently of all other safety interlocks.

(E) All safety interlocks shall be fail safe, i.e., designed so that any defect or component failure in the interlock system prevents operation of the accelerator.

(F) A scram button or other emergency power cutoff switch shall be located and easily identifiable in all high radiation areas. Such a cutoff switch shall include a manual reset so that the accelerator cannot be restarted from the accelerator control console without resetting the cutoff switch. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-316. Warning devices. (a) Each location designated as a high- radiation area and each entrance to the high-radiation area shall be equipped with easily observable flashing or rotating warning lights that operate only if radiation is being produced.

(b) Except in facilities designed for human exposure, each high-radiation area shall have an audible warning device that shall be activated for 15 seconds before the possible creation of a high-radiation area. The warning device shall be clearly discernible in all high- radiation areas and all radiation areas.

(c) All barriers, temporary or permanent, and all pathways leading to high- radiation areas shall be identified as specified in K.A.R. 28-35-219a. (Authorized by and implementing K.S.A. 48-1607; effective May 1, 1976; amended December 30, 2005.)

28-35-317. Operating procedures. (A) Particle accelerators, when not in operation, shall be secured to prevent unauthorized use.

(B) Only a switch on the accelerator control console shall be routinely used to turn the accelerator beam on and off. The safety interlock system shall not be used to turn off the accelerator beam except in an emergency.

(C) All safety and warning devices, including interlocks, shall be checked for proper operability at intervals not to exceed three (3) months. Results of such tests shall be maintained for inspection at the accelerator facility.

(D) Electrical circuit diagrams of the accelerator, and the associated interlock systems, shall be kept current and maintained for inspection by the department and available to the operator at each accelerator facility.

(E) If, for any reason, it is necessary to intentionally bypass a safety interlock or interlocks, such action shall be: (1) Authorized by the radiation safety committee and/or radiation safety officer; (2) recorded in a permanent log and a notice posted at the accelerator control console; and (3) terminated as soon as possible.

(F) A copy of the current operating and the emergency procedures shall be maintained at the accelerator control panel. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-318. Radiation monitoring requirements. (a) Each particle accelerator facility registrant shall have available the appropriate portable monitoring equipment that is operable and is calibrated for the appropriate types and levels of radiation being produced at the facility. The equipment shall be tested for proper operation daily and calibrated at intervals not to exceed one year, and after each servicing or repair.

(b) A radiation protection survey shall be performed and documented by a qualified expert acceptable to the department each time that changes have been made in the shielding, operation, or equipment, or in the occupancy of adjacent areas.

(c) Radiation levels in each high-radiation area shall be continuously monitored. Each monitoring device shall be electrically independent of the accelerator control and interlock systems and capable of providing a remote and local readout with visual alarms or audible alarms, or both, at both the control panel and the entrance to high-radiation areas, and other appropriate locations, so that people entering or present become aware of the existence of the hazard.

(d) All area monitors shall be calibrated at intervals not to exceed one year, and after each servicing or repair.

(e) Whenever applicable, the registrant shall make periodic surveys to determine the amount of airborne particulate radioactivity present in areas of airborne hazards.

(f) Whenever applicable, the registrant shall make periodic smear surveys to determine the degree of contamination in target and other pertinent areas.

(g) All area surveys shall be made in accordance with the written procedures established by a qualified expert or by the radiation safety officer of the particle accelerator facility.

(h) Records of all radiation protection surveys, calibration results, instrumentation tests, and smear results shall be kept current and on file at each accelerator facility. (Authorized by and implementing K.S.A. 48-1607; effective May 1, 1976; amended December 30, 2005.)

28-35-319. Ventilation systems. (a) Adequate ventilation shall be provided in areas where airborne radioactivity could be produced.

(b) No registrant shall vent, release, or otherwise discharge airborne radioactive material to an uncontrolled area , except as specified in K.A.R. 28-35-214b. (Authorized by and implementing K.S.A. 48-1607; effective May 1, 1976; amended December 30, 2005.)

PART 10. NOTICES, INSTRUCTIONS AND REPORTS TO WORKER: INSPECTIONS

28-35-331. Persons required to meet the requirements of this part. The requirements of this part apply to all persons who receive, possess, use own or transfer material licensed by or registered with the department pursuant to part 2 or 3 of these regulations. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-332. Posting of notices to workers. (a) Each licensee or registrant shall post current copies of the following documents:

(1) The regulations in this part and part 4;

(2) the license, or certificate of registration, including any conditions on the license and any document or documents incorporated into the license by reference and also any amendment to the license;

(3) the operating procedures applicable to work under the license or registration; and

(4) any notice of violation involving radiological working conditions, any order issued pursuant to Part 1, and any response from the licensee or registrant.

(b) If the posting of a document specified in paragraph (a)(1), (2), or (3) is not practicable, the licensee or registrant may post a notice which describes the document and states where it may be examined.

(c) Department form RH-3 shall be posted by each licensee or registrant where individuals work in or frequent any portion of a controlled area.

(d) Documents, notices or forms shall be posted to allow individuals engaged in work under the license or registration to observe them on the way to or from any particular work location to which the document applies, shall be conspicuous, and shall be replaced if defaced or altered.

(e) Department documents posted pursuant to paragraph (a)(4) shall be posted within two working days after receipt of the documents from the department; the licensee's or registrant's response, if any, shall be posted within two working days after dispatch from the licensee or registrant. The documents shall remain posted for a minimum of five working days or until action correcting the violation has been completed, whichever is longer. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-333. Instructions to workers. (a) Each licensee or registrant shall ensure that each individual who is likely to receive in a year an occupational dose in excess of 100 mrem (1 mSv) is instructed as follows:

(1) Is kept informed of the storage, transfer, or use of radioactive material or of radiation in the restricted area;

(2) is instructed in all of the following subjects:

(A)Health protection problems associated with exposure to radioactive material or radiation to the individual and potential offspring;

(B) precautions or procedures to minimize exposure; and

(C) the purposes and functions of protective devices employed;

(3) is instructed in, and instructed to observe, to the extent within the worker's control, the provisions of these regulations and any licenses concerning the protection of personnel from exposures to radiation or radioactive material;

(4) is informed of the individual's responsibility to report promptly to the licensee or registrant any condition that has caused or could cause any of the following:

(A) A violation of these regulations;

(B) a violation of a license or registration; or

(C) unnecessary exposure to radiation or radioactive material;

(5) is instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that could involve exposure to radiation or radioactive material; and

(6) is informed of the radiation exposure reports that workers may request as specified in K.A.R. 28-35-334.

(b) In determining which individuals are subject to the requirements of subsection (a) of this regulation, each licensee or registrant shall take into consideration each individual's assigned activities

during normal and abnormal situations involving exposure to radiation or radioactive material, or both, that can reasonably be expected to occur during the life of a licensed or registered facility.
The extent of the instruction specified in subsection (a) shall be commensurate with the potential radiological health protection problems present in the workplace. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1607; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Oct. 17, 1994; amended December 30, 2005.)

28-35-334. Notifications and reports to individuals. (a) Radiation exposure data for an individual and the results of any measurements, analyses, and calculations of radioactive material deposited or retained in the body of an individual shall be reported to the individual as specified in this section. The information reported shall include data and results obtained pursuant to the requirements of these regulations, any order of the secretary or license condition, as shown in records maintained by the licensee or registrant pursuant to K.A.R. 28-35-227h of these regulations. Each notification and report shall:

(1) Be in writing;

(2) include appropriate identifying data such as the name of the licensee or registrant, the name of the individual, and the individual's identification number, preferably social security number;

(3) include the individual's exposure information; and

(4) contain the following statement:

"This report is furnished to you under the provisions of Kansas Administrative Rule and Regulation 28-35-334. You should preserve this report for further reference."

(b) Each licensee or registrant shall furnish each worker annually a written report of the worker's dose as shown in records maintained by the licensee or registrant pursuant to K.A.R. 28-35-227h(b).

(c) Each licensee or registrant shall furnish to the worker a written report of the worker's exposure to sources of radiation or radioactive material at the request of a worker formerly engaged in activities controlled by the licensee or registrant. The report shall be furnished within 30 days from the date of the request, or within 30 days after the dose of the individual has been determined by the licensee or registrant, whichever is later. The report shall cover, within the period of time specified in the request, the dose record for each year the worker was required to be monitored pursuant to 28-35-217b of these regulations. The report shall also include the period of time in which the worker's activities involved exposure to sources of radiation and shall include the dates and locations of work under the license or registration in which the worker participated during this period.

(d) When a licensee or registrant is required pursuant to K.A.R. 28-35-229a(a)(1), and (b)(1) of these regulations to report to the department any exposure of an individual to sources of radiation, the licensee or the registrant shall also provide to the individual a written report of the individual's exposure data included in the report. These reports shall be transmitted at a time not later than the transmittal to the department.

(e) At the request of a worker who is terminating employment with the licensee or registrant that involves exposure to radiation or radioactive material, or at the request of a worker who, while employed by another person is terminating assignment to work involving radiation dose in the licensee's facility, each licensee or registrant shall provide to the worker, or the worker's designee, a written report regarding the radiation dose received by that worker from operations of the licensee or registrant during the current year. The report shall be provided at the worker's termination. The licensee or registrant may provide a written estimate of that dose if the finally determined personnel monitoring results are not available at that time. Estimated doses shall be clearly indicated as such. (Authorized by K.S.A. 1993 Supp. 48-1607; implementing K.S.A. 1993 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Oct. 17, 1994.)

28-35-335. Presence of representatives of licensees or registrants and workers during inspection. (a) Each licensee or registrant shall afford to the department, at all reasonable times, opportunity to inspect materials, machines, activities, facilities, premises, and records maintained by the licensee or registrant.

(b) During an inspection, department inspectors may consult privately with workers as specified in K.A.R. 28-35-336 and any amendment to that rule and regulation. The licensee or registrant may accompany department inspectors during other phases of an inspection.

(c) If, at the time of inspection, an individual has been authorized by the workers to represent

them during department inspections, the licensee shall give the workers' representative an opportunity to accompany the inspectors during the inspection of physical working conditions.

(d) Each workers' representative shall be routinely engaged in work under control of the licensee or registrant and shall have received the instructions specified in K.A.R. 28-25-333 and any amendment of that rule and regulation.

(e) Different representatives of licensees or registrants and workers may accompany the inspectors during different phases of an inspection if there is no resulting interference with the conduct of the inspection. However, only one workers' representative at a time shall accompany the inspectors.

(f) With the approval of the licensee or registrant and the workers' representative, an individual who is not routinely engaged in work under control of the licensee or registrant shall be afforded the opportunity to accompany the department inspectors during the inspection of physical working conditions.

(g) Department inspectors may refuse to permit accompaniment by an individual who deliberately interferes with a fair and orderly inspection. If an area to be inspected is a restricted area, the workers' representative for that area shall be an individual previously authorized by the licensee or registrant to enter that area. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-336. Consultation with workers during inspections. (a) Department inspectors may consult privately with workers concerning matters of occupational radiation protection and other matters related to the provisions of these regulations or any condition of a license, to the extent the inspectors deem necessary for the conduct of an effective and thorough inspection.

(b) During the course of an inspection, any worker may bring privately to the attention of the inspectors, either orally or in writing, any past or present condition which that worker has reason to believe may have contributed to or caused any violation of the act, these regulations, or any license condition, or any unnecessary exposure of an individual to radiation from licensed radioactive material or a registered radiation machine under the licensee's or registrant's control. Any such notice in writing shall state clearly the condition complained of and be signed by the worker.

(c) The provisions of 28-35-336 subsection (b) shall not be interpreted as authorizing disregard of instructions given pursuant to K.A.R. 28-35-333 and any amendments of that rule and regulation. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-337. Requests by workers for inspections. (a) Any worker or representative of workers who believes that a violation of the act, these regulations or a license conditions exists or has occurred in work under a license or registration with regard to radiological working conditions in which the worker is engaged may request an inspection by giving notice of the alleged violation to the department. Any such notice shall be in writing, shall set forth the specific grounds for the notice, and shall be signed by the worker or representative of the workers. A copy shall be provided to the licensee or registrant by the department no later than at the time of inspection except that, upon the request of the worker giving the notice, the worker's name and the name of individuals referred to shall not appear in the copy or on any record published, released, or made available by the department, except for good cause shown.

(b) If, upon receipt of the notice, the department determines that the complaint meets the requirements of subsection (a), and that there are reasonable grounds to believe that the alleged violation exists or has occurred, an inspection shall be made as soon as practicable, to determine if the alleged violation exists or has occurred. Inspections pursuant to this section need not be limited to matters referred to in the complaint.

(c) No licensee or registrant shall discharge or in any manner discriminate against any worker because the worker has filed any complaint, or instituted or caused to be instituted any proceeding under these regulations, or has testified or is about to testify in any proceeding, or because of the exercise by the worker on behalf of the worker or others of any option afforded by this part. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-338. Inspections not warranted; informal review. (a) If the department determines, with

respect to a complaint filed under K.A.R. 28-35-337, and any amendments to that rule and regulation that an inspection is not warranted because there are no reasonable grounds to believe that violation exists or has occurred, the department shall notify the complainant in writing of that determination. The complainant may obtain a review of the determination by submitting a written statement of position to the secretary, who will provide the license or registrant with a copy of the statement by certified mail, excluding, at the request of the complainant, the name of the complainant. The licensee or registrant may submit an opposing written statement of position to the secretary, who will provide the complainant with a copy of that statement by certified mail. Upon the request of the complainant, the secretary or the secretary's designee may hold an informal conference in which the complainant and the licensee or registrant may orally present their views. An informal conference may also be held at the request of the licensee or registrant, but disclosure of the identity of the complainant shall be made only following receipt of written authorization from the complainant. After considering all written or oral views presented, the secretary shall affirm, modify, or reverse the determination of the department and furnish the complainant and the licensee or registrant a written notification of the decision and the reason for the decision.

(b) If the secretary determines that an inspection is not warranted because the requirements of K.A.R. 28-35-337(a) have not been met, the secretary shall notify the complainant in writing of the determination. That determination shall be without prejudice to the filing of a new complaint meeting the requirements of K.A.R. 28-35-337(a). (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

PART 11. WIRELINE AND SUBSURFACE TRACER STUDIES

28-35-341. Persons to whom these regulations apply. The regulations in this part shall apply to each licensee or registrant who uses any source of radiation for wireline service operations, including mineral logging, radioactive markers, or subsurface tracer studies. The requirements of this part shall be in addition to, and not in substitution for, the requirements of Parts 1, 2, 3, 4, and 10 of these regulations. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-342. Preoperational and use requirements. (a) Preoperational agreements. A licensee shall not perform any wireline service operation with a sealed source or source unless, before commencement of the operation, the licensee has a written agreement with the well operator, well owner, drilling contractor, or land owner stating the following:

(1) If a sealed source is lodged downhole, a reasonable effort at recovery will be made.

(2) No person will attempt to recover a sealed source in a manner that, in the licensee's opinion, could result in a rupture of the sealed source.

(3) If a decision is made to abandon the sealed source downhole, the requirements of K.A.R. 28-35-362 (c) will be met.

(b) Limits on levels of radiation. All sources of radiation shall be used, stored, and transported so that the transportation and the dose limitation requirements of these regulations are met.

(c) Uranium sinker bars. Any licensee may use a uranium sinker bar in well-logging applications only if the sinker bar is legibly impressed with these words: "CAUTION RADIOACTIVE -- DEPLETED URANIUM" and "NOTIFY CIVIL AUTHORITIES [or COMPANY NAME] IF FOUND."

(d) Energy compensation source. Any licensee may use either an energy compensationsource (ECS) contained within a logging tool or other tool components, if the ECS contains quantities of licensed material not exceeding 3.7 Mbq (100 microcuries).

(1) For well-logging applications with a surface casing protecting freshwater aquifers, use of the ECS shall be subject only to the requirements of K.A.R. 28-35-346, K.A.R. 28-35-347, and K.A.R. 28-35-360.

(2) For well-logging applications without a surface casing protecting freshwater aquifers, use of the ECS shall be subject only to the requirements of K.A.R. 28-35-342, K.A.R. 28-35-346, K.A.R. 28-35-347, K.A.R. 28-35-360, and K.A.R. 28-35-362.

(e) Use of sealed source in a well without a surface casing. Any licensee may use a sealed source in a well without a surface casing for protecting freshwater aquifers if the licensee follows a procedure for reducing the probability that the source will become lodged in the well. This procedure shall be required to be approved by the U.S. nuclear regulatory commission or by an agreement state before the licensee uses the procedure.

(f) Use of a tritium neutron generator target source.

(1) Each licensee who uses a tritium neutron generator target source that contains a total quantity of tritium not exceeding 1,110 Mbq (30 curies) and is located in a well with a surface casing to protect freshwater aquifers shall be subject to the requirements of this part, excluding K.A.R. 28-35-349 and K.A.R. 28-35-362.

(2) Each licensee who uses a tritium neutron generator target source that contains a total quantity of tritium exceeding 1,110 Mbq (30 curies) or is located in a well without a surface casing to protect freshwater aquifers shall be subject to the requirements of this part, excluding K.A.R. 28-35-349. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-343. Storage precautions. (a) Each source of radiation, except accelerators, shall be provided with a storage container and, if transported, a transport container. The same container may be used in both cases if the container meets the requirements for each use. The container shall be provided with a lock to prevent unauthorized removal of, or exposure to, the source of radiation.

(b) Each source of radiation shall be stored in a manner that minimizes danger from explosion or fire.

(c) Each licensee shall lock and physically secure the transport package containing licensed material in the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal of the licensed material from the vehicle. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993;

amendedDecember 30, 2005.)

28-35-344. Transport precautions. Each transport container shall be physically secured to the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-345. Radiation survey instruments. (a) Each licensee or registrant shall maintain a sufficient supply of calibrated and operable radiation survey instruments capable of detecting beta and gamma radiation at each field station and temporary job site to make any physical radiation survey required by this part and part 4 of these regulations. Instrumentation shall be capable of measuring a range of 0.1 milliroentgens through at least 50 milliroentgens per hour.

(b) Each licensee shall have available additional calibrated and operable radiation-detection instruments sensitive enough to detect the low radiation and contamination levels that could be encountered if a sealed source ruptures. Any licensee may own the instruments or may have a procedure to obtain them from a second party when needed.

(c) Within the previous six months and after each servicing or repair, each radiation survey instrument used shall be calibrated as follows:

(1) At energies and radiation levels appropriate for use;

(2) with a demonstrated accuracy of within plus or minus 20 percent of the true radiation level on each scale; and

(3) (A) At two points located approximately one-third and two-thirds of full scale on each scale if it is a linear instrument;

(B) at midrange of each decade, and at two points of at least one decade if it is a logarithmic scale instrument; and

(C) at appropriate points if it is a digital instrument.

(d) A calibration record for each instrument shall be maintained for two years for inspection by the department. (Authorized by and implementing K.S.A 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-346. Leak testing of sealed sources. (a) Requirements. Each licensee using any sealed source of radioactive material shall have the source tested for leakage as specified in subsection (c). A record of leak test results shall be kept in units of microcuries and maintained for inspection by the department. The licensee shall keep the records of the results for three years after the leak test is performed.

(b) Method of testing. Each test for leakage shall be performed only by a person specifically authorized to perform such a test by the department, the U.S. nuclear regulatory commission, an agreement state, or a licensing state. The test sample shall be taken from the surface of the source, the source holder, or the surface of the device in which the source is stored or mounted and on which one could expect contamination to accumulate. The test sample shall be analyzed for radioactive contamination. The analysis shall be capable of detecting the presence of 0.005 microcurie (185 Bq) of radioactive material on the test sample and shall be performed by a person specifically authorized to perform such a test by the department, the U.S. nuclear regulatory commission, an agreement state, or a licensing state.

(c) Interval of testing. Each sealed source of radioactive material, except an energy compensation source (ECS), shall be tested at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within the six months before the transfer, the sealed source shall not be put into use until tested. If, for any reason, it is suspected that a sealed source may be leaking, it shall be removed from service immediately and tested for leakage as soon as practical. Each ECS that is not exempt from testing in accordance with subsection (e) of this regulation shall be tested at intervals not to exceed three years. In the absence of a certificate from a transferor that a test has been made within the three years before the transfer, the ECS shall not be used until tested.

(d) Leaking or contaminated sources. If the test reveals the presence of 0.005 microcurie (185 Bq) or more of leakage or contamination, the licensee shall immediately withdraw the source from use and shall cause it to be decontaminated, repaired, or disposed of in accordance with these regulations. Each licensee shall check the equipment associated with the leaking source for radioactive contamination and, if contaminated, shall have the equipment decontaminated or disposed of by an NRC or agreement state

licensee that is authorized to perform these functions. A report describing the equipment involved, the test result, and the corrective action taken shall be filed with the department within five days after receiving the test results.

(e) Exemptions. The following sources shall be exempt from the periodic leak test requirements of this regulation:

(1) Hydrogen-3 (tritium) sources;

(2) sources of radioactive material with a half-life of 30 days or less;

(3) sealed sources of radioactive material in gaseous form;

(4) sources of radioactive material emitting beta, beta-gamma, or gamma radiation, with an activity of not more than 100 microcuries (3.7 Mbq); and

(5) sources of alpha-emitting radioactive material with an activity of not more than 10 micro- curies (0.370 MBq). (Authorized by and implementing K.S.A 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-347. Quarterly inventory. Each licensee or registrant shall conduct a physical inventory to account for all sources of radiation once every three months. A record of each inventory shall be maintained for two years from the date of the inventory for inspection by the department and shall include the quantities and kinds of sources of radiation, the location where sources of radiation are assigned, the date of the inventory, and the name of the individual conducting the inventory. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-348. Utilization records. Each licensee or registrant shall maintain current utilization records, which shall be kept available for inspection by the department for two years from the date of the recorded event, showing the following information for each source of radiation:

(a) make, model number, and a serial number or a description of each source of radiation used;

(b) the identity of the well-logging supervisor or field unit to whom assigned;

(c) each location where used and each date of use; and

(d) the radionuclide and activity used in a particular well, when dealing with tracer materials and radioactive markers. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-349. Design, performance, and certification criteria for sealed sources used in downhole operations. (a) Each sealed source that is used in downhole operations and manufactured after May 1, 1991 shall be certified by the manufacturer or other testing organization to meet the following minimum criteria.

(1) Each source shall be doubly encapsulated .

(2) Each source shall contain radioactive material with a chemical and physical form that is as insoluble and nondispersive as practical.

(3) Each source's prototype shall have been tested and found to maintain its integrity after each of the following tests:

(A) Temperature. The test source shall be held at -40° C for 20 minutes and at 600^{0} C for one hour. Then the test source be subjected to a thermal shock test with a temperature drop from 600^{0} C to 20^{0} C within 15 seconds.

(B) Impact test. A five-kg steel hammer with a diameter of 2.5 cm shall be dropped from a height of one meter onto the test source.

(C) Vibration test. The test source shall be subject to a vibration from 25 Hz to 500 Hz at five g (gravitational acceleration) amplitude for 30 minutes.

(D) Puncture test. A one-gram hammer with a pin having a diameter of 0.3 cm shall be dropped from a height of one meter onto the test source.

(E) Pressure test. The test source shall be subjected to an external pressure of 24,600 pounds per square inch absolute (1.695 x 10 ^{7} pascal).

(b) No sealed source acquired after May 1, 1992 shall be put into use in the absence of a certificate from a transferor certifying that the sealed source meets the requirements of subsection (a) of this regulation, until the required determinations and testing have been performed.

(c) Each sealed source that is used in downhole operations after May 1, 1992 shall be certified by the manufacturer or other testing organization as meeting the sealed source performance requirements for oil

well-logging contained in " sealed radioactive sources--classification," ANSI/HPS N43.6-1977, approved by the American national standards institute, inc. in November 1997, published by the health physics society, and hereby adopted by reference.

(d) Certification documents shall be maintained for inspection by the department for a period of two years after source disposal. If the source is abandoned downhole, the certification documents shall be maintained until the department authorizes disposition of these documents.

(e) The requirements in subsections (a), (b), (c), and (d) of this regulation shall not apply to any sealed sources that contain licensed material in gaseous form.

(f) The requirements in subsections (a), (b), (c), and (d) of this regulation shall not apply to any energy compensation sources (ECS). Each ECS shall be registered with the department, NRC, or an agreement state. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-350. Labeling. (a) Each source, source holder, and logging tool containing radioactive material shall bear a durable, legible, and clearly visible marking or label that has, at a minimum, the standard radiation caution symbol, without the conventional color requirement, and the following wording:

DANGER (or CAUTION)
RADIOACTIVE MATERIAL

This labeling shall be on the smallest component transported as a separate piece of equipment.

(b) Each storage container that is transported shall have securely attached to the container a durable, legible, and clearly visible label that has, at a minimum, the standard radiation caution symbol and the following wording:

DANGER (or CAUTION)
RADIOACTIVE MATERIAL
NOTIFY CIVIL AUTHORITIES
(or NAME OF COMPANY)

(c) No licensee may transport licensed material unless the material is packaged, labeled, marked, and accompanied by appropriate shipping papers in accordance with these regulations. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-351. Repair, opening, or modification. (a) Each licensee shall visually check for defects all source holders, logging tools, sinker bars, injection tools, source handling tools, storage containers, transport containers, and uranium sinker bars before each use to ensure that the equipment is in good working condition and that the required labeling is present. If any defects are found, the equipment shall be removed from service until repaired, and a record shall be made listing the following:

(1) The date of inspection;
(2) the name of the inspector;
(3) the type of equipment involved;
(4) the defects found; and
(5) the repairs made.

(b) Each licensee shall have a program for semiannual visual inspections and routine maintenance of containers, and uranium sinker bars to ensure that the required labeling is legible and that no physical damage is visible. If any defects are found, the equipment shall be removed from service until repaired, and a record shall be made listing the following:

(1) The date of the inspection;
(2) the type of equipment involved;
(3) the inspection and maintenance operations performed;
(4) any defects found; and
(5) any actions taken to correct the defects.

(c) Removal of a sealed source holder or logging tool, and maintenance on sealed sources or holders in which sealed sources are contained shall not be performed by the licensee unless a written procedure to perform this operation that is approved by the U.S. nuclear regulatory commission, an agreement state, or a licensing state is used.

(d) If a sealed source is stuck in the source holder, the licensee shall not drill, cut, chisel, or perform any other operation on the source holder unless the licensee is approved by the U.S. nuclear regulatory commission, an agreement state, or a licensing state to perform this operation.

(e) The repair, opening, or modification of any sealed source shall be performed only by a person authorized to do so by the department, the U.S. nuclear regulatory commission, an agreement state, or a licensing state.

(f) Each licensee shall maintain the records required by this regulation for three years. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-352. Training requirements. (a) A licensee or registrant shall not permit any individual to act as a logging supervisor as defined in this part until that individual meets the following requirements:

(1) Has received, in a course recognized by the department, the U.S. nuclear regulatory commission, an agreement state, or a licensing state, instruction in each subject outlined in K.A.R. 28-35-363 and has demonstrated an understanding of the course material and of this subsection by successfully completing a written or oral test;

(2) (A) has received copies of and received instruction in the regulations contained in this part and the applicable regulations in parts 1, 4, and 10 of these regulations , the conditions of the appropriate license or certificate of registration, and the licensee's or registrant's operating and emergency procedures; and

(B) has demonstrated an understanding of these materials; and

(3) has demonstrated competence to use sources of radiation, related handling tools, and radiation survey instruments that will be used on the job.

(b) No licensee may permit an individual to act as a logging assistant until that person meets the following:

(1) Has received instruction in the applicable regulations in parts 4, 10 and 11;

(2) has received copies of, and instruction in, the licensee's operating and emergency procedures;

(3) has demonstrated understanding of the materials listed in paragraphs (1) and (2) of this subsection by successfully completing a written or oral test; and

(4) has received instruction in the use of licensed materials, remote handling tools, and radiation survey instruments, as appropriate for the logging assistant's intended job responsibilities.

(c) Each licensee or registrant shall maintain training records for each employee for inspection by the department for three years following termination of employment. (Authorized by and implementing K.S.A 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-353. Operating and emergency procedures. Each licensee shall develop and follow written operating and emergency procedures that cover the following:

(a) The handling and use of licensed materials, including the use of sealed sources in wells without surface casing for protecting freshwater aquifers, if appropriate;

(b) the use of remote handling tools for handling sealed sources and radioactive tracer material, except low-activity calibration sources;

(c) the methods and occasions for conducting radiation surveys, including surveys for detecting contamination;

(d) the ways to minimize personnel exposure, including exposures from inhalation and ingestion of licensed tracer materials;

(e) the methods and occasions for locking and securing stored licensed materials;

(f) personnel monitoring and the use of personnel-monitoring equipment;

(g) the transportation of licensed materials to field stations or temporary job sites, packaging of licensed materials for transport in vehicles, placarding of vehicles when needed, and physically securing licensed materials in transport vehicles during transportation to prevent accidental loss, tampering, or unauthorized removal;

(h) the procedures for picking up, receiving, and opening packages containing licensed materials;

(i) the use of tracers;

(j) decontamination of the environment, equipment, and personnel;

(k) the maintenance of records generated by logging personnel at temporary job sites;

(l) the inspection and maintenance of sealed sources, source holders, logging tools, injection tools, injection tools, source handling tools, storage containers, transport containers, and uranium sinker bars;

(m) the actions to be taken if a sealed source is lodged in a well;

(n) the means of notifying the proper persons if an accident occurs; and

(o) the actions to be taken if a sealed source is ruptured, including actions to prevent the spread of contamination and minimize the inhalation and ingestion of licensed materials and actions to obtain appropriate radiation survey instruments as required by K.A.R. 28-35-345. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-354. Personnel monitoring. (a) The licensee or registrant shall not permit any individual to act as a logging supervisor or to assist in the handling of sources of radiation unless each individual wears a personnel-monitoring device as specified in K.A.R. 28-35-217a. Each PMD shall be assigned to and worn by only one individual. Film badges shall be replaced at least monthly, and other personnel-monitoring devices shall be replaced at least quarterly. After replacement, each film badge or PMD shall be promptly processed.

(b) Each licensee shall provide bioassay services to individuals using licensed materials in subsurface tracer studies if required by the license.

(c) Personnel monitoring and bioassay results records shall be maintained for inspection until the secretary authorizes the disposition of these records. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-355. Security. (a) During each logging or tracer application, except when radiation sources are below ground or in shipping or storage containers, the logging supervisor or other designated employee shall maintain direct surveillance of the operation to protect against unauthorized or unnecessary entry into a controlled area.

(b) A logging supervisor shall be physically present at a temporary job site whenever licensed materials either are being handled or are not stored and locked in a vehicle or storage place. The logging supervisor may leave the job site in order to obtain assistance if a source becomes lodged in a well. (Authorized by and implementing K.S.A 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-356. Handling tools. Each licensee shall provide and require the use of tools that will assure remote handling of sealed sources other than low activity calibration sources. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-357. Subsurface tracer studies. (a) Protective gloves and other appropriate protective clothing and equipment shall be used by all personnel when handling radioactive tracer material. Precautions shall be taken to avoid ingestion or inhalation of radioactive material and to avoid contamination of field stations and temporary job sites.

(b) A licensee shall not intentionally cause the injection of radioactive material into freshwater aquifers. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-358. Particle accelerators. A licensee or registrant shall not permit above-ground testing of any particle accelerator, designed for use in well logging which results in the production of radiation, except in areas or facilities controlled or shielded so that the requirements of K.A.R. 28-35-212a and 28-35-214a of these regulations, as applicable, are met. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-359. Radiation surveys. (a) Each licensee shall make a radiation survey or calculation and record for each area where radioactive materials are stored.

(b) Each licensee shall make a radiation survey or calculation and record for the radiation levels in occupied positions and on the exterior of each vehicle used to transport radioactive material. The survey or calculation shall include each source of radiation or combination of sources to be transported in the vehicle.

(c) After removal of the sealed source from the logging tool and before departing the job site, the logging tool detector shall be energized, or a survey meter used, to ensure that the logging tool is free of contamination.

(d) If the licensee has reason to believe that, as a result of any operation involving a sealed source, the encapsulation of the sealed source could be damaged by the operation, the licensee shall conduct radiation surveys, including a contamination survey, during and after the operation.

(e) The licensee shall make a radiation survey at the temporary job site before and after each subsurface tracer study to confirm the absence of contamination.

(f) Each licensee shall make a radiation survey and record at the job site or wellhead for each tracer operation, except those using hydrogen-3, carbon-14, and sulfur-35. The survey shall include measurements of radiation levels before and after the operation.

(g) Each record required by subsections (a) through (f) of this regulation shall include the dates, the identification of the individual or individuals making the survey, the identification of the survey instrument or instruments used, and an exact description of the location of the survey. The record of each licensee's survey shall be maintained for inspection by the department for three years after completion of the survey. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-359a. Radioactive contamination control. (a) If the licensee detects any evidence that a sealed source has ruptured or that licensed materials have caused any contamination, the licensee shall immediately initiate the emergency procedures required by this part.

(b) If contamination results from the use of licensed materials in well logging, the licensee shall decontaminate all work areas, equipment, and unrestricted areas.

(e) During all efforts to recover a sealed source lodged in a well, the licensee shall continuously monitor, with an appropriate radiation-detection instrument or a logging tool with a radiation detector, the circulating fluids from the well, if any, to check for contamination resulting from damage to the sealed source. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-360. Documents and records required to be maintained at field stations. Each licensee or registrant shall maintain, for inspection by the department, the following documents and records for the specific devices and sources assigned to the field station:

(a) The appropriate license, certificate of registration, or equivalent document;

(b) operating and emergency procedures;

(c) applicable regulations;

(d) records of the latest survey instrument calibrations conducted according to K.A.R. 28-35-345;

(e) records of the latest leak test results conducted according to K.A.R. 28-35-348;

(f) quarterly physical inventories required by K.A.R. 28-35-359;

(g) utilization records required by K.A.R. 28-35-348;

(h) survey records required by K.A.R. 28-35-349;

(i) records of inspection and maintenance required by K.A.R. 28-35-351; and

(j) training records required by K.A.R. 28-35-352. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended December 30, 2005.)

28-35-361. Documents and records required at temporary jobsites. Each licensee or registrant conducting operations at a temporary jobsite shall have the following documents and records available at that site for inspection by the department:

(a) operating and emergency procedures;

(b) survey records required pursuant to K.A.R. 28-35-359 for the period of operation at the site;

(c) evidence of current calibration for each radiation survey instrument in use at the site;

(d) when operating in the state under a reciprocity agreement, a copy of the appropriate license, certificate of registration, or equivalent documentation; and

(e) shipping papers for the transportation of radioactive material. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-362. Notification of incidents, abandonment, and lost sources. (a) The licensee shall notify the

department of any incidents and sources lost in other than downhole logging operations in accordance with K.A.R. 28-35-184b, 28-35-228a, 28-35-229a and 28-35-230a.

(b) Whenever a sealed source or device containing radioactive material is lodged downhole, the licensee shall:

(1) monitor at the surface for the presence of radioactive contamination with a radiation survey instrument or logging tool during logging tool recovery operations; and

(2) notify the department immediately by telephone and subsequently, within 30 days, by confirmatory written report if the licensee knows or has reason to believe that a sealed source has been ruptured. This written report shall identify the well or other location, describe the magnitude and extent of the escape of radioactive material, assess the consequences of the rupture, and explain efforts planned or being taken to mitigate these consequences.

(c) If it becomes apparent that efforts to recover the radioactive source will not be successful, the licensee shall comply with the following requirements,

(1) The licensee shall advise the well-operator of the following requirements regarding the method of abandonment:

(A) The well-operator shall immobilize and seal the radioactive source in place with a cement plug.

(B) The well-operator shall set in place a whipstock or other deflection device.

(C) The well-operator shall mount a permanent identification plaque at the surface of the well, containing the appropriate information required by this regulation.

(2) The licensee shall notify the department by telephone, giving the circumstances of the loss, and request approval of the proposed abandonment procedures.

(3) The licensee shall file a written report with the department within 30 days of the abandonment, setting forth the following information:

(A) the date of occurrence and a brief description of attempts to recover the source;

(B) a description of the radioactive source involved, including the radionuclide, quantity, and chemical and physical form;

(C) a description of the surface location and identification of well;

(D) the results of efforts to immobilize and set the source in place;

(E) the depth of the radioactive source;

(F) the depth of the top of the cement plug;

(G) the depth of the well; and

(H) the information contained on the permanent identification plaque.

(d) Whenever a sealed source containing radioactive material is abandoned downhole, the licensee shall provide a permanent plaque as described in K.A.R. 28-35-364 for posting on the well or well-bore. The plaque shall:

(1) be constructed of long-lasting material, which may include stainless steel or monel; and

(2) contain the following information engraved on its face:

(A) the word "CAUTION";

(B) the radiation symbol, without the conventional color requirement;

(C) the date of abandonment;

(D) the name of the well operator or well owner;

(E) the well name and well identification number or numbers or other designation;

(F) a description of the sealed source or sources, by radionuclide and quantity of activity;

(G) the source depth and the depth to the top of the plug; and

(H) an appropriate warning which, depending on the specific circumstances of that abandonment, shall include:

(i) "Do not drill below plug back depth";

(ii) "do not enlarge casing"; or

(iii) "do not reenter the hole before contacting the Kansas department of health and environment radiation control program;" and

(2) be a minimum of seven inches square. The word caution shall be written in 1/2-inch letters and all other information shall be written in 1/4-inch letters.

(e) Each licensee shall immediately notify the department by telephone, and subsequently by confirming letter, if the licensee knows or has reason to believe that radioactive material has been lost in or to

an underground potable water source. The notice shall designate the well location and shall describe the magnitude and extent of loss of radioactive material, assess the consequences of such loss, and explain efforts planned or being taken to mitigate these consequences. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended Nov. 1, 1996.)

28-35-363. Appendix A; training courses for logging supervisors; subjects. (a) Each training course for logging supervisors shall cover the fundamentals of radiation safety, including:

(1) characteristics of radiation;

(2) units of radiation dose and quantity of radioactivity; and

(3) significance of radiation dose, including;

(A) radiation protection standards; and

(B) biological effects of radiation dose;

(4) levels of radiation from sources of radiation;

(5) methods of minimizing radiation dose, including:

(A) working time;

(B) working distances; and

(C) shielding; and

(6) radiation safety practices, including prevention of contamination and methods of decontamination.

(b) Each training course for logging supervisors shall cover radiation detection instrumentation to be used, including:

(1) use of radiation survey instruments, including training as to their:

(A) operation;

(B) calibration; and

(C) limitations;

(2) survey techniques; and

(3) use of personnel monitoring equipment.

(c) Each training course for logging supervisors shall cover the equipment to be used, including:

(1) handling equipment;

(2) sources of radiation;

(3) storage and control of equipment; and

(4) operation and control of equipment.

(d) Each training course for logging supervisors shall include:

(1) the requirements of pertinent federal and state regulations;

(2) the licensee's or registrant's written operating and emergency procedures; and

(3) the licensee's or registrant's record-keeping procedures. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

PART 12. LICENSING AND RADIATION SAFETY REQUIREMENTS FOR IRRADIATORS

28-35-375. General requirements. The provisions of 10 CFR part 36, as in effect on May 4, 2004, are hereby adopted by reference, with the changes specified in this regulation. (a) All reports required by this regulation shall be submitted to the department.

(b) The following sections shall be deleted:

(1) 10 CFR 36.2, "definitions";

(2) 10 CFR 36.5, "interpretations";

(3) 10 CFR 36.8, "information collection requirements: OMB approval";

(4) 10 CFR 36.11, "application for a specific license";

(5) 10 CFR 36.91, "violations"; and

(6) 10 CFR 36.93, "criminal penalties."

(c) Wherever the following CFR references occur within 10 CFR part 36, these references shall be replaced with the specified references to regulations and parts in this article:

(1) "10 CFR part 19" shall be replaced with "part 10, 'instructions and reports to worker: inspections.'"

(2) "10 CFR 20.1501(c)" shall be replaced with "K.A.R. 28-35-217a, 'conditions requiring individual monitoring of external and internal occupational dose.'"

(3) "10 CFR 20.1902" shall be replaced with "K.A.R. 28-35-219a, 'caution signs and labels.'"

(4) "10 CFR 30.33 of this chapter" shall be replaced with "K.A.R. 28-35-180a, 'general requirements for the issuance of specific licenses.'"

(5) "10 CFR 30.35" shall be replaced with "K.A.R. 28-35-180b, 'financial assurance for decommissioning.'"

(6) "10 CFR 30.41" shall be replaced with "K.A.R. 28-35-190a, 'transfer of material.'"

(7) "10 CFR 30.50" shall be replaced with "K.A.R. 28-35-230a, 'reports of over- exposures and excessive levels and concentrations.'"

(8) "10 CFR 30.51" shall be replaced with "K.A.R. 28-35-137, 'records.'"

(9) "10 CFR 170.31" shall be replaced with "K.A.R. 28-35-147a, 'schedule of fees.'"

(d) Wherever the following terms occur within 10 CFR part 36, these terms shall be replaced with "department":

(1) "Commission";

(2) "NRC operation center";

(3) "NRC regional office"; and

(4) "NRC."

(e) The following changes shall be made to the sections specified:

(1) In 10 CFR 36.51, paragraph (a)(2) shall be replaced with the following text: "the requirements of part 10 and part 12 of these regulations that are relevant to the irradiator."

(2) In 10 CFR 36.57(d), the last sentence shall be replaced with the following sentence: "Radioactive concentrations shall not exceed those specified in 'appendices to part 4: standards for protection against radiation,' effective April 1994, table 2, column 2 or table 3 of appendix B, 'annual limits on intake (ALIs) and derived air concentrations (DACs) or radionuclides for occupational exposure; effluent concentrations; concentrations for release to sewerage.'"

(3) In 10 CFR 36.59(c), the last sentence shall be replaced with the following sentence: "If a pool is contaminated, the licensee shall arrange to clean the pool until the contamination levels do not exceed the appropriate concentration in table 2, column 2 of 'appendices to part 4: standards for protection against radiation,' effective April 1994." (Authorized by and implementing K.S.A. 48-1607; eff. December 30, 2005.)

PART 13. CONTINGENCY PLANNING FOR RESPONSE TO RADIOACTIVE MATERIAL EMERGENCIES

28-35-400. Applicability; additional requirements. (a) Each person licensed to receive, possess, own, acquire, use, process, store, transfer, or dispose of radioactive material shall be subject to this part.

(b) In addition to conforming to the licensing requirements in part 3 of these regulations and the requirements for protection in part 4 of these regulations, each licensee with any of the quantities of radioactive material specified in K.A.R. 28-35-411 shall be required to evaluate and prepare to respond to an event involving the possible release of radioactive material. This requirement shall include, at a minimum, immediate activities including containment, rescue, notification, and securing the scene of an event. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-401. Dose evaluation and contingency plan. Each person seeking a license to possess radioactive material in unsealed form, on a foil or plated source, or sealed in glass shall submit an application containing either of the following, if the radioactive material is in excess of any of the quantities specified in K.A.R. 28-35-411:

(a) An evaluation, as specified in K.A.R. 28-35-402, showing that the projected dose to a person off-site due to a release of radioactive material would not exceed 0.01 sievert (1 rem) total effective dose equivalent or 0.01 sievert (1 rem) to the thyroid; or

(b) a contingency plan, as prescribed in K.A.R. 28-35-403, for responding to any event in which radioactive material could be released from the site. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-402. Evaluation of potential dose. (a) For purposes of this part, the following terms shall have the meanings specified in this subsection.

(1) "Release fraction" means the ratio of the quantity of radioactive material released to the quantity of radioactive material available for release.

(2) "Respirable size range" means the range of sizes of airborne particles that can be deposited anywhere in the respiratory tract.

(b) In evaluating the total effective dose equivalent to an individual as specified in K.A.R. 28-35-401, the applicant may take the following into account, as applicable:

(1) The radioactive material is physically separated so that only a portion could be involved in an alert, site area emergency, or general emergency.

(2) All or part of the radioactive material, because of the way the material is stored or packaged, is not subject to release during an alert, site area emergency, or general emergency.

(3) The release fraction in the respirable size range is predicted to be lower than the release fraction specified in K.A.R. 28-35-411, due to the chemical or physical form of the material.

(4) The solubility in body fluids of the radioactive material is predicted to reduce the dose received.

(5) The facility design or engineered safety features in the facility are predicted to cause the release fraction to be lower than the release fraction specified in K.A.R. 28-35-411.

(6) The operating restrictions or procedures are predicted to prevent any release fraction equal to or larger than that specified in K.A.R. 28-35-411. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-403. Contents of contingency plan. Each applicant or licensee shall ensure that the contingency plan that is submitted as specified in K.A.R. 28-35-401 includes information about the following, in separate sections:

(a) The facility, including a brief description of the applicant's or licensee's facility and surroundings;

(b) the types of accidents that the contingency plan addresses, including an identification of each type

of alert, site area emergency, or general emergency involving radioactive material for which actions by applicant's or licensee's staff or off-site response organizations will be needed to protect members of the public;

(c) classification of accidents, consisting of a method for classifying and declaring each alert, site area emergency, or general emergency as defined in this part;

(d) detection of accidents, including the identification of the means for detecting each type of alert, site area emergency, or general emergency in a timely manner;

(e) mitigation of consequences, including a brief description of the means and equipment that are available for mitigating the consequences of each type of alert, site area emergency, or general emergency including the following:

(1) Means and equipment provided to protect workers on-site;

(2) a description of the program for maintaining the equipment;

(3) radiological exposure controls for on-site and off-site response personnel; and

(4) the readiness to carry out special efforts within any designated emergency planning zone;

(f) assessment of radioactive releases, including a brief description of the methods and equipment available to assess any releases of radioactive material;

(g) personnel responsibilities, including the following information:

(1) The names and titles of the applicant's or licensee's personnel responsible for developing, maintaining, and updating the contingency plan;

(2) a brief description of the responsibilities of the applicant's or licensee's personnel who will respond if an alert, site area emergency, or general emergency is declared, including identification of personnel responsible for promptly notifying off-site response organizations, which shall include the department; and

(3) a list of off-site response organizations, a description of their responsibilities and anticipated actions, and a copy of their formal commitments, if any;

(h) notification, coordination, and use of off-site response organizations, including the following information:

(1) A brief description of the means for promptly notifying the off-site response organizations specified in paragraph (g)(3) of this regulation if an alert, site area emergency, or general emergency occurs;

(2) a brief description of the arrangements made for requesting, and coordinating, and using off-site organizations capable of augmenting the planned on-site response, including arrangements for backup communications and 24-hour response capability. The types of assistance that could be requested may include medical treatment of contaminated or injured on-site workers;

(3) a description or drawing of designated locations from which control and assessment of an alert, site area emergency, or general emergency would be exercised; and

(4) provisions of notification and coordination if key personnel, parts of the facility, or any equipment is unavailable;

(i) information to be communicated, including the following information:

(1) A brief description of the information to be provided to off-site response organizations, which shall include the department, if an alert, site area emergency, or general emergency occurs. The types of information to be provided shall include the following:

(A) The declared status of the facility;

(B) a description of the actual or potential releases of radioactive material;

(C) the names and telephone numbers of personnel designated as points of contact;

(D) the population that has been affected; and

(E) any recommendations for protective action;

(2) a brief description of the types of information to be provided to the public by facility staff and through off-site response organizations; and

(3) if protective action by the public is part of the contingency plan, a description of how the public will be trained to perform the action;

(j) training, including the following information:

(1) A brief description of the performance objectives and plans for the initial and annual training that the applicant or licensee will provide to workers and responders about how to respond to

an emergency, including any special instructions and orientation tours that the applicant or licensee will provide for fire, police, medical, and other emergency response personnel;

(2) provisions for familiarizing radiation workers and non-radiation workers, including off-site responders, with site-specific hazards and emergency procedures; and

(3) provisions for preparing site personnel for their responsibilities during an alert, site area emergency, or general emergency, including the use of drills, exercises and team training;

(k) drills and exercises, including specifications for the following:

(1) Conducting quarterly communications checks with off-site response organizations that include the verification and updating of all necessary telephone numbers and other electronic communication addresses;

(2) conducting at least one radiological and health physics, medical drill, or fire drill every two years and conducting, between the required biennial drills, at least one drill involving a combination of some of the principal functional areas of the applicant's or licensee's on-site emergency response capabilities;

(3) inviting off-site response organizations to participate in on-site exercises conducted pursuant to K.A.R. 28-35-407;

(4) using several alert, site area emergency, or general emergency scenarios, including those involving many of the potential responders identified in the contingency plan and those postulated as most probable for the specific site, up to and including the maximum credible accident; and

(5) ensuring that scenarios are not known in advance by the exercise participants whose roles are prescribed in the contingency plan; and

(l) the criteria for determining when a safe condition exists, including a brief description of the site-specific criteria for a safe condition and the means of restoring the facility and surroundings to a safe condition after an alert, site area emergency, or general emergency. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-404. Comment from off-site response organizations. (a) Each applicant or licensee shall provide the contingency plan for comment to off-site response organizations expected to respond in case of an alert, site area emergency, or general emergency including, at a minimum, local fire, ambulance, emergency management, and hospital emergency response officials. The applicant or licensee shall provide the contingency plan to these organizations at least 60 days before submitting the plan to the department. Each applicant or licensee shall submit any changes to the plan to off-site agencies for comment before resubmitting the plan to the department.

(b) Each applicant or licensee shall provide each comment received within the 60 days specified in subsection (a) to the department with the initial or amended contingency plan. The applicant or licensee shall also provide to the department any proposed response to the comment or comments. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-405. Certification of compliance. Each applicant shall certify to the department that the applicant is in compliance with the emergency planning and community right-to-know act of 1986, title III, pub. L. 99-499, at the proposed place of use of the radioactive material. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-406. Training. Each licensee required to submit a contingency plan in accordance with K.A.R. 28-35-401 shall provide training to facility staff and to personnel for each off-site response organization at least annually for each person who is responsible for responding to the types of accidents postulated in the contingency plan as most probable for the specific site. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-407. Conduct of drills and exercises. Each licensee that is required to submit a contingency plan in accordance with K.A.R. 28-35-401 shall meet the following requirements:

(a) Conduct drills and exercises at least every two years to test the response to simulated emergencies;

(b) perform critiques of drills and exercises and ensure that these critiques evaluate the

appropriateness of the contingency plan, emergency procedures, facilities, equipment, training of personnel, and overall effectiveness of the response;

(c) unless the secretary approves otherwise, ensure that the critique of each exercise is performed by individuals who are not responsible for conducting the exercise; and

(d) correct any deficiencies noted in the critique of each drill and exercise within a time period for corrective action that is conveyed, in writing, to the department and approved by the secretary. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-408. Plan implementation. Each licensee required to submit a contingency plan in accordance with K.A.R. 28-35-401 shall meet the following requirements:

(a) Comply with the contingency plan submitted to the department;

(b) notify all off-site response organizations, including the department, not later than one hour after the licensee declares an alert, site area emergency, or general emergency; and

(c) promptly report any projected dose and protective action recommendation as required by the contingency plan. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-409. Contingency plan revision. Each licensee that is required to submit a contingency plan pursuant to K.A.R. 28-35-401 shall comply with the following:

(a) Update the contingency plan at least annually and provide the updated contingency plan to the department and to affected off-site response organizations within 30 days after the update is completed; and

(b) obtain the secretary's written approval before implementing any changes to the plan, except for updating individual names, titles, assignments of responsibility, and telephone numbers. All updates of individual names, titles, assignments of responsibility, and telephone numbers shall be reported to the department and to affected off-site response organizations within 30 days of these changes. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-410. Documentation and recordkeeping. Each licensee required to submit a contingency plan pursuant to K.A.R. 28-35-401 shall retain the following records in accordance with the recordkeeping requirements of part 3 of these regulations:

(a) The reports of contingency plan training, drills, and exercises as specified in K.A.R. 28-35-403; and

(b) the revisions and records of all notifications and reports as specified in K.A.R. 28-35-409 and part 3 of these regulations. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)

28-35-411. Table of quantities of radioactive material; need for contingency plan.

Quantities of Radioactive Materials Requiring Consideration of the Need for a Contingency Plan for Responding to a Release

RadioactiveMaterial[1]	Releasee Fraction	Quantitiy (GBq)	Quantity (Ci)
Actinium-228	0.001	148,000	4,000
Americium-241	0.001	74	2
Americium-242	0.001	74	2
Americium-243	0.001	74	2
Antimony-124	0.01	148,000	4,000
Antimony-126	0.01	222,000	6,000
Barium-133	0.01	370,000	10,000
Barium-140	0.01	1,110,000	30,000
Bismuth-207	0.01	185,000	5,000
Bismuth-210	0.01	22,200	600

Cadmium-109	**0.01**	**37,000**	**1,000**
Cadmium-113	**0.01**	**2,960**	**80**
Calcium-45	**0.01**	**740,000**	**20,000**
Californium-252	**0.001**	**333**	**9 (20mg)**
Carbon-14 (Non-CO)	**0.01**	**1,850,000**	**50,000**
Cerium-141	**0.01**	**370,000**	**10,000**
Cerium-144	**0.01**	**11,100**	**300**
Cesium-134	**0.01**	**74,000**	**2,000**
Cesium-137	**0.01**	**111,000**	**3,000**
Chlorine-36	**0.5**	**3,700**	**100**
Chromium-51	**0.01**	**11,100,000**	**300,000**
Cobalt-60	**0.001**	**185,000**	**5,000**
Copper-64	**0.01**	**7,400,000**	**200,000**
Curium-242	**0.001**	**2,220**	**60**
Curium-243	**0.001**	**110**	**3**
Curium-244	**0.001**	**148**	**4**
Curium-245	**0.001**	**74**	**2**
Europium-152	**0.01**	**18,500**	**500**
Europium-154	**0.01**	**14,800**	**400**
Europium-155	**0.01**	**111,000**	**3,000**
Gadolinium-153	**0.01**	**185,000**	**5,000**
Gold-198	**0.01**	**1,110,000**	**30,000**
Hafnium-172	**0.01**	**14,800**	**400**
Hafnium-181	**0.01**	**259,000**	**7,000**
Holmium-166m	**0.01**	**3,700**	**100**
Hydrogen-3	**0.5**	**40,000**	**20,000**
Indium-114m	**0.01**	**37,000**	**1,000**
Iodine-124	**0.5**	**370**	**10**
Iodine-125	**0.5**	**370**	**10**
Iodine-131	**0.5**	**370**	**10**
Indium-114m	**0.01**	**37,000**	**1,000**
Iridium-192	**0.001**	**1,480,000**	**40,000**
Iron-55	**0.01**	**1,480,000**	**40,000**
Iron-59	**0.01**	**259,000**	**7,000**
Krypton-85	**1.0**	**222,000,000**	**6,000,000**
Lead-210	**0.01**	**296**	**8**
Manganese-56	**0.01**	**2,220,000**	**60,000**
Mercury-203	**0.01**	**370,000**	**10,000**
Molybdenum-99	**0.01**	**1,110,000**	**30,000**
Neptunium-237	**0.001**	**74**	**2**
Nickel-63	**0.01**	**740,000**	**20,000**
Niobium-94	**0.01**	**11,100**	**300**
Phosphorus-32	**0.5**	**3,700**	**100**
Phosphorus-33	**0.5**	**37,000**	**1,000**
Polonium-210	**0.01**	**370**	**10**
Potassium-42	**0.01**	**333,000**	**9,000**
Promethium-145	**0.01**	**148,000**	**4,000**

Promethium-147	**0.01**	**148,000**	**4,000**
Ruthenium-106	**0.01**	**7,400**	**200**
Samarium-151	**0.01**	**148,000**	**4,000**
Scandium-46	**0.01**	**111,000**	**3,000**
Selenium-75	**0.01**	**370,000**	**10,000**
Silver-110m	**0.01**	**37,000**	**1,000**
Sodium-22	**0.01**	**333,000**	**9,000**
Sodium-24	**0.01**	**370,000**	**10,000**
Strontium-89	**0.01**	**111,000**	**3,000**
Strontium-90	**0.01**	**3,330**	**90**
Sulfur-35	**0.5**	**33,30**	**900**
Technetium-99	**0.01**	**370,000**	**10,000**
Technetium-99m	**0.01**	**14,800,000**	**400,000**
Tellurium-127m	**0.01**	**185,000**	**5,000**
Tellurium-129m	**0.01**	**185,000**	**5,000**
Terbium-160	**0.01**	**148,000**	**4,000**
Thulium-170	**0.01**	**148,000**	**4,000**
Tin-113	**0.01**	**370,000**	**10,000**
Tin-123	**0.01**	**111,000**	**3,000**
Tin-126	**0.01**	**37,000**	**1,000**
Titanium-44	**0.01**	**3,700**	**100**
Vanadium-48	**0.01**	**259,000**	**7,000**
Xenon-133	**1.0**	**33,300,000**	**900,000**
Yttrium-91	**0.01**	**74,000**	**2,000**
Zinc-65	**0.01**	**185,000**	**5,000**
Zirconium-93	**0.01**	**14,800**	**400**
Zirconium-95	**0.01**	**185,000**	**5,000**
Any other beta-gamma emitter	**0.01**	**370,000**	**10,000**
Mixed fission products	**0.01**	**37,000**	**1,000**
Contaminated equipment: beta-gamma emitters	**0.001**	**70,000**	**10,000**
Irradiated material, in any form other than solid noncombustible	**0.01**	**370,000**	**10,000**
Irradiated material that is solid and noncombustible	**0.001**	**370,000**	**10,000**
Mixed radioactive waste: beta-gamma emitters	**0.01**	**37,000**	**1,000**
Packaged mixed waste[2]: beta-gamma emitters	**0.001**	**370,000**	**10,000**
Any other alpha emitter	**0.001**	**74**	**2**
Contaminated equipment: alpha emitters	**0.0001**	**740**	**20**
Packaged waste[2]: alpha emitters	**0.0001**	**740**	**20**

[1] For combinations of radioactive materials, the licensee shall be required to consider whether a contingency plan is needed if the sum of the ratios of the quantity of each radioactive material authorized to the quantity listed in this table for that material exceeds one.

[2] **Waste packaged in type B containers shall not require a contingency plan. (Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective December 30, 2005.)**

PART 14. THERAPEUTIC RADIATION MACHINES

28-35-450. General requirements. The provisions of part X of the "suggested state regulations for control of radiation," including appendices A, B, and C, published by the conference of radiation control program directors, inc. and dated February 1999, are hereby adopted by reference, with the changes specified in this regulation. (a) Sec. X.2, "definitions," shall be deleted.

(b) In Sec. X.3(d)(vi), the phrase "on or before December 31, 1999," shall be deleted.

(c) Wherever the following phrases and references occur in part X, these phrases and references shall be replaced with the specified phrases and references to regulations and parts in this article:

(1) "Agency" shall be replaced with "department."

(2) "[INSERT EFFECTIVE DATE OF THESE REGULATIONS]" shall be replaced with "the effective date of these regulations."

(3) "G.14" shall be replaced with "part 6."

(d) The following phrases in part X shall be replaced with the phrase "part 4":

(1) In sec. X.3(i), "Parts D.201, D.205 and D.502";

(2) in sec. X.4(a)(i)(1), " Part D.201a.";

(3) in sec. X.4(a)(i)(2), "Parts D.301a. and D.301b";

(4) in sec. X.4(b), (b)(i), and (b)(iv), "Parts D.301a. and D.301b.";

(5) in sec. X.4(b)(iv), "Part D.301c.";

(6) in sec. X.6(r)(vi), "Part D.201";

(7) in sec. X.9(a), "Parts D.201 and D.301"; and

(8) in appendix A, sec. II(c), "Part D.201."

(e) In sec. X.3(e), paragraphs (i) and (ii) shall be replaced with the following text: "Individuals operating a therapeutic radiation machine for healing arts purposes shall meet the requirements specified in the radiologic technologists practice act." (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

PART 15. PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIAL

28-35-500. General license: NRC-approved packages. (a) A general license shall be deemed to have been issued to any licensee to transport, or to deliver to a carrier for transport, any licensed or registered material in a package for which a license, certificate of compliance (CoC), or other approval has been issued by the NRC.

(b) Each general license specified in subsection (a) shall apply only to a licensee who has a quality assurance program approved by the NRC.

(c) Each general license specified in subsection (a) shall apply only to a licensee who meets the following requirements:

(1) Has a copy of the specific license, certificate of compliance, or other approval by the NRC for the package and has the drawings and any other documents referenced in the approval relating to the use and maintenance of the package and to the actions to be taken before shipment;

(2) complies with the terms and conditions of the license, certificate of compliance, or other approval, as applicable, and with the applicable requirements of this part; and

(3) has registered with the NRC before the licensee's first use of the package.

(d) Each general license specified in subsection (a) shall apply only if the package approval authorizes the use of the package under this general license.

(e) Each general licensee specified in subsection (a) shall meet the requirements of K.A.R. 28-35-501 when using any type B or fissile material package approved by the NRC before April 1, 1996. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-501. Previously approved type B package. (a)(1) Any type B package previously approved by the NRC but not designated as "B(U)," "B(M)," "B(U)F," or "B(M)F" in the identification number of the NRC CoC and any type AF package approved by the NRC before September 6, 1983 may be used under the general license specified in K.A.R. 28-35-500(a), if the following additional provisions are met:

(A) The fabrication of the packaging was satisfactorily completed by August 31, 1986, as demonstrated by application of the model number on the package in accordance with 10 CFR 71.85(c).

(B) A serial number is assigned that is a unique identifier of each package that conforms to the approved design. The serial number shall be legibly and durably marked on the outside of each package.

(2) This subsection shall not apply to type B packages after October 1, 2008.

(b) Any type B(U) package, type B(M) package, or fissile material package may be used under the general license specified in K.A.R. 28-35-500(a), if the following provisions are met:

(1) The package has been previously approved by the NRC and does not have the designation "-85" in the identification number of the NRC CoC.

(2) The fabrication of the package was satisfactorily completed on or before April 1, 1999, as demonstrated by the application of the model number on the package in accordance with 10 CFR 71.85(c).

(3) The package used for a shipment to a location outside the United States is subject to multilateral approval as defined in the U.S. DOT regulations specified in 49 CFR 173.403.

(4) A serial number is assigned that is a unique identifier of the package conforming to the approved design. The serial number shall be legibly and durably marked on the outside of the package. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-502. Air transport of plutonium. (a) Notwithstanding any applicable provisions of any general licenses and notwithstanding any applicable exemptions stated in this part or in the U.S. department of transportation regulations, each licensee shall ensure that plutonium in any form, whether for import, export, or domestic shipment, is not transported by air or delivered to a carrier for air transport unless at least one of the following conditions is met:

(1) The plutonium is contained in a medical device designed for human application for one individual.

(2) The plutonium is contained in a material in which the specific activity is less than or equal to the activity concentration values for plutonium specified in K.A.R. 28-35-221b and in which the radioactivity is essentially uniformly distributed.

(3) The plutonium is shipped in a single package containing no more than an A_2 quantity of plutonium in any isotope or form and is shipped as specified in K.A.R. 28-35-196a.

(4) The plutonium is shipped in a package specifically authorized for the shipment of plutonium by air in the certificate of compliance issued by the NRC for that package.

(b) Nothing in subsection (a) of this regulation shall be interpreted as removing or diminishing the requirements of 10 CFR 73.24.

(c) For any shipment of plutonium by air that is subject to paragraph (a)(4), each licensee shall, through special arrangement with the carrier, require the carrier's compliance with 49 CFR 175.704. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005)

28-35-503. Package-opening instructions. Before delivering any package containing licensed or registered material to a carrier for transport, each licensee shall ensure that any special instructions that are needed to safely open the package have been sent to, or otherwise have been made available to, the consignee for the consignee's use in accordance with K.A.R. 28-35-221a. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-504. Advance notification of shipment of certain types of licensed or registered material. (a) As specified in subsections (b), (c), and (d) of this regulation, each licensee shall provide advance notification to the governor, or the governor's designee, of each state of each shipment of licensed or registered material through or across the boundary of that governor's state. The licensee shall provide this advance notification before transporting, or delivering to a carrier for transport, any licensed or registered material outside the confines of the licensee's facility or other place of use or storage.

(b) (1) The advance notification specified in subsection (a) shall be required for each shipment of irradiated reactor fuel containing 100 grams or less in net weight of irradiated fuel, exclusive of cladding and any other structural or packaging material, that has a total external radiation dose rate in excess of 100 rems per hour at a distance of three feet from any accessible surface without intervening shielding.

(2) The advance notification specified in subsection (a) shall also be required for each shipment of licensed or registered material, other than irradiated fuel, meeting all of the following conditions:

(A) The licensed or registered material is required to be shipped in a type B package for transportation as specified in this part.

(B) The licensed or registered material is being transported to or across a state boundary en route to a disposal facility or to a collection point for transport to a disposal facility.

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

(i) 3,000 times the A_1 value of the radionuclides as specified in K.A.R. 28-35-221b for special form radioactive material or 3,000 times the A_2 value of the radionuclides as specified in K.A.R. 28-35-221b for normal form radioactive material; and

(iii) 1,000 TBq (27,000 Ci).

(c) The notification specified in subsection (b) shall meet the following requirements: (1) The notification shall be submitted, in writing, to the office of each appropriate governor or governor's designee and to the director of the division of nuclear security in the office of nuclear security and incident response. A list of names and addresses for the governor's designees can be obtained from one of the following sources:

(A) A list is published by the NRC annually in the federal register on or about June 30.

(B) A list is available on request from the director of the office of state programs at the U.S. NRC.

(2) Each notification delivered by mail shall be postmarked at least seven days before the beginning of the seven-day period during which departure of the shipment is estimated by the licensee to occur.

(3) Each notification delivered by any means other than mail shall reach the office of each governor or governor's designee at least four days before the beginning of the seven-day period during which departure of the shipment is estimated by the licensee to occur.

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

(d) Each advance notification of any shipment of irradiated reactor fuel or nuclear waste shall contain the following information:

(1) The name, address, and telephone number of the shipper, carrier, and receiver of the irradiated

reactor fuel or nuclear waste shipment;

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

(3) a shipment schedule, which shall include the following information:

(A) The point of origin of the shipment and a specification of the seven-day period during which departure of the shipment is estimated by the licensee to occur;

(B) a specification of the seven-day period during which arrival of the shipment at the state boundaries is estimated by the licensee to occur; and

(C) the destination of the shipment and a specification of the seven-day period during which arrival of the shipment at the destination is estimated by the licensee to occur; and

(4) the name of a contact person, including a telephone number, for current shipment information.

(e) If any licensee finds out that the shipment schedule previously furnished to any governor or governor's designee in accordance with this regulation will not be met, that licensee shall perform the following:

(1) Telephone a responsible individual in the office of the governor or governor's designee as soon as practical after the licensee has found out that the shipment schedule will not be met and inform that individual of the revised schedule; and

(2) maintain a record of the name of the responsible individual contacted and the date of this contact for three years.

(f) Each licensee who cancels an irradiated reactor fuel or nuclear waste shipment for which advance notification has been sent shall send a cancellation notice to the governor of each state, or the governor's designee, who was previously notified and to the director of the division of nuclear security in the office of nuclear security and incident response. The licensee shall state in the notice that the notice is a cancellation and shall identify the advance notification that is being canceled. The licensee shall retain a copy of the notice as a record for three years. (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)

28-35-505. Quality assurance requirements. Each program for transport container inspection and maintenance that is limited to radiographic exposure devices, source changers, or any package transporting these devices or changers and that meets the requirements of K.A.R. 28-35-282a or equivalent NRC or agreement state requirements shall be deemed to meet the requirement specified in K.A.R. 28-35-500(b). (Authorized by and implementing K.S.A. 48-1607; effective December 30, 2005.)