

25 TEXAS ADMINISTRATIVE CODE

§289.201

General Provisions for Radioactive Material

Texas Regulations for Control of Radiation

(revisions effective October 23, 2024, are shown as **shaded text**)

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(October 2024)

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TITLE 25	HEALTH SERVICES
PART 1	DEPARTMENT OF STATE HEALTH SERVICES
CHAPTER 289	RADIATION CONTROL
SUBCHAPTER D	GENERAL

§289.201. General Provisions for Radioactive Material.

(a) Scope. Except as otherwise specifically provided, this section applies to all persons who receive, possess, use, transfer, or acquire any radioactive material **unless the** person is subject to regulation by the United States Nuclear Regulatory Commission (NRC). **This section does not apply** to radioactive material in the possession of federal agencies. **State regulation** of source material, byproduct material, and special nuclear material in quantities not sufficient to form a critical mass is subject to the provisions of the agreement between the state and NRC and to Part 150 of NRC regulations (10 Code of Federal Regulations (CFR) Part 150). A person who receives, possesses, uses, owns, transfers, or acquires radioactive material **before** receiving a license is subject to the requirements of this chapter.

(b) Definitions. The following words and terms when used in this chapter have the following meanings unless the context clearly indicates otherwise.

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

(2) Accelerator-produced material--Any material made radioactive by exposing it to the radiation from a particle accelerator.

(3) Access control--A system for allowing only approved individuals to have unescorted access to the security zone and for ensuring that all other individuals are subject to escorted access.

(4) Act--Texas Radiation Control Act, **Texas** Health and Safety Code (HSC) Chapter 401.

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

(6) Adult--An individual 18 or more years of age.

(7) Aggregated--Accessible by the breach of a single physical barrier that would allow access to radioactive material in any form, including any devices that contain the radioactive material, when the total activity equals or exceeds a category 2 quantity of radioactive material.

(8) Agreement state--Any state with which NRC has entered into an effective agreement under Section 274 of the Atomic Energy Act of 1954, as amended.

(9) Airborne radioactive material--Any radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases.

(10) Airborne radioactivity area--A room, enclosure, or area in which airborne

radioactive materials exist in concentrations:

(A) **over** the derived air concentrations (DACs) specified in Table I, Column 3 of §289.202(ggg)(2)(F) of this **subchapter** (relating to Standards for Protection Against Radiation from Radioactive Materials); or

(B) to such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 derived air concentration-hours (DAC-hours).

(11) Approved individual--An individual whom the licensee has determined to be trustworthy and reliable for unescorted access as specified in §289.252(ii)(2)-(8) of this **chapter** (relating to Licensing of Radioactive Material) and who has completed the training required by §289.252(ii)(10)(C) of this **chapter**.

(12) As low as is reasonably achievable (ALARA)--Making every reasonable effort to maintain exposures to radiation as far below the dose limits in these regulations as is practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of ionizing radiation and licensed sources of radiation in the public interest.

(13) Background investigation--The investigation conducted by a licensee or applicant to support the determination of trustworthiness and reliability.

(14) Background radiation--Radiation from cosmic sources; non-technologically enhanced, naturally occurring radioactive material, including radon, except as a decay product of source or special nuclear material; and global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents, such as Chernobyl, **contributing** to background radiation and not under the control of the licensee. "Background radiation" does not include radiation from sources of radiation regulated by the **department**.

(15) Becquerel (Bq)--The International System of Units (SI) unit of activity. One becquerel is equal to **one** disintegration or transformation per second (dps or tps). Commonly used multiples of the becquerel are the kBq (kilobecquerel, 10^3 Bq), MBq (megabecquerel, 10^6 Bq), GBq (gigabecquerel, 10^9 Bq), and TBq (terabecquerel, 10^{12} Bq). 1 Ci = 37 GBq.

(16) Bioassay--The determination of kinds, quantities, or concentrations, and, in some cases, the locations of radioactive material in the human body, whether by direct measurement, in vivo counting, or by analysis and evaluation of materials excreted or removed from the human body. For purposes of this chapter, "radiobioassay" is an equivalent term.

(17) Brachytherapy--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.

(18) Byproduct material--Byproduct material is defined as:

(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;

(B) the tailings or wastes produced by or resulting from the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "byproduct material" within this definition;

(C) any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity;

(D) any material that has been made radioactive by use of a particle accelerator; and is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; or

(E) any discrete source of naturally occurring radioactive material, other than source material, that is extracted or converted after extraction before, on, or after August 8, 2005, for use in a commercial, medical, or research activity and that the United States NRC, in consultation with the Administrator of the United States Environmental Protection Agency (EPA), the United States Secretary of Energy, the United States Secretary of Homeland Security, and the head of any other appropriate federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security.

(19) Category 1 quantity of radioactive material--A quantity of radioactive material meeting or exceeding the category 1 threshold in §289.252(jj)(9) of this chapter. This is determined by calculating the ratio of the total activity of each radionuclide to the category 1 threshold for that radionuclide and adding the ratios together. If the sum is equal to or exceeds one, the quantity would be considered a category 1 quantity. Category 1 quantities of radioactive material do not include the radioactive material contained in any fuel assembly, subassembly, fuel rod, or fuel pellet.

(20) Category 2 quantity of radioactive material--A quantity of radioactive material meeting or exceeding the category 2 threshold but less than the category 1 threshold in §289.252(jj)(9) of this chapter. This is determined by calculating the ratio of the total activity of each radionuclide to the category 2 threshold for that radionuclide and adding the ratios together. If the sum is equal to or exceeds one, the quantity would be considered a category 2 quantity. Category 2 quantities of radioactive material do not include the radioactive material contained in any fuel assembly, subassembly, fuel rod, or fuel pellet.

(21) Certificate of registration--A form of permission to engage in regulated activities given by the department to an applicant who has met the requirements for registration or mammography system certification set out in the Act and this chapter.

(22) Certification of mammography systems (state certification)--A form of permission to engage in regulated activities given by the department to an applicant who has met the requirements for mammography system certification set out in the Act and this chapter.

(23) Collective dose--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.

(24) Commercial--Having financial profit as the primary aim.

(25) Committed dose equivalent ($H_{T,50}$) --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.

(26) Committed effective dose equivalent ($H_{E,50}$)--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 ($H_{E,50} = \sum W_T H_{T,50}$).

(27) Consortium--An association of medical use licensees and a Positron Emission Tomography (PET) radionuclide production facility in the same geographical area that jointly own or share in the operation and maintenance costs of the PET radionuclide production facility. The PET radionuclide production facility produces radionuclides for production and noncommercial distribution of radioactive drugs among consortium members for medical use and is located at an educational institution or a medical facility.

(28) Constraint (dose constraint)--A value above which specified licensee actions are required.

(29) Critical group--The group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.

(30) Curie (Ci)--A unit of measurement of radioactivity. One curie (Ci) is the quantity of radioactive material that decays at the rate of 3.7×10^{10} disintegrations per second (dps). Commonly used submultiples of the curie are the millicurie (mCi) and the microcurie (μ Ci). One mCi = 1×10^{-3} Ci = 3.7×10^7 dps. One μ Ci = 1×10^{-6} Ci = 3.7×10^4 dps. One nanocurie (nCi) = 1×10^{-9} Ci = 3.7×10^1 dps. One picocurie (pCi) = 1×10^{-12} Ci = 3.7×10^{-2} dps.

(31) Decommission--To remove a facility or site safely from service and reduce residual radioactivity to a level that permits the following:

(A) release of the property for unrestricted use or termination of license; or

(B) release of the property under alternate requirements for license termination.

(32) Deep dose equivalent (H_d), that applies to external whole body exposure--The dose equivalent at a tissue depth of 1 centimeter (cm) (1,000 milligrams per square centimeter (mg/cm^2)).

(33) Department--The Department of State Health Services.

(34) Depleted uranium--The source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. Depleted uranium does not include special nuclear material.

(35) Discrete source--A radionuclide that has been processed so that its concentration within a material has been purposely increased for use for commercial, medical, or research activities.

(36) Distinguishable from background--The detectable concentration of a radionuclide is statistically different from the background concentration of that radionuclide in the vicinity of the site, or, in the case of structures or equipment, in similar materials using adequate measurement technology, survey, and statistical techniques.

(37) Distribution--The physical conveyance and authorized transfer of commodities from producers to consumers and any intermediate persons involved in that conveyance.

(38) Diversion--The unauthorized movement of radioactive material subject to §289.252(ii) of this chapter to a location different from the material's authorized destination inside or outside of the site at which the material is used or stored.

(39) Dose--A generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, total organ dose equivalent, or total effective dose equivalent. For purposes of this chapter, "radiation dose" is an equivalent term.

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

(41) Dose limits--The permissible upper bounds of radiation doses established as specified in this chapter. For purposes of this chapter, "limits" is an equivalent term.

(42) Effective dose equivalent (H_E)--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 ($H_E = \sum W_T H_T$).

(43) Embryo/fetus--The developing human organism from conception until the

time of birth.

(44) Entrance or access point--Any opening through which an individual or extremity of an individual could gain access to radiation areas or to licensed sources of radiation. This includes portals of sufficient size to permit human access, irrespective of their intended use.

(45) Escorted access--Accompaniment while in a security zone by an approved individual who maintains continuous direct visual surveillance, at all times over an individual who is not approved for unescorted access.

(46) Exposure--The quotient of dQ by dm where " dQ " is the absolute value of the total charge of the ions of one sign produced in air when all the electrons and positrons liberated by photons in a volume element of air having mass " dm " are completely stopped in air. The SI unit of exposure is the coulomb per kilogram (C/kg). The roentgen is the special unit of exposure. For purposes of this chapter, this term is used as a noun.

(47) Exposure rate--The exposure per unit of time.

(48) External dose--That portion of the dose equivalent received from any source of radiation outside the body.

(49) Extremity--Hand, elbow, arm below the elbow, foot, knee, and leg below the knee. The arm above the elbow and the leg above the knee are considered part of the whole body.

(50) Fingerprint orders--The orders issued by the NRC or the legally binding requirements issued by agreement states that require fingerprints and criminal history records checks for individuals with unescorted access to category 1 and category 2 quantities of radioactive material or Safeguards Information-Modified Handling files.

(51) Generally applicable environmental radiation standards--Standards issued by the 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.

(52) Gray (Gy)--The SI unit of absorbed dose. One gray is equal to an absorbed dose of 1 joule per kilogram (J/kg) or 100 rad.

(53) High radiation area--An area, accessible to individuals, in which radiation levels from sources of radiation external to the body could result in an individual receiving a dose equivalent more than 0.1 rem (1 millisievert (mSv)) in one hour at 30 cm from any source of radiation or from any surface that the radiation penetrates.

(54) Human use--The internal or external administration of radiation or radioactive material to human beings for healing arts purposes or research and

development specifically authorized by the department.

(55) Individual--Any human being.

(56) Individual monitoring--The assessment of:

(A) dose equivalent to an individual using individual monitoring devices; or

(B) committed effective dose equivalent to an individual by bioassay or by determination of the time-weighted air concentrations to which an individual has been exposed, that is, DAC-hours. (See the definition for DAC-hours in §289.202(c) of this subchapter); or

(C) dose equivalent to an individual using survey data.

(57) Individual monitoring device--Device designed to be worn by a single individual (such as a film badge, thermoluminescent dosimeter (TLD), optically stimulated luminescence dosimeter (OSL), or digital output personnel dosimeter) used for the assessment of dose equivalent. For purposes of this chapter, "personnel dosimeter" and "dosimeter" are equivalent terms.

(58) Inspection--An official examination or observation, including records, tests, surveys, and monitoring to determine compliance with the Act and rules, orders, requirements, and conditions of the department.

(59) Internal dose--That portion of the dose equivalent received from radioactive material taken into the body.

(60) Ionizing radiation--Any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in its passage through matter. Ionizing radiation includes gamma rays and x-rays, alpha and beta particles, high-speed electrons, neutrons, and other nuclear particles.

(61) Land disposal facility--The land, buildings, and equipment that are intended to be used for the disposal of low-level radioactive waste (LLRW) into the subsurface of the land.

(62) Lens dose equivalent--The external dose equivalent to the lens of the eye at a tissue depth of 0.3 cm (300 mg/cm²).

(63) License--A form of permission to engage in regulated activities given by the department to an applicant who has met the requirements for licensing set out in the Act and this chapter.

(64) Licensed material--Radioactive material received, possessed, used, or transferred under a general or specific license issued by the department.

(65) Licensee--Any person who is licensed by the department as specified in the Act and this chapter.

(66) Local law enforcement agency (LLEA)--A public or private organization that

has been approved by a federal, state, or local government to carry firearms and make arrests, and is authorized and has the capability to provide an armed response in the jurisdiction where the licensed category 1 or category 2 quantity of radioactive material is used, stored, or transported.

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

(68) Low-level radioactive waste (LLRW)--Radioactive material that meets the following criteria:

(A) LLRW **includes**:

(i) discarded or unwanted **radioactive material** not exempt by rule adopted under the Texas Radiation Control Act (Act), **specifically**, HSC, §401.106;

(ii) waste, as that term is defined in 10 CFR §61.2; and

(iii) **radioactive material** subject to:

(I) concentration limits established in 10 CFR §61.55, or compatible rules adopted by the **department** or the Texas Commission on Environmental Quality (TCEQ), as applicable; and

(II) disposal criteria established in Title 10 of the CFR or established by the **department** or TCEQ, as applicable.

(B) LLRW does not include:

(i) high-level radioactive waste as defined by 10 CFR §60.2;

(ii) spent nuclear fuel as defined by 10 CFR §72.3;

(iii) byproduct material defined in HSC §401.003(3)(B);

(iv) naturally occurring radioactive material (NORM) waste that is not oil and gas NORM waste;

(v) oil and gas NORM waste; or

(vi) transuranics greater than 100 nanocuries per gram.

(69) Manufacture--To fabricate or mechanically produce.

(70) Member of the public--Any individual, except when that individual is receiving an occupational dose.

(71) Minor--An individual less than 18 years of age.

(72) Mobile device--A piece of equipment containing licensed radioactive

material that either is mounted on a permanent base with wheels or casters, or otherwise equipped for moving while completely assembled and without dismounting; or is a portable device. Mobile devices do not include stationary equipment installed in a fixed location.

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

(74) Movement control center--An operations center remote from the transport activity that maintains position information on the movement of radioactive material, receives reports of attempted attacks or thefts, provides a means for reporting these and other problems to appropriate agencies, and can request and coordinate appropriate aid.

(75) Naturally occurring or accelerator-produced radioactive material (NARM)--Any naturally occurring or accelerator-produced radioactive material except source material or special nuclear material.

(76) Natural radioactivity--Radioactivity of naturally occurring nuclides whose location and chemical and physical form have not been altered by man.

(77) No-later-than arrival time--The date and time that the shipping licensee and receiving licensee have established as the time at which an investigation will be initiated if the shipment has not arrived at the receiving facility. The no-later-than arrival time may not be more than six hours after the estimated arrival time for shipments of category 2 quantities of radioactive material.

(78) NRC--The United States Nuclear Regulatory Commission or its duly authorized representatives.

(79) Occupational dose--The dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to sources of radiation from licensed/registered and unlicensed/unregistered sources of radiation, whether in the possession of the licensee/registrant or other person. Occupational dose does not include dose received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released **as specified** in this chapter, from voluntary participation in medical research programs, or as a member of the public.

(80) Particle accelerator--Any machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and designed to discharge the resultant particulate or other associated radiation at energies usually **greater than** 1 million electron volts (MeV).

(81) Person--Any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, local government, any other state or political subdivision or agency thereof, or any other legal entity, and any

legal successor, representative, agent, or agency of the foregoing, other than NRC, and other than federal government agencies licensed or exempted by NRC.

(82) Personnel monitoring equipment (See definition for individual monitoring devices.)

(83) Pharmacist--An individual licensed by the Texas State Board of Pharmacy to compound and dispense drugs, prescriptions, and poisons.

(84) Physician--An individual licensed by the Texas Medical Board to practice medicine under Texas Occupations Code Chapter 155.

(85) Pocket dosimeter--A small ionization detection instrument or electronic personal dosimeter that indicates ionizing radiation exposure directly. An auxiliary charging device may be necessary.

(86) Portable device--A piece of equipment containing licensed radioactive material that is designed by the manufacturer to be hand carried during use.

(87) Positron emission tomography (PET) radionuclide production facility--A facility operating a cyclotron or accelerator for the purpose of producing PET radionuclides.

(88) Principal activities--Activities authorized by the license that are essential to achieving the purposes for which the license was issued or amended. Storage during which no licensed material is accessed for use or disposal and activities incidental to decontamination or decommissioning are not principal activities.

(89) Public dose--The dose received by a member of the public from exposure to sources of radiation released by a licensee, or to any other source of radiation under the control of a licensee/registrant. It does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released as specified in this chapter, or from voluntary participation in medical research programs.

(90) Quality factor (Q)--The modifying factor listed in subsection (m)(1) and (2) of this section that is used to derive dose equivalent from absorbed dose.

(91) Quarter (calendar quarter)--A period of time equal to one-fourth of the year observed by the licensee, approximately 13 consecutive weeks, providing that the beginning of the first quarter in a year coincides with the starting date of the year and that no day is omitted or duplicated in consecutive quarters.

(92) Rad--The special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs per gram (erg/g) or 0.01 J/kg (0.01 Gy).

(93) Radiation--One or more of the following:

(A) gamma and x rays; alpha and beta particles and other atomic or nuclear particles or rays;

(B) emission of radiation from any electronic device to such energy density levels as to reasonably cause bodily harm; or

(C) sonic, ultrasonic, or infrasonic waves from any electronic device or resulting from the operation of an electronic circuit in an electronic device in the energy range to reasonably cause detectable bodily harm.

(94) Radiation area--Any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent **more than** 0.005 rem (0.05 mSv) in one hour at 30 cm from the source of radiation or from any surface that the radiation penetrates.

(95) Radiation machine--Any device capable of producing ionizing radiation except those devices with radioactive material as the only source of radiation.

(96) Radiation safety officer (RSO)--An individual **who has the knowledge, authority, and responsibility** to apply appropriate radiation protection rules, standards, and practices, who **is** specifically authorized on a radioactive material license, and who is the primary contact with the **department**. Specific training and responsibilities for an RSO are listed in §289.252 of this **chapter**, §289.253 of this **chapter** (relating to Radiation Safety Requirements for Well Logging Service Operations and Tracer Studies), §289.255 of this **chapter** (relating to Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography), and §289.256 of this **chapter** (relating to Medical and Veterinary Use of Radioactive Material).

(97) Radioactive material--Any material (solid, liquid, or gas) that emits radiation spontaneously.

(98) Radioactive waste--For purposes of this chapter, this term is equivalent to LLRW.

(99) Radioactivity--The disintegration of unstable atomic nuclei with the emission of radiation.

(100) Radiobioassay--See definition for bioassay.

(101) Registrant--Any person issued a certificate of registration by the **department as specified in** the Act and this chapter.

(102) Regulation--See definition for rule.

(103) Regulations of the United States Department of Transportation (DOT)--The **federal** requirements in 49 CFR Parts 100 – 189.

(104) Rem--The special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor (1 rem = 0.01 sievert (Sv)).

(105) Research and development--Research and development is defined as:

(A) theoretical analysis, exploration, or experimentation; or

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

(106) Residential location--Any area where a structure or structures are located in which people live, and the grounds on which these structures are located, including houses, apartments, condominiums, and garages.

(107) Residual radioactivity--The radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radiation. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the site, even if those burials were made **as specified in** 10 CFR Part 20.

(108) Restricted area--An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to sources of radiation. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

(109) Reviewing official--The individual who makes the trustworthiness and reliability determination of an individual to determine whether the individual may have, or continue to have, unescorted access to the category 1 or category 2 quantities of radioactive materials in the possession of the licensee.

(110) Roentgen (R)--The special unit of exposure. One roentgen (R) equals 2.58×10^{-4} C/kg of air. (See definition for exposure.)

(111) Rule (as defined in **Texas** Government Code **Chapter 2001**)--Any agency statement of general applicability that implements, interprets, or prescribes law or policy, or describes the procedure or practice requirements of an agency. The term includes the amendment or repeal of a prior **rule and** does not include **a statement regarding** only the internal management or organization of **a state** agency and not affecting private rights or procedures. The word "rule" was formerly referred to as "regulation."

(112) Sabotage--The deliberate damage, with malevolent intent, to a category 1 or category 2 quantity of radioactive material, a device that contains a category 1 or category 2 quantity of radioactive material, or the components of the security system **protecting those materials**.

(113) Safe haven--A readily recognizable and readily accessible site at which security is present or from which, in the event of an emergency, the transport crew can notify and wait for local law enforcement authorities.

(114) Sealed source--**Any radioactive or byproduct material that is encased in a**

capsule designed to prevent leakage or escape of the material.

(115) Security zone--Any temporary or permanent area determined and established by the licensee for the physical protection of category 1 or category 2 quantities of radioactive material.

(116) Shallow dose equivalent (H_s) (that applies to the external exposure of the skin of the whole body or the skin of an extremity)--The dose equivalent at a tissue depth of 0.007 cm (7 mg/cm²).

(117) SI--The abbreviation for the International System of Units.

(118) Sievert--The SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sievert is equal to the absorbed dose in gray multiplied by the quality factor (1 Sv = 100 rem).

(119) Site boundary--That line beyond which the land or property is not owned, leased, or otherwise controlled by the licensee.

(120) Source material--Source material is defined as:

(A) uranium or thorium, or any combination thereof, in any physical or chemical form; or

(B) ores that contain by weight 0.05 percent or more of uranium, thorium, or any combination thereof; and

(C) does not include special nuclear material.

(121) Source of radiation--Any radioactive material, or any device or equipment emitting or capable of producing radiation.

(122) Special form radioactive material--Radioactive material satisfying the following conditions:

(A) either a single solid piece or contained in a sealed capsule **only** opened by destroying the capsule;

(B) the piece or capsule has at least one dimension not less than 5 millimeters (mm) (0.2 inch); and

(C) satisfies the requirements specified by NRC. A special form encapsulation designed **as specified** in NRC requirements in effect on June 30, 1983, and constructed **before** July 1, 1985, may continue to be used. A special form encapsulation designed **as specified** in NRC requirements in effect on March 31, 1996, and constructed **before** April 1, 1998, may continue to be used. A special form encapsulation either designed or constructed after April 1, 1998, must meet the requirements of this definition applicable at the time of its design or construction.

(123) Special nuclear material--Special nuclear material is defined as:

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(A) plutonium (Pu), uranium-233 (U-233), uranium enriched in the isotope 233 or in the isotope 235, and any other material that NRC, **as specified** in the provisions of the Atomic Energy Act of 1954, §51 as amended, determines to be special nuclear material, but does not include source material; or

(B) any material artificially enriched by any of the foregoing, but does not include source material.

(124) Special nuclear material in quantities not sufficient to form a critical mass--Uranium enriched in the isotope 235 in quantities not exceeding 350 grams (g) of contained uranium-235; uranium-233 in quantities not exceeding 200 g; plutonium in quantities not exceeding 200 g; or any combination of them **as specified** in the following formula.

(A) For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified above for the same kind of special nuclear material. The sum of such ratios for all kinds of special nuclear material in combination **must** not exceed "1" (i.e., unity).

(B) For example, the following quantities in combination would not exceed the limitation and are within the formula.

Figure: 25 TAC §289.201(b)(124)(B)

(125) Special units--The conventional units historically used by licensees, for example, curie (activity), rad (absorbed dose), and rem (dose equivalent).

(126) Stationary device--A piece of equipment containing licensed radioactive material that is installed in a fixed location.

(127) Survey--An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of sources of radiation. When appropriate, such survey includes tests, physical examination of location of materials and equipment, measurements of levels of radiation or concentration of radioactive material present, and evaluation of administrative and engineered controls.

(128) Telemetric position monitoring system--A data transfer system that captures information by instrumentation or measuring devices about the location and status of a transport vehicle or package between the departure and destination locations.

(129) Temporary job site--A location where licensed or registered sources of radiation are used or stored other than the specific use location or locations listed on a license or certificate of registration.

(130) Termination--A release by the **department** of the obligations and authorizations of the licensee under the terms of the license. It does not relieve a person of duties and responsibilities imposed by law.

(131) Test--A method of determining the characteristics or condition of sources

of radiation or components thereof.

(132) Texas Regulations for Control of Radiation (TRCR)--All sections of 25 Texas Administrative Code (TAC) Chapter 289.

(133) Total effective dose equivalent (TEDE)--The sum of the effective dose equivalent for external exposures and the committed effective dose equivalent for internal exposures.

(134) Total organ dose equivalent (TODE)--The sum of the deep dose equivalent and the committed dose equivalent to the organ receiving the highest dose as described in §289.202(rr)(1)(F) of this **chapter**.

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

(A) For non-fissile material packages, the number determined by multiplying the maximum radiation level in millisievert per hour (mSv/hr) at 1 meter (m) (3.3 feet) from the external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour (mrem/hr) at 1 m (3.3 feet).

(B) For fissile material packages, the number determined by multiplying the maximum radiation level in mSv/hr at 1 m (3.3 feet) from the external surface of the package by 100 (equivalent to the maximum radiation level in mrem/hr at 1 m (3.3 feet)), or, for criticality control purposes, the number obtained as described in 10 CFR §71.59, whichever is larger.

(136) Trustworthiness and reliability--Characteristics of an individual considered dependable in judgment, character, and performance, such that unescorted access to category 1 or category 2 quantities of radioactive material by that individual does not constitute an unreasonable risk to the public health and safety or security. A determination of trustworthiness and reliability for this purpose is based upon the results from a background investigation.

(137) Type A quantity--A quantity of radioactive material, the aggregate radioactivity of which does not exceed A_1 for special form radioactive material or A_2 for normal form radioactive material, where A_1 and A_2 are given in §289.257(ee) of this **chapter** (relating to Packaging and Transportation of Radioactive Material) or may be determined by procedures described in §289.257(ee) of this **chapter**.

(138) Type B quantity--A quantity of radioactive material greater than a type A quantity.

(139) Unescorted access--Solitary access to an aggregated category 1 or category 2 quantity of radioactive material or the devices that contain the material.

(140) Unrefined and unprocessed ore--Ore in its natural form **before** any processing, such as grinding, roasting or beneficiating, or refining. Processing does

not include sieving or encapsulation of ore or preparation of samples for laboratory analysis.

(141) Unrestricted area (uncontrolled area)--An area, or access to, which is neither limited nor controlled by the licensee. For purposes of this chapter, "uncontrolled area" is an equivalent term.

(142) Very high radiation area--An area, accessible to individuals, in which radiation levels from sources of radiation external to the body could result in an individual receiving an absorbed dose more than 500 rads (5 Gy in one hour at 1 m) from a source of radiation or from any surface that the radiation penetrates. At very high doses received at high dose rates, units of absorbed dose, gray and rad, are appropriate, rather than units of dose equivalent, Sv, and rem.

(143) Veterinarian--An individual licensed by the Texas State Board of Veterinary Medical Examiners to practice veterinary medicine under Texas Occupations Code Chapter 801.

(144) Waste--Low-level radioactive wastes containing source, special nuclear, or byproduct material that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level radioactive waste means radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct material as defined in paragraph (18)(B) - (E) of this subsection.

(145) Week--Seven consecutive days starting on Sunday.

(146) Whole body--For purposes of external exposure, head, trunk including male gonads, arms above the elbow, or legs above the knee.

(147) Worker--An individual engaged in work under a license or certificate of registration issued by the department and controlled by a licensee or registrant but does not include the licensee or registrant.

(148) Working level (WL)--Any combination of short-lived radon daughters in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha particle energy. The short-lived radon daughters are--for radon-222: polonium-218, lead-214, bismuth-214, and polonium-214; and for radon-220: polonium-216, lead-212, bismuth-212, and polonium-212.

(149) Working level month (WLM)--An exposure to one working level for 170 hours--2,000 working hours per year divided by 12 months per year is approximately equal to 170 hours per month.

(150) Year--The period of time beginning in January used to determine compliance with the provisions of this chapter. The licensee may change the starting date of the year used to determine compliance by the licensee if the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.

(c) Exemptions.

§289.201(c)(1)

(1) General provision. The department may, upon application or its own initiative, exempt a source of radiation or a kind of use or user from the requirements of this chapter if the department determines that the exemption is not prohibited by law and will not result in a significant risk to public health and safety, and the environment. In determining such exemptions, the department considers:

(A) state of technology;

(B) economic considerations in relation to benefits to the public health and safety; and

(C) other societal, socioeconomic, or public health and safety considerations.

(2) United States Department of Energy (DOE) contractors and NRC contractors. Any DOE contractor or subcontractor and any NRC contractor or subcontractor of the following categories, operating within Texas, is exempt from this chapter, except §289.204 of this subchapter (relating to Fees for Certificates of Registration, Radioactive Material Licenses, Emergency Planning and Implementation, and Other Regulatory Services), to the extent that such contractor or subcontractor under that individual's contract, receives, possesses, uses, transfers, or acquires sources of radiation:

(A) prime contractors performing work for DOE at United States 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;

(B) prime contractors of DOE performing research in, or development, manufacture, storage, testing, or transportation of atomic weapons or components of atomic weapons;

(C) prime contractors of DOE using or operating nuclear reactors or other nuclear devices in a United States government-owned vehicle or vessel; and

(D) any other prime contractor or subcontractor of DOE or of NRC when Texas and NRC jointly determine that:

(i) the exemption of the prime contractor or subcontractor is authorized by law; and

(ii) as specified in the terms of the contract or subcontract, there is adequate assurance that the work can be accomplished without undue risk to the public health and safety and the environment.

(d) Records.

(1) Each licensee must maintain records showing the receipt, transfer, and disposal of all non-exempt sources of radiation.

(A) Records of receipt, transfer, and disposal of sources of radiation must

include, as a minimum:

- (i) a unique identification of each source of radiation, including:
 - (I) manufacturer's name;
 - (II) isotope;
 - (III) activity; and
 - (IV) if available, sealed source serial number;
- (ii) the date of receipt, transfer, or disposal of each source of radiation;
- (iii) for the licensee transferring the source of radiation, the name of the transferee, the number of the transferee's radioactive material license authorizing possession of the material, and the regulatory agency issuing the license to the transferee; and
- (iv) for the licensee receiving the source of radiation, the name of the transferor, the number of the transferor's radioactive material license authorizing possession of the material, and the regulatory agency issuing the license to the transferor.

(B) Records of receipt and transfer of radioactive material must be retained by the licensee until disposal of the records is authorized by the department. Records of radioactive material disposal must be retained by the licensee until termination of the license.

(2) Additional record requirements and retention periods are specified elsewhere in this chapter.

(3) All records required by this chapter **must** be accurate and factual.

(4) Records are only valid if stamped, initialed, or signed and dated by authorized personnel or otherwise authenticated.

(5) Each record required by this chapter must include all pertinent information and be stored in a legible and reproducible format throughout the retention period specified by the department. The licensee must maintain adequate safeguards against tampering with and loss of records.

(e) Inspections.

(1) The **department** may enter public or private property at reasonable times to determine whether, in a matter under the **department's** jurisdiction, there is compliance with the Act, the department's rules, license conditions, and orders issued by the department.

(2) Each licensee **must** afford the **department**, at all reasonable times, opportunity to inspect sources of radiation and the premises and facilities where sources of radiation are used or stored.

(3) Each licensee **must make available to the department** for inspection, upon reasonable notice, records maintained as specified in this chapter.

(f) Tests.

(1) Each licensee **must** perform, upon instructions from the **department**, or **must** permit the **department** to perform, reasonable tests the **department** deems appropriate or necessary, including tests of:

(A) sources of radiation;

(B) facilities where sources of radiation are used or stored;

(C) radiation detection and monitoring instruments; and

(D) other equipment and devices used in connection with utilization or storage of licensed sources of radiation.

(2) Each licensee is required to accept from the **department**, samples collected from its facility or from areas that are radioactive resulting from its licensed activities.

(g) Tests for leakage **or** contamination of sealed sources.

(1) The licensee possessing any sealed source **must** assure that:

(A) each sealed source, except as specified in paragraph (2) of this subsection and **§289.253(j)** of this **chapter**, is tested for leakage or contamination and the test results are 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;

(B) each sealed source that is not designed to emit alpha particles is tested for leakage or contamination at intervals not to exceed six months or at alternative intervals approved by the **department**, the NRC, or any agreement state after evaluation of information specified in §289.252(v) of this **chapter** or equivalent regulations of the NRC or any agreement state;

(C) each sealed source that is designed to emit alpha particles is tested for leakage or contamination at intervals not to exceed three months or at alternative intervals approved by the **department**, the NRC, or any agreement state after evaluation of information specified in §289.252(v) of this **chapter**, or equivalent regulations of the NRC, or any agreement state;

(D) for each sealed source that is required to be tested for leakage or contamination, at any other time there is reason to suspect that the sealed source might have been damaged or might be leaking, the sealed source is tested for leakage or contamination before further use;

(E) tests for leakage for all sealed sources, except brachytherapy sources manufactured to contain radium, **are** capable of detecting the presence of 0.005 µCi

(185 Bq) of radioactive material on a test sample. Test samples must be taken from the sealed source or from the surfaces of the container in which the sealed source is stored or mounted and at the nearest accessible point to the sealed source where contamination might accumulate. For a sealed source contained in a device, test samples are obtained when the source is in the "off" position;

(F) the test for leakage for brachytherapy sources manufactured to contain radium **are** capable of detecting an absolute leakage rate of 0.001 μCi (37 Bq) of radon-222 in a 24-hour period when the collection efficiency for radon-222 and its daughters has been determined with respect to collection method, volume, and time;

(G) tests for contamination from radium daughters **are** taken on the interior surface of brachytherapy source storage containers and **are** capable of detecting the presence of 0.005 μCi (185 Bq) of a radium daughter that has a half-life greater than four days; and

(H) tests for leakage or contamination **are** performed using a leak test kit or method approved by the **department**, the NRC, or any agreement state.

(2) A licensee need not perform tests for leakage or contamination on the following:

(A) sealed sources containing only radioactive material with a half-life of less than 30 days;

(B) sealed sources containing only radioactive material as a gas;

(C) sealed sources containing 100 μCi (3.7 MBq) or less of beta or gamma-emitting material or 10 μCi (370 kBq) or less of alpha or neutron-emitting material;

(D) sealed sources containing only hydrogen-3 (tritium);

(E) seeds of iridium-192 encased in nylon ribbon; and

(F) sealed sources, except teletherapy and brachytherapy sources, that are stored, not being used, and identified as in storage. **However, the licensee must** test each sealed source for leakage or contamination and receive the test results before any use or transfer, unless it has been tested for leakage or contamination **in the** six months before the date of use or transfer.

(3) Analysis of tests for leakage or contamination from sealed sources **must** be performed by persons specifically authorized by the **department**, the NRC, or any agreement state to perform such services.

(4) Test results **must** be kept in units of microcurie or becquerel and maintained for inspection by the **department**.

(5) The following **is** considered evidence that a sealed source is leaking:

(A) the presence of 0.005 μCi (185 Bq) or more of removable contamination

on any test sample;

(B) leakage of 0.001 μCi (37 Bq) of radon-222 per 24 hours for brachytherapy sources manufactured to contain radium; or

(C) the presence of removable contamination resulting from the decay of 0.005 μCi (185 Bq) or more of radium.

(6) The licensee **must** immediately withdraw a leaking sealed source from use and **must** take action to prevent the spread of contamination. Within two years of the determination that a sealed source is leaking, the leaking sealed source **must** be repaired or transferred for disposal **as specified** in §289.202 of this **subchapter**. The licensee **must** check the equipment associated with the leaking source for radioactive contamination and, if contaminated, have it decontaminated or disposed of **as specified** in §289.202 of this **subchapter**.

(7) Reports of test results for leaking or contaminated sealed sources **must** be made **as specified** in §289.202(bbb) of this **subchapter**.

(h) Additional requirements. The **department** may, by rule, order, or condition of license or general license acknowledgment, impose upon any licensee such requirements in addition to those established in this chapter as it deems appropriate or necessary to minimize danger to public health and safety or property or the environment.

(i) Violations. An injunction or other court order may be obtained prohibiting any violation of any provision of the Act or any rule or order issued thereunder. Any person who willfully violates any provision of the Act or any rule or order issued thereunder may be guilty of a misdemeanor and upon conviction, may be punished by fine or imprisonment or both, as provided by law.

(j) Impounding. Sources of radiation **are** subject to impounding as specified in §401.068 of the Act and §289.205 of this **subchapter** (relating to Hearing and Enforcement Procedures).

(k) Communications.

(1) Except where otherwise specified, all communications and reports concerning this chapter and applications filed under them should be addressed to Radiation Control, Department of State Health Services, P.O. Box 149347, Austin, Texas, 78714-9347. Communications, reports, and applications may be delivered in person to the **department's** office located at **1100 West 49th Street, Austin, Texas**.

(2) Documents transmitted to the **department** will be deemed submitted on the date of the postmark or other electronic media transmission.

(l) Interpretations. Except as specifically authorized by the **department** in writing, no interpretation of the meaning of this chapter by any officer or employee of the **department** other than a written interpretation by the Office of General Counsel, Department of State Health Services, will be considered binding upon the

department.

(m) Mean quality factors and absorbed dose equivalencies.

(1) As used in this chapter, the quality factors for converting absorbed dose to dose equivalent are shown in the following table:

Figure: 25 TAC §289.201(m)(1)

(2) 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 paragraph (1) of this subsection, 1 rem (0.01 Sv) of neutron radiation of unknown energies may, for purposes of this section, 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 may use the fluence rate per unit dose equivalent or the appropriate Q value from the following table to convert a measured tissue dose in rad (gray) to dose equivalent in rem (Sv).

Figure: 25 TAC §289.201(m)(2)

(n) Units of activity. For purposes of this chapter, activity is expressed in the special unit of curie (Ci), becquerel (Bq), or its multiples, or disintegrations or transformations per second (dps or tps).

(1) $1 \text{ Ci} = 3.7 \times 10^{10} \text{ dps or tps} = 3.7 \times 10^{10} \text{ Bq} = 2.22 \times 10^{12} \text{ disintegrations or transformations per minute (dpm or tpm)}$.

(2) $1 \text{ Bq} = 1 \text{ dps or tps}$.

Figure: 25 TAC §289.201(b)(124)(B)

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

MEAN QUALITY FACTORS AND ABSORBED DOSE EQUIVALENCIES

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

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

Figure: 25 TAC §289.201(m)(2)

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

		Fluence per Unit	Fluence per Unit
Neutron	Quality	Dose Equivalent*	Dose Equivalent*
Energy	Factor**	(neutrons	(neutrons
(MeV)	(Q)	cm ⁻² rem ⁻¹)	cm ⁻² Sv ⁻¹)

(thermal)	2.5 x 10 ⁻⁸	2	980 x 10 ⁶	980 x 10 ⁸
	1.0 x 10 ⁻⁷	2	980 x 10 ⁶	980 x 10 ⁸
	1.0 x 10 ⁻⁶	2	810 x 10 ⁶	810 x 10 ⁸
	1.0 x 10 ⁻⁵	2	810 x 10 ⁶	810 x 10 ⁸
	1.0 x 10 ⁻⁴	2	840 x 10 ⁶	840 x 10 ⁸
	1.0 x 10 ⁻³	2	980 x 10 ⁶	980 x 10 ⁸
	1.0 x 10 ⁻²	2.5	1,010 x 10 ⁶	1,010 x 10 ⁸
	1.0 x 10 ⁻¹	7.5	170 x 10 ⁶	170 x 10 ⁸
	5.0 x 10 ⁻¹	11	39 x 10 ⁶	39 x 10 ⁸
	1.0	11	27 x 10 ⁶	27 x 10 ⁸
	2.5	9	29 x 10 ⁶	29 x 10 ⁸
	5.0	8	23 x 10 ⁶	23 x 10 ⁸
	7.0	7	24 x 10 ⁶	24 x 10 ⁸
	10	6.5	24 x 10 ⁶	24 x 10 ⁸
	14	7.5	17 x 10 ⁶	17 x 10 ⁸
	20	8	16 x 10 ⁶	16 x 10 ⁸
	40	7	14 x 10 ⁶	14 x 10 ⁸
	60	5.5	16 x 10 ⁶	16 x 10 ⁸
	1.0 x 10 ²	4	20 x 10 ⁶	20 x 10 ⁸
	2.0 x 10 ²	3.5	19 x 10 ⁶	19 x 10 ⁸
	3.0 x 10 ²	3.5	16 x 10 ⁶	16 x 10 ⁸
	4.0 x 10 ²	3.5	14 x 10 ⁶	14 x 10 ⁸

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

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