25 TEXAS ADMINISTRATIVE CODE

§289.201

General Provisions for Radioactive Material

Texas Regulations for Control of Radiation

(revisions effective March 22, 2015, are shown as shaded text)

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(March 2015)

§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, provided, however, that nothing in this section shall apply to any person to the extent such person is subject to regulation by the United States Nuclear Regulatory Commission (NRC) or to radioactive material in the possession of federal agencies. Attention is directed to the fact that regulation by the state 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 (Title 10, Code of Federal Regulations (CFR), Part 150). A person who receives, possesses, uses, owns, transfers, or acquires radioactive material prior to receiving a license is subject to the requirements of this chapter.

(b) Definitions. The following words and terms when used in this chapter shall 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) Act--Texas Radiation Control Act, Health and Safety Code, Chapter 401.

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

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

(6) Agency--The Department of State Health Services.

(7) Agreement state--Any state with which NRC has entered into an effective agreement under §274b of the Atomic Energy Act of 1954, as amended (73 Stat. 689).

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

(9) Airborne radioactivity area--A room, enclosure, or area in which airborne radioactive materials exist in concentrations:

(A) in excess of the derived air concentrations (DACs) specified in Table I, Column 3 of §289.202(ggg)(2)(F) of this title (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% of the annual limit on intake (ALI) or 12 DAC-hours.

(10) 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.

(11) 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 including global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents, such as Chernobyl, that contribute to background radiation and are not under the control of the licensee. "Background radiation" does not include radiation from sources of radiation regulated by the agency.

(12) Becquerel (Bq)--The International System of Units (SI) unit of activity. One becquerel is equal to 1 disintegration or transformation per second (dps or tps).

(13) 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.

(14) 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.

(15) 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, 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 for use for a commercial, medical, or research activity; and

(E) any discrete source of naturally occurring radioactive material, other than source material, that is extracted or converted after extraction 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.

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

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

(18) 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.

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

(20) 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.

(21) 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 ($H_{E,50} = \Sigma W_T H_{T,50}$).

(22) 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 that produces PET radionuclides for use in producing radioactive drugs within the consortium for noncommercial distributions among its associated members for medical use. The PET radionuclide production facility within the consortium shall be located at an educational institution or a medical facility.

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

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

(25) Curie (Ci)--A unit of measurement of radioactivity. One curie (Ci) is that 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 (µCi). One mCi = 1×10^{-3} Ci = 3.7×10^{7} dps. One µCi = 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.

(26) 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 and/or termination of license; or

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

(27) 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)).

(28) 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.

(29) 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.

(30) 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.

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

(32) 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.

(33) 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.

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

(35) 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 ($H_E = \sum w_T H_T$).

(36) Embryo/fetus--The developing human organism from conception until the time of birth.

(37) 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.

(38) 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 (negatrons 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.

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

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

(41) 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.

(42) Generally applicable environmental radiation standards--Standards issued by the United States 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.

(43) 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.

(44) 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 in excess of 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.

(45) Human use--The internal or external administration of radiation or radioactive material to human beings for healing arts purposes or research and/or development specifically authorized by the agency.

(46) Individual--Any human being.

(47) Individual monitoring--The assessment of:

(A) dose equivalent to an individual by the use of 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 title); or

(C) dose equivalent to an individual by the use of survey data.

(48) Individual monitoring devices--Devices designed to be worn by a single individual for the assessment of dose equivalent. For purposes of this chapter, "personnel dosimeter" and "dosimeter" are equivalent terms. Examples of individual monitoring devices include, but are not limited to, film badges, thermoluminescence dosimeters (TLDs), optically stimulated luminescence dosimeters (OSLs), pocket ionization chambers (pocket dosimeters), electronic personal dosimeters, and personal air sampling devices.

(49) Inspection--An official examination and/or observation including, but not limited to, records, tests, surveys, and monitoring to determine compliance with the Act and rules, orders, requirements, and conditions of the agency.

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

(51) 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.

(52) 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.

(53) Lens dose equivalent--The external dose equivalent to the lens of the eye at a tissue depth of 0.3 cm (300 mg/cm^2).

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

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

(56) Licensee--Any person who is licensed by the agency in accordance with the Act and this chapter.

(57) Licensing state--Any state with rules equivalent to the Suggested State Regulations for Control of Radiation relating to, and having an effective program for, the regulatory control of naturally occurring or accelerator-produced radioactive material (NARM) and has been designated as such by the Conference of Radiation Control Program Directors, Inc. For the purposes of evaluation and/or distribution of sealed sources, this includes Licensing State Status: Product Review Only.

(58) 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.

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

(A) LLRW is radioactive material that is:

(i) discarded or unwanted and is not exempt by rule adopted under the Texas Radiation Control Act (Act), Health and Safety Code, §401.106;

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

(iii) subject to:

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

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

(B) LLRW does not include:

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

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

(iii) byproduct material defined in the Act, Health and Safety Code, §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.

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

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

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

(63) 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.

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

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

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

(67) 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 in accordance with this chapter, from voluntary participation in medical research programs, or as a member of the public.

(68) 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 in excess of 1 MeV.

(69) 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.

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

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

(72) Physician--An individual licensed by the Texas Medical Board.

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

(74) Principal activities--Activities authorized by the license that are essential to achieving the purpose(s) 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.

(75) 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 in accordance with this chapter, or from voluntary participation in medical research programs.

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

(77) 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.

(78) 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 gray).

(79) 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.

(80) Radiation area--Any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 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.

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

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

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

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

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

(86) Radiobioassay (See definition for bioassay.)

(87) Registrant--Any person issued a certificate of registration by the agency in accordance with the Act and this chapter.

(88) Regulation (See definition for rule.)

(89) Regulations of the United States Department of Transportation (DOT)--The requirements in Title 49, CFR, Parts 100 - 189.

(90) 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)).

(91) 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.

(92) Residential location--Any area where a structure or structures are located in which people lodge or live, and the grounds on which these structures are located including, but not limited to, houses, apartments, condominiums, and garages.

(93) 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 in accordance with the provisions of Title 10, CFR, Part 20.

(94) 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.

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

(96) Rule (as defined in the Government Code, Chapters 2001 and 2002, as amended)--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 section but does not include statements concerning only the internal management or organization of any agency and not affecting private rights or procedures. The word "rule" was formerly referred to as "regulation."

(97) Sealed source--Radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material.

(98) 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/cm^2).

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

(100) 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).

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

(102) 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% or more of uranium, thorium, or any combination thereof; and

(C) does not include special nuclear material.

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

(104) Special form radioactive material--Radioactive material that satisfies the following conditions.

(A) It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;

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

(C) It satisfies the requirements specified by NRC. A special form encapsulation designed in accordance with NRC requirements in effect on June 30, 1983, and constructed prior to July 1, 1985, may continue to be used. A special form encapsulation designed in accordance with NRC requirements in effect on March 31, 1996, and constructed prior to 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.

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

(A) plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that NRC, in accordance with 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.

(106) 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 in accordance with 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 of the kinds of special nuclear material in combination shall not exceed "1" (i.e., unity).

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

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

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

(108) Survey--An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, and/or presence of sources of radiation. When appropriate, such survey includes, but is not limited to, 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/or engineered controls.

(109) Termination--A release by the agency 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.

(110) Test--A method of determining the characteristics or condition of sources of radiation or components thereof.

(111**)** Texas Regulations for Control of Radiation (TRCR)--All sections of Title 25 TAC, Chapter 289.

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

(113) 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 title.

(114) 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); or

(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 Title 10, CFR, §71.59 whichever is larger.

(115) 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 title (relating to Packaging and Transportation of Radioactive Material) or may be determined by procedures described in §289.257(ee) of this title.

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

(117) Unrefined and unprocessed ore--Ore in its natural form prior to any processing, such as grinding, roasting, beneficiating, or refining.

(118) 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.

(119) 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 in excess of 500 rads (5 grays) in one hour at 1 meter (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.

(120) Veterinarian--An individual licensed by the Texas State Board of Veterinary Medical Examiners.

(121) 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 (15)(B) - (E) of this subsection.

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

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

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

(125) 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 million electron volts (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.

(126) 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.

(127) 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 provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.

(c) Exemptions.

(1) General provision. The agency may, upon application therefore or upon its own initiative, exempt a source of radiation or a kind of use or user from the requirements of this chapter if the agency 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 agency will consider:

(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, with the exception of §289.204 of this title (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 thereof;

(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 the state and NRC jointly determine that:

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

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

(d) Records.

(1) Each licensee shall 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 shall include as a minimum, the following information:

(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, transfer, and disposal shall be maintained by the licensee until disposal is authorized by the agency.

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

(3) All records required by this chapter shall 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 be legible throughout the retention period specified by the agency. The record may 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. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, or specifications, must include all pertinent information such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(e) Inspections.

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

(2) Each licensee shall afford the agency, at all reasonable times, opportunity to inspect sources of radiation and the premises and facilities wherein such sources of radiation are used or stored.

(3) Each licensee shall make available to the agency for inspection, upon reasonable notice, records maintained in accordance with this chapter.

(f) Tests.

(1) Each licensee shall perform, upon instructions from the agency, or shall permit the agency to perform such reasonable tests as the agency deems appropriate or necessary including, but not limited to, tests of:

(A) sources of radiation;

(B) facilities wherein 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 agency, samples collected from its facility(ies) or from areas that are radioactive as a result of its licensed activities.

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

(1) The licensee in possession of any sealed source shall assure that:

(A) each sealed source, except as specified in paragraph (2) of this subsection and §289.253(i) of this title (relating to Radiation Safety Requirements for Well Logging Service Operations and Tracer Studies), 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 agency, or by NRC, an agreement state, or a licensing state after evaluation of information specified in §289.252(v) of this title;

(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 agency, after evaluation of information specified in §289.252(v) of this title, or by NRC, an agreement state, or a licensing 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 licensee shall assure that 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, shall be capable of detecting the presence of 0.005 μCi (185 Bq) 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 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 shall be 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 shall be taken on the interior surface of brachytherapy source storage containers and shall be 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 shall be performed using a leak test kit or method approved by the agency, NRC, an agreement state, or a licensing state.

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

(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 megabecquerels (MBq)) or less of beta or gamma-emitting material or 10 µCi (370 kilobecquerels (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, which are stored, not being used, and identified as in storage. The licensee shall, however, test each such 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 within six months before the date of use or transfer.

(3) Analysis of tests for leakage or contamination from sealed sources shall be performed by persons specifically authorized by the agency, NRC, an agreement state, or a licensing state, to perform such services.

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

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

(A) the presence of 0.005 µCi (185 becquerels 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 shall immediately withdraw a leaking sealed source from use and shall take action to prevent the spread of contamination. Within two years of the determination that a sealed source is leaking, the leaking sealed source shall be repaired or transferred for disposal in accordance with §289.202 of this title. The licensee shall check the equipment associated with the leaking source for radioactive contamination and, if contaminated, have it decontaminated or disposed of in accordance with §289.202 of this title.

(7) Reports of test results for leaking or contaminated sealed sources shall be made in accordance with §289.202(bbb) of this title.

(h) Additional requirements. The agency 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 shall be subject to impounding in accordance with §401.068 of the Act and §289.205 of this title (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, 1100 West 49th Street, P.O. Box 149347, Austin, Texas, 78714-9347. Communications, reports, and applications may be delivered in person to the agency's office located at 8407 Wall Street, Austin, Texas.

(2) Documents transmitted to the agency will be deemed submitted on the date of the postmark, telegram, telefacsimile, or electronic media transmission.

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

(m) Open records.

(1) Subject to the limitations provided in the Texas Public Information Act, Government Code, Chapter 552, all information and data collected, assembled, or maintained by the agency are public records open to inspection and copying during regular office hours.

(2) Any person who submits written information or data to the agency and requests that the information be considered confidential, privileged, or otherwise not available to the public under the Texas Public Information Act, shall justify such request in writing, including statutes and cases where applicable, addressed to the agency.

(A) Documents containing information that is claimed to fall within an exception to the Texas Public Information Act shall be marked to indicate that fact. Markings shall be placed on the document on origination or submission.

(i) The words "NOT AN OPEN RECORD" shall be placed conspicuously at the top and bottom of each page containing information claimed to fall within one of the exceptions.

(ii) The following wording shall be placed at the bottom of the front cover and title page, or first page of text if there is no front cover or title page:

"INFORMATION FALLING WITHIN EXCEPTION OF THE TEXAS PUBLIC INFORMATION ACT, GOVERNMENT CODE, CHAPTER 552 ---- CONFIDENTIAL

This document contains information submitted to Radiation Control, Department of State Health Services by

_____

(Name of Company)(Name of Submitter)

_____

that is claimed to fall within the following exception to the Texas Public Information Act, Government Code, Chapter 552, Subchapter C _____

(Appropriate Subsection)

WITHHOLD FROM PUBLIC DISCLOSURE _____

_____

(Signature and Title)(Office)(Date)"

_____

(B) The agency requests, whenever possible, that all information submitted under the claim of an exception to the Texas Public Information Act be extracted from the main body of the application and submitted as a separate annex or appendix to the application.

(C) Failure to comply with any of the procedures described in subparagraphs (A) and (B) of this paragraph may result in all information in the agency file being disclosed upon an open records request.

(3) The agency will determine whether information falls within one of the exceptions to the Texas Public Information Act. The Office of General Counsel will be queried as to whether or not there has been a previous determination that the information falls within one of the exceptions to the Texas Public Information Act. If there has been no previous determination and the agency believes that the information falls within one of the exceptions, an opinion of the Attorney General will be requested. If the agency agrees in writing to the request, the information shall not be open for public inspection unless the Attorney General's office subsequently determines that it does not fall within an exception.

(4) Requests for information.

(A) All requests for open records information must be in writing and refer to documents currently in possession of the agency.

(B) The agency will ascertain whether the information may be released or whether it falls within an exception to the Texas Public Information Act.

(i) The agency may take a reasonable period of time to determine whether information falls within one of the exceptions to the Texas Public Information Act.

(ii) If the information is determined to be public, it will be presented for inspection and/or copies of documents will be furnished within a reasonable period of time. A fee will be charged to recover agency costs for copies.

(C) Original copies of public records may not be removed from the agency. Under no circumstances shall material be removed from existing records.

(n) 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:

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.

(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).

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

	Neutron Energy (MeV)	Quality Factor** (Q)	Fluence per Unit Dose Equivalent* (neutrons $cm^{-2}rem^{-1}$)	Fluence per Unit Dose Equivalent* (neutrons $cm^{-2}Sv^{-1}$)
(thermal)	2.5×10^{-8}	2	980×10^{6}	980×10^{8}
	1.0×10^{-7}	2	980×10^{6}	980×10^{8}
	1.0×10^{-6}	2	810×10^{6}	810×10^{8}
	1.0×10^{-5}	2	810×10^{6}	810×10^{8}
	1.0×10^{-4}	2	840×10^{6}	840×10^{8}
	1.0×10^{-3}	2	980×10^{6}	980×10^{8}
	1.0×10^{-2}	2.5	$1{,}010 \times 10^{6}$	$1{,}010 \times 10^{8}$
	1.0×10^{-1}	7.5	170×10^{6}	170×10^{8}
	5.0×10^{-1}	11	39×10^{6}	39×10^{8}
	1.0	11	27×10^{6}	27×10^{8}
	2.5	9	29×10^{6}	29×10^{8}
	5.0	8	23×10^{6}	23×10^{8}
	7.0	7	24×10^{6}	24×10^{8}
	10	6.5	24×10^{6}	24×10^{8}
	14	7.5	17×10^{6}	17×10^{8}
	20	8	16×10^{6}	16×10^{8}
	40	7	14×10^{6}	14×10^{8}
	60	5.5	16×10^{6}	16×10^{8}
	1.0×10^{2}	4	20×10^{6}	20×10^{8}
	2.0×10^{2}	3.5	19×10^{6}	19×10^{8}
	3.0×10^{2}	3.5	16×10^{6}	16×10^{8}
	4.0×10^{2}	3.5	14×10^{6}	14×10^{8}

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

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

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

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

(2) 1 Bq = 1 dps or tps.