From: "Cindy Cardwell" <Cindy.Cardwell@tdh.state.tx.us>
To: OWFN_DO.owf1_po(JHM)
Date: Wed, Apr 5, 2000 11:14 AM
Subject: TX final rules

Jim,

Here are the files we talked about this morning. Let me know if you have any problems opening them. They're Wordperfect files.

See ya' soon,
Cindy

Final regs

Texas Bureau of Radiation Control Proposed Rule Changes

10 CFR Citation	Rule Subject	TRCR Citation	Comments
20.1003	Resolution of Dual	289.201(b)(22)	Meets compatibility
20.1101(d)	Regulation of Airborne	289.202(e)(4)	Meets compatibility
20.2203(a)(2)(vi)	Effluents of Radioactive	289.202(yy)(1)(B)(*vi*)	Meets compatibility
20.2203(b)(1)(iv)	Materials	289.202(yy)(2)(D)	Meets compatibility
20.2203(b)(2)		289.202(yy)(3)	Meets compatibility
20.1002	Criteria for the Release	289.202(b)	Meets compatibility
20.1003	of Individuals	289.201(b)(65),(72)	Meets compatibility
20.1301(a)	Administered Radio-	289.202(n)(1)	Meets compatibility
20.1903	active Material	289.202(bb)(2)	Meets compatibility
20.1003	Radiological Criteria for	289.202(b)(11),(23),(25)	
	for License Termination	(28),(89)	Meets compatibility
20.1009		N/A	
20.1401		289.202(ddd)(1)	Meets compatibility
20.1402		289.202(ddd)(2)	Meets compatibility
20.1403		*	*
20.1404		289.202(ddd)(3)	Meets compatibility
20.1405		289.202(ddd)(4)	Meets compatibility
20.1406		289.202(ddd)(5)	Meets compatibility
20.2402(b)		N/A	**
20.1003	Minor corrections,	289.202(c)(3);	
	Clarifying Changes	298.201(b)(42),(46),	
		(51),(115)	Meets compatibility
20.1201		289.202(f)(1)	Meets compatibility
20.1208		289.202(m)	Meets compatibility
20.2101		289.202(ll)	Meets compatibility
20.2106		289.202(rr)	Meets compatibility
20.2202		289.202(xx)	Meets compatibility
20.1101		289.202(e)(2)	***
20.1206		289.202(k)(1)	Meets compatibility
20.1501		289.202(p)(1)(B)	Meets compatibility
20.1502		289.202(q)(1)(B),(C);	
		(q)(2)(B),(C)	Meets compatibility
20.1903		289.202(bb)(4)	Meets compatibility
20.1906		N/A	
20.1002	Transfer for Disposal	N/A	****
20.2006	and Manifests: Minor	289.257	*****
	Technical Conforming		
	Amendment		

71.101(g)	Licenses for Industrial Radiography and Radiation Safety	289.257(g)(1)(D)	Meets compatibility

* The Texas Bureau of Radiation Control has chosen not to propose the same wording that NRC has concerning criteria for license termination under restricted conditions. We believe that the majority of licensees will be able to decommission and terminate their licenses under the criteria for unrestricted release, without the potential vagaries of "institutional controls." However, we have proposed essentially equivalent language to 20.1404, because a situation could potentially arise that may require consideration of alternate criteria, including that in 20.1403. Therefore, our proposed rule meets the essential objective of the NRC compatibility category C decommissioning rule, but can be considered more stringent.

** The Texas requirements for escalated enforcement, including criminal penalties, are stated in the Texas Radiation Control Act and in §289.205. Those requirements do not need to be repeated in §289.202.

*** We inadvertently neglected to change the word "practicable" to "practical" in the proposed rule. This will be changed during the comment period and will appear as "practical" in the adopted rule.

**** The Texas irradiator rules (§289.258) refer back to the general provisions and standards in §289.201 and §289.202, not vice versa. This is consistent with our other licensing sections, also.

***** The Texas transportation rules (§289.257) were adopted with the correct forms (10 CFR 20 Appendix G), so there is no need to remove an obsolete reference to outdated forms.

LEGEND for Proposed rules

Underlined language - proposed new language
[Bold-faced, bracketed language] - proposed for deletion

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LEGEND: (Final Amendments - With additional changes not proposed)
Double Underline = New language not proposed
[Bold, underline, and brackets] = Proposed new language now being deleted
[Bold and brackets] = Final language now being deleted
Regular Print = Current language incorporating proposed changes for final adoption
(No change) = No changes are being considered for the designated subdivision

§289.201 General Provisions for Radioactive Material **[Materials]**.

(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 the NRC and to Part 150 of the NRC regulations (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)-(9) (No change.)

(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) (No change.)

(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)-(15) (No change.)

(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)-(19) (No change.)

(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 ($H_{E,\,50} = \sum w_T, H_{T,50}$).

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

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

(24) 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.

(25) 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.

(26) 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)).

(27) 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.

(28) 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.

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

(30) 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.

(31) 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.

(32) 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.

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

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

(35) 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.

(36) 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.

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

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

(39) 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.

(40) (No change.)

(41) 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.

(42) 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.

(43)-(44) (No change.)

(45) 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.

(46) 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, **[are]** film badges, thermoluminescence dosimeters (TLDs), optically stimulated luminescence dosimeters (OSLs), pocket ionization chambers (pocket dosimeters), electronic personal dosimeters, and personal air sampling devices.

(47)-(49) (No change.)

(50) 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.

(51) 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).

(52) 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.

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

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

(55) 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.

(56) 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.

(57) 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 10 CFR Part 61.2; and

(*iii*) subject to:

(*I*) concentration limits established in 10 CFR Part 61.55, or compatible rules adopted by the agency or the Texas Natural Resource Conservation Commission (TNRCC), as applicable; and

(*II*) disposal criteria established in 10 CFR, or established by the agency or TNRCC, 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 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.

(58) Manufacture - To fabricate or mechanically produce.

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

(60) (No change.)

(61) 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.

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

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

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

(65) 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.

(66) 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.

(67) 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 the NRC, and other than federal government agencies licensed or exempted by the NRC.

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

(69) Pharmacist - An individual licensed by the Texas State Board of Pharmacy, and with license in good standing, to compound and dispense drugs, prescriptions, and poisons.

(70) Physician - An individual licensed by the Texas State Board of Medical Examiners, with license in good standing.

(71) 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.

(72) 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.

(73) Quality factor (Q) - The modifying factor listed in subsection (n)(3) and (4) of this section that is used to derive dose equivalent from absorbed dose.

(74) 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.

(75) 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).

(76) 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) stimulated 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.

(77) 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.

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

(79) 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.

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

(81) Radioactive waste - As used in §289.254 of this chapter, this term is equivalent to LLRW.

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

(83) Radiobioassay (See definition for bioassay.)

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

(85) Regulation (See definition for rule.)

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

(87) 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)).

(88) 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.

(89) 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 30 Texas Administrative Code §336.334.

(90) 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.

(91)-(96) (No change.)

(97) Site boundary - That line beyond which the land or property is not

owned, leased, or otherwise controlled by the licensee.

(98)-(99) (No change.)

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

(A) (No change.)

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

(C) (No change.)

(101)-(103) (No change.)

(104) 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.

(105) 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.

(106) (No change.)

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

(108)-(113) (No change.)

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

(115) 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.

(116) Veterinarian - An individual licensed by the Texas Board of Veterinary Medical Examiners, with license in good standing.

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

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

(119) 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.

(120) 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.

(121) 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.

(122) 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 therefor 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) (No change.)

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(d) Records.

(1) Each licensee shall maintain records showing the receipt, transfer, and disposal of all licensed sources of radiation. These records shall be maintained by the licensee until disposal is authorized by the agency. Additional record requirements are specified elsewhere in this chapter. All records required by this chapter shall be accurate and factual.

(2)-(3) (No change.)

(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) (No change.)

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

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

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(A)-(D) (No change.)

(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 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)-(G) (No change.)

(2)-(5) (No change.)

(6) The licensee shall immediately withdraw a leaking sealed source from use and shall take action to prevent the spread of contamination. The leaking sealed source shall be repaired or transferred for disposal in accordance with §289.202 of this title.

(7) (No change.)

(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) (No change.)

(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 the Bureau of Radiation Control, Texas Department of Health, 1100 West 49th Street, Austin, Texas, 78756-3189. 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.

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(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, Texas Department of Health, 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:

Figure: 25 TAC §289.201(m)(2)(A)(*ii*)

(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:

Figure: 25 TAC §289.201(n)(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(n)(2)

(o) 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 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.

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LEGEND: (Final Amendments - With additional changes not proposed)

Double Underline = New language not proposed
[Bold, underline, and brackets] = Proposed new language now being deleted
[Bold and brackets] = Final language now being deleted
Regular Print = Current language incorporating proposed changes for final adoption
(No change) = No changes are being considered for the designated subdivision

§289.202 Standards for Protection Against Radiation from Radioactive Material **[Materials]**.

(a) Purpose.

(1) This section establishes standards for protection against ionizing radiation resulting from activities conducted in accordance with licenses issued by the agency.

(2) The requirements in this section are designed to control the receipt, possession, use, and transfer of sources of radiation by any licensee so the total dose to an individual, including doses resulting from all sources of radiation other than background radiation, does not exceed the standards for protection against radiation prescribed in this section. However, nothing in this section shall be construed as limiting actions that may be necessary to protect health and safety in an emergency.

(b) Scope.

(1) Except as specifically provided in other sections of this chapter, this section applies to persons who receive, possess, use, or transfer sources of radiation, unless otherwise exempted. No person may use, manufacture, produce, transport, transfer, receive, acquire, own, possess, process, or dispose of sources of radiation unless that person has a license or exemption from the agency. The dose limits in this section do not apply to doses due to background radiation, to exposure of patients to radiation for the purpose of medical diagnosis or therapy, to exposure from individuals administered radioactive material and released in accordance with this chapter, or to voluntary participation in medical research programs. However, no radiation may be deliberately applied to human beings except by or under the supervision of an individual authorized by and licensed in accordance with Texas' statutes to engage in the healing arts.

(2) Licensees who are also registered by the agency to receive, possess, use, and transfer radiation machines must also comply with the requirements of §289.231 of this title (relating to General Provisions and Standards for Protection Against Machine-Produced Radiation).

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(c) Definitions. The following words and terms when used in this section shall have the following meaning, unless the context clearly indicates otherwise.

(1)-(2) (No change.)

(3) Declared pregnant woman - A woman who has voluntarily informed the licensee, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman voluntarily withdraws the declaration in writing or is no longer pregnant.

(4)-(10) (No change.)

(11) 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.

(12)-(15) (No change.)

(16) Weighting factor w_T for an organ or tissue (T) - The proportion of the risk of stochastic effects resulting from irradiation of that organ or tissue to the total risk of stochastic effects when the whole body is irradiated uniformly. For calculating the effective dose equivalent, the values of w_T are:

Figure: 25 TAC §289.202(c)(16)

(d) Implementation.

(1) Any existing license condition that is more restrictive than this section remains in force until there is an amendment or renewal of the license that modifies or removes this condition.

(2) If a license condition exempts a licensee from a provision of this section in effect on or before January 1, 1994, it also exempts the licensee from the corresponding provision of this section.

(3) If a license condition cites provisions of this section in effect prior to January 1, 1994, that do not correspond to any provisions of this section, the license condition remains in force until there is an amendment or renewal of the license that modifies or removes this condition.

(e) Radiation protection programs.

(1) Each licensee shall develop, document, and implement a radiation protection program sufficient to ensure compliance with the provisions of this section.

See subsection (mm) of this section for recordkeeping requirements relating to these programs. Documentation of the radiation protection program may be incorporated in the licensee's operating, safety, and emergency procedures.

(2) The licensee shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and public doses that are as low as is reasonably achievable (ALARA).

(3) The licensee shall, at intervals not to exceed 12 months, ensure the radiation protection program content and implementation is reviewed.

(4) To implement the ALARA requirement in paragraph (2) of this subsection and notwithstanding the requirements in subsection (n) of this section, a constraint on air emissions of radioactive material to the environment, excluding radon-222 and its daughters, shall be established by licensees such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 millirems (mrem) (0.1 mSv) per year from these emissions. If a licensee subject to this requirement exceeds this dose constraint, the licensee shall report the exceedance as required in subsection (yy) of this section and promptly take appropriate corrective action.

(f) Occupational dose limits for adults.

(1) The licensee shall control the occupational dose to individuals, except for planned special exposures in accordance with subsection (k) of this section, to the following dose limits.

(A) An annual limit shall be the more limiting of:

(*i*) the total effective dose equivalent being equal to 5 rems (0.05 Sv); or

(*ii*) the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems (0.5 Sv).

(B) The annual limits to the lens of the eye, to the skin, and to the extremities shall be:

(*i*) a lens dose equivalent of 15 rems (0.15 Sv); and

(*ii*) a shallow dose equivalent of 50 rems (0.5 Sv) to the skin or to any extremity.

(2) Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime. See subsection (k)(6)(A) and (B) of this section.

(3) (No change.)

(4) The deep dose equivalent, lens dose equivalent and shallow dose equivalent may be assessed from surveys, calculations, or radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure, or the results of individual monitoring are unavailable.

(5) Derived air concentration (DAC) and annual limit on intake (ALI) values are specified in Table I of subsection (ggg)(2) of this section and may be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits. See subsection (rr) of this section.

(6) Notwithstanding the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to 10 milligrams (mg) in a week in consideration of chemical toxicity. See footnote 3 of subsection (ggg)(2) of this section.

(7) The licensee shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person. See subsection (j)(4) of this section.

(g) Compliance with requirements for summation of external and internal doses.

(1) If the licensee is required to monitor in accordance with both subsection (q)(1) and (3) of this section, the licensee shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee is required to monitor only in accordance with subsection (q)(1) of this section or only in accordance with subsection (q)(3) of this section, then summation is not required to demonstrate compliance with the dose limits. The licensee may demonstrate compliance with the requirements for summation of external and internal doses in accordance with paragraphs (2)-(4) of this subsection. The dose equivalents for the lens of the eye, the skin, and the extremities are not included in the summation, but are subject to separate limits.

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(2)-(4) (No change.)

(h) (No change.)

(i) Determination of internal exposure.

(1)-(3) (No change.)

(4) If the licensee chooses to assess intakes of Class Y material using the measurements given in paragraph (1)(A) or (B) of this subsection, the licensee may delay the recording and reporting of the assessments for periods up to seven months, unless otherwise required by subsections (xx) or (yy) of this section. This delay permits the licensee to make additional measurements basic to the assessments.

(5)-(8) (No change.)

(j) Determination of occupational dose for the current year.

(1) For each individual who is likely to receive, in a year, an occupational dose requiring monitoring in accordance with subsection (q) of this section, the licensee shall determine the occupational radiation dose received during the current year.

(2) In complying with the requirements of paragraph (1) of this subsection, a licensee may:

(A) accept, as a record of the occupational dose that the individual received during the current year, BRC Form 202-2 from prior or other current employers, or other clear and legible record, of all information required on that form and indicating any periods of time for which data are not available; or

(B) accept, as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual, or from the individual's prior or other current employer(s) for work involving radiation exposure, that discloses the nature and the amount of any occupational dose that the individual received during the current year; or

(C) obtain reports of the individual's dose equivalent from prior or other current employer(s) for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee, by telephone, telegram, facsimile, or letter. The licensee shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(3) The licensee shall record the exposure data for the current year, as required by paragraph (1) of this subsection, on BRC Form 202-3, or other clear and legible record, of all the information required on that form.

(4) If the licensee is unable to obtain a complete record of an individual's current occupational dose while employed by any other licensee, the licensee shall assume in establishing administrative controls in accordance with subsection (f)(8) of this section for the current year, that the allowable dose limit for the individual is reduced by 1.25 rems (12.5 millisieverts (mSv)) for each quarter; or 416 mrem (4.16 mSv) for each month for which records were unavailable and the individual was engaged in activities that could have resulted in occupational radiation exposure.

(5) If an individual has incomplete (e.g., a lost or damaged personnel monitoring device) current occupational dose data for the current year and that individual is employed solely by the licensee during the current year, the licensee shall:

(A) assume that the allowable dose limit for the individual is reduced by 1.25 rems (12.5 mSv) for each quarter;

(B) assume that the allowable dose limit for the individual is reduced by 416 mrem (4.16 mSv) for each month; or

(C) assess an occupational dose for the individual during the period of missing data using surveys, radiation measurements, or other comparable data for the purpose of demonstrating compliance with the occupational dose limits.

(6) Administrative controls established in accordance with paragraph (4) of this subsection shall be documented and maintained for inspection by the agency. Occupational dose assessments made in accordance with paragraph (5) of this subsection and records of data used to make the assessment shall be maintained for inspection by the agency. The licensee shall retain the records in accordance with subsection (rr) of this section.

(k) Planned special exposures. A licensee may authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in subsection (f) of this section provided that each of the following conditions is satisfied.

(1) The licensee authorizes a planned special exposure only in an exceptional situation when alternatives that might avoid the doses estimated to result from the planned special exposure are unavailable or impractical.

(2) The licensee and employer, if the employer is not the licensee, specifically authorizes the planned special exposure, in writing, before the exposure occurs.

(3) Before a planned special exposure, the licensee ensures that each individual involved is:

(A) informed of the purpose of the planned operation;

(B) informed of the estimated doses and associated potential risks and specific radiation levels or other conditions that might be involved in performing the task; and

(C) instructed in the measures to be taken to keep the dose ALARA considering other risks that may be present.

(4) Prior to permitting an individual to participate in a planned special exposure, the licensee shall determine:

(A) the internal and external doses from all previous planned special exposures;

(B) all doses in excess of the limits, including doses received during accidents and emergencies, received during the lifetime of the individual; and

(C) all lifetime cumulative occupational radiation doses.

(5) In complying with the requirements of paragraph (4)(C) of this subsection, a licensee may:

(A) accept, as the record of lifetime cumulative radiation dose, an up-to-date BRC Form 202-2 or equivalent, signed by the individual and countersigned by an appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee; and

(B) obtain reports of the individual's dose equivalent from prior employer(s) for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee, by telephone, telegram, facsimile, or letter. The licensee shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(6) Subject to subsection (f)(2) of this section, the licensee shall not authorize a planned special exposure that would cause an individual to receive a dose from all planned special exposures and all doses in excess of the limits to exceed:

(A) the numerical values of any of the dose limits in subsection (f)(1) of this section in any year; and

(B) five times the annual dose limits in subsection (f)(1) of this section during the individual's lifetime.

(7) The licensee maintains records of the conduct of a planned special exposure in accordance with subsection (qq) of this section and submits a written report to the agency in accordance with subsection (zz) of this section.

(8) The licensee records the best estimate of the dose resulting from the planned special exposure in the individual's record and informs the individual, in writing, of the dose within 30 days from the date of the planned special exposure. The dose from planned special exposures shall not be considered in controlling future occupational dose of the individual in accordance with subsection (f)(1) of this section but shall be included in evaluations required by paragraphs (4) and (6) of this subsection.

(9) The licensee shall record the exposure history, as required by paragraph (4) of this subsection, on BRC Form 202-2, or other clear and legible record, of all the information required on that form. The form or record shall show each period in which the individual received occupational exposure to radiation or radioactive material and shall be signed by the individual who received the exposure. For each period for which the licensee obtains reports, the licensee shall use the dose shown in the report in preparing BRC Form 202-2 or equivalent.

(l) (No change.)

(m) Dose equivalent to an embryo/fetus.

(1) If a woman declares her pregnancy, the licensee shall ensure that the dose equivalent to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv). If a woman chooses not to declare pregnancy, the occupational dose limits specified in subsection (f)(1) of this section are applicable to the woman. See subsection (rr) of this section for recordkeeping requirements.

(2) The licensee shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in paragraph (1) of this subsection. The National Council on Radiation Protection and Measurements recommended in NCRP Report No. 91 "Recommendations on Limits for Exposure to Ionizing Radiation" (June 1, 1987) that no more than 0.05 rem (0.5 mSv) to

the embryo/fetus be received in any one month.

(3) The dose equivalent to an embryo/fetus shall be taken as:

(A) the dose equivalent to the embryo/fetus from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman; and

(B) the dose equivalent that is most representative of the dose equivalent to the embryo/fetus from external radiation, that is, in the mother's lower torso region.

(*i*) If multiple measurements have not been made, assignment of the highest deep dose equivalent for the declared pregnant woman shall be the dose equivalent to the embryo/fetus.

(*ii*) If multiple measurements have been made, assignment of the deep dose equivalent for the declared pregnant woman from the individual monitoring device that is most representative of the dose equivalent to the embryo/fetus shall be the dose equivalent to the embryo/fetus. Assignment of the highest deep dose equivalent for the declared pregnant woman to the embryo/fetus is not required unless that dose equivalent is also the most representative deep dose equivalent for the region of the embryo/fetus.

(4) If by the time the woman declares pregnancy to the licensee, the dose equivalent to the embryo/fetus has exceeded 0.45 rem (4.5 mSv), the licensee shall be deemed to be in compliance with paragraph (1) of this subsection, if the additional dose equivalent to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the remainder of the pregnancy.

(n) Dose limits for individual members of the public.

(1) Each licensee shall conduct operations so that:

(A) except as provided in subparagraph (B) of this paragraph, the total effective dose equivalent to individual members of the public from the licensed and/or registered operation does not exceed 0.1 rem (1 mSv) in a year, exclusive of the dose contribution 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, and from the licensee's disposal of radioactive material into sanitary sewerage in accordance with subsection (gg) of this section; and

(B) the dose in any unrestricted area from licensed and/or registered external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with this chapter, does not exceed 0.002 rem (0.02 mSv) in any one hour.

(2) If the licensee permits members of the public to have access to restricted areas, the limits for members of the public continue to apply to those individuals.

(3)-(5) (No change.)

(o) Compliance with dose limits for individual members of the public.

(1) The licensee shall make or cause to be made surveys of radiation levels in unrestricted areas and radioactive materials in effluents released to unrestricted areas to demonstrate compliance with the dose limits for individual members of the public as required in subsection (n) of this section.

(2) A licensee shall show compliance with the annual dose limit in subsection (n) of this section by:

(A) demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed or registered operation does not exceed the annual dose limit; or

(B) demonstrating that:

(*i*) the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in Table II of subsection (ggg)(2) of this section; and

(*ii*) if an individual were continuously present in an unrestricted area, the dose from external sources of radiation would not exceed 0.002 rem (0.02 mSv) in an hour and 0.05 rem (0.5 mSv) in a year.

(3) Upon approval from the agency, the licensee may adjust the effluent concentration values in Table II, of subsection (ggg)(2) of this section, for members of the public, to take into account the actual physical and chemical characteristics of the effluents, such as, aerosol size distribution, solubility, density, radioactive decay equilibrium, and chemical form.

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(p) General surveys and monitoring.

(1) Each licensee shall make, or cause to be made, surveys that:

(A) are necessary for the licensee to comply with this section; and

(B) are necessary under the circumstances to evaluate:

(*i*) the magnitude and extent of radiation levels;

(*ii*) concentrations or quantities of radioactive material; and

(*iii*) the potential radiological hazards.

(2) The licensee shall ensure that instruments and equipment used for quantitative radiation measurements, for example, dose rate and effluent monitoring, are operable and calibrated:

(A) by a person licensed or registered by the agency, another agreement state, a licensing state, or the United States Nuclear Regulatory Commission (NRC) to perform such service;

(B) at intervals not to exceed 12 months unless a different time interval is specified in another section of this chapter;

(C) after each instrument or equipment repair;

(D) for the types of radiation used and at energies appropriate for use; and

(E) at an accuracy within 20% of the true radiation level.

(3) All individual monitoring devices, except for direct and indirect reading pocket dosimeters, electronic personal dosimeters, and those individual monitoring devices used to measure the dose to any extremity, that require processing to determine the radiation dose and that are used by licensees to comply with subsection (f) of this section, with other applicable provisions of this chapter, or with conditions specified in a license, shall be processed and evaluated by a dosimetry processor:

(A) holding current personnel dosimetry accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology;

(B) approved in this accreditation process for the type of radiation or radiations included in the NVLAP program that most closely approximates the type of radiation or radiations for which the individual wearing the dosimeter is monitored; and

(C) holding a current certificate of registration from the agency authorizing dosimetry processing.

(q) Conditions requiring individual monitoring of external and internal occupational dose. Each licensee shall monitor exposures from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits of this section. As a minimum:

(1) each licensee shall monitor occupational exposure to radiation and shall supply and require the use of individual monitoring devices by:

(A) adults likely to receive, in one year from sources external to the body, a dose in excess of 10% of the limits in subsection (f)(1) of this section;

(B) minors likely to receive, in one year from sources of radiation external to the body, a deep dose equivalent in excess of 0.1 rem (1 mSv), a lens dose equivalent in excess of 0.15 rem (1.5 mSv), or a shallow dose equivalent to the skin or to the extremities in excess of 0.5 rem (5 mSv);

(C) declared pregnant women likely to receive during the entire pregnancy, from sources of radiation external to the body, a deep dose equivalent in excess of 0.1 rem (1 mSv); and

(D) individuals entering a high or very high radiation area;

(2) notwithstanding paragraph (1)(C) of this subsection, a licensee is exempt from supplying individual monitoring devices to healthcare personnel who may enter a high radiation area while providing patient care if:

(A) the personnel are not likely to receive, in one year from sources external to the body, a dose in excess of 10% of the limits in subsection (f)(1) of this section; and

(B) the licensee complies with the requirements of subsection (e)(2) of this section; and

(3) each licensee shall monitor, to determine compliance with subsection (i) of this section, the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

(A) adults likely to receive, in one year, an intake in excess of 10% of the applicable ALI in Columns 1 and 2 of Table I of subsection (ggg)(2) of this section;

(B) minors likely to receive, in one year, a committed effective dose equivalent in excess of 0.1 rem (1 mSv); and

(C) declared pregnant women likely to receive, during the entire pregnancy, a committed effective dose equivalent in excess of 0.1 rem (1 mSv).

(r) Location and use of individual monitoring devices.

(1) Each licensee shall ensure that individuals who are required to monitor occupational doses in accordance with subsection (q)(l) of this section wear and use individual monitoring devices as follows.

(A) An individual monitoring device used for monitoring the dose to the whole body shall be worn at the unshielded location of the whole body likely to receive the highest exposure. When a protective apron is worn, the location of the individual monitoring device is typically at the neck (collar).

(B) If an additional individual monitoring device is used for monitoring the dose to an embryo/fetus of a declared pregnant woman, in accordance with subsection (m)(1) of this section, it shall be located at the waist under any protective apron being worn by the woman.

(C) An individual monitoring device used for monitoring the lens dose equivalent, to demonstrate compliance with subsection (f)(1)(B)(*i*) of this section, shall be located at the neck (collar) or at a location closer to the eye, outside any protective apron being worn by the monitored individual.

(D) An individual monitoring device used for monitoring the dose to the extremities, to demonstrate compliance with subsection (f)(1)(B)(*ii*) of this section, shall be worn on the extremity likely to receive the highest exposure. Each individual monitoring device, to the extent practicable, shall be oriented to measure the highest dose to the extremity being monitored.

(E) An individual monitoring device shall be assigned to and worn by only one individual.

(F) An individual monitoring device shall be worn for the period of time authorized by the dosimetry processor's certificate of registration or for no

longer than three months, whichever is more restrictive.

(2) Each licensee shall ensure that individual monitoring devices are returned to the dosimetry processor for proper processing.

(3) Each licensee shall ensure that adequate precautions are taken to prevent a deceptive exposure of an individual monitoring device.

(s) Control of access to high radiation areas.

(1) The licensee shall ensure that each entrance or access point to a high radiation area has one or more of the following features:

(A) a control device that, upon entry into the area, causes the level of radiation to be reduced below that level at which an individual might receive a deep dose equivalent of 0.1 rem (1 mSv) in one hour at 30 centimeters (cm) from the source of radiation from any surface that the radiation penetrates;

(B) a control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry; or

(C) entryways that are locked, except during periods when access to the areas is required, with positive control over each individual entry.

(2) In place of the controls required by paragraph (1) of this subsection for a high radiation area, the licensee may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

(3) The licensee may apply to the agency for approval of alternative methods for controlling access to high radiation areas.

(4) The licensee shall establish the controls required by paragraphs (1) and (3) of this subsection in a way that does not prevent individuals from leaving a high radiation area.

(5) The licensee is not required to control each entrance or access point to a room or other area that is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with the regulations of the United States Department of Transportation (DOT) provided that:

(A) the packages do not remain in the area longer than three days; and

(B) (No change.)

(6) The licensee is not required to control entrance or access to rooms or other areas in hospitals solely because of the presence of patients containing radioactive material, provided that there are personnel in attendance who are taking the necessary precautions to prevent the exposure of individuals to sources of radiation in excess of the established limits in this section and to operate within the ALARA provisions of the licensee's radiation protection program.

(t) Control of access to very high radiation areas. In addition to the requirements in subsection (s) of this section, the licensee shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 500 rads (5 grays) or more in one hour at 1 m from a source of radiation or any surface through which the radiation penetrates at this level.

(u)-(x) (No change.)

(y) Security and control of licensed sources of radiation.

(1) The licensee shall secure radioactive material from unauthorized removal or access.

(2) The licensee shall maintain constant surveillance, using devices and/or administrative procedures to prevent unauthorized use of radioactive material that is in an unrestricted area and that is not in storage.

(z) Caution signs.

(1) (No change.)

(2) Notwithstanding the requirements of paragraph (1) of this subsection, licensees are authorized to label sources, source holders, or device components containing sources of radiation that are subjected to high temperatures, with conspicuously etched or stamped radiation caution symbols and without a color requirement.

(aa) Posting requirements.

(1) The licensee shall post each radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA."

(2) The licensee shall post each high radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA."

(3) The licensee shall post each very high radiation area with a

conspicuous sign or signs bearing the radiation symbol and words "GRAVE DANGER, VERY HIGH RADIATION AREA." If the very high radiation area involves medical treatment of patients, the licensee may omit the word "GRAVE" from the sign or signs.

(4)-(5) (No change.)

(bb) Exceptions to posting requirements.

(1) A licensee is not required to post caution signs in areas or rooms containing sources of radiation for periods of less than 8 hours, if each of the following conditions is met:

(A) the sources of radiation are constantly attended during these periods by an individual who takes the precautions necessary to prevent the exposure of individuals to sources of radiation in excess of the limits established in this section; and

(B) the area or room is subject to the licensee's control.

(2) Rooms or other areas in hospitals that are occupied by patients are not required to be posted with caution signs in accordance with subsection (aa) of this section provided that the patient could be released from licensee control in accordance with this chapter.

(3) (No change.)

(4) Rooms in medical facilities that are used for teletherapy are exempt from the requirement to post caution signs in accordance with subsection (aa) of this section provided the following conditions are met.

(A) Access to the room is controlled in accordance with this chapter; and

(B) Personnel in attendance take necessary precautions to prevent the inadvertent exposure of workers, other patients, and members of the public to radiation in excess of the limits established in this section.

(cc) Labeling containers.

(1) The licensee shall ensure that each container of licensed material bears a durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL." The label shall also provide information, such as the radionuclides present, an estimate of the quantity of radioactivity, the date for which the activity is estimated, radiation levels, kinds of materials, and mass enrichment, to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid

or minimize exposures.

(2) Each licensee shall, prior to removal or disposal of empty uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive materials.

(dd) (No change.)

(ee) Procedures for receiving and opening packages.

(1)-(2) (No change.)

(3) The licensee shall perform the monitoring required by paragraph (2) of this subsection as soon as practicable after receipt of the package, but not later than three hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours. If a package is received after working hours, the package shall be monitored no later than three hours from the beginning of the next working day. If the licensee discovers there is evidence of degradation of package integrity, such as a package that is crushed, wet, or damaged, the package shall be surveyed immediately.

(4) The licensee shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the agency when removable radioactive surface contamination or external radiation levels exceed the limits established in subparagraphs (A) and (B) of this paragraph.

(A) Limits for removable radioactive surface contamination levels.

(*i*) The level of removable radioactive contamination on the external surfaces of each package offered for shipment shall be ALARA. The level of removable radioactive contamination may be determined by wiping an area of 300 square centimeters (cm^2) of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the removable contamination levels. Except as provided in clause (*iii*) of this subparagraph, the amount of radioactivity measured on any single wiping material, when averaged over the surface wiped, must not exceed the limits given in clause (*ii*) of this subparagraph at any time during transport. If other methods are used, the detection efficiency of the method used must be taken into account and in no case may the removable contamination on the external surfaces of the package exceed 10 times the limits listed in clause (*ii*) of this subparagraph.

(*ii*)-(*iii*) (No change.)

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(B) Limits for external radiation levels.

(*i*) (No change.)

(*ii*) For a package transported in exclusive use by rail, highway or water, radiation levels external to the package may exceed the limits specified in clause (*i*) of this subparagraph but shall not exceed any of the following:

(*I*)-(*III*) (No change.)

(*IV*) 2 mrem/hr (0.02 mSv/hr) in any normally occupied positions of the vehicle, except that this provision does not apply to private motor carriers when persons occupying these positions are provided with special health supervision, personnel radiation exposure monitoring devices, and training in accordance with §289.203(c) of this title (relating to Notices, Instructions, and Reports to Workers; Inspections).

(5)-(6) (No change.)

(ff) General requirements for waste management.

(1) Unless otherwise exempted, a licensee shall discharge, treat, or decay licensed material or transfer waste for disposal only:

(A) by transfer to an authorized recipient as provided in subsection (jj) of this section **[or in]**, §289.252 of this title, **[or]** §289.254 of this title (relating to Licensing of Radioactive Waste Processing and Storage Facilities), §289.257 of this title, §289.259 of this title (relating to Licensing of Naturally Occurring Radioactive Material (NORM)), or to the United States Department of Energy (DOE);

(B)-(D) (No change.)

(2) (No change.)

(gg) Discharge by release into sanitary sewerage.

(1) A licensee may discharge licensed material into sanitary sewerage if each of the following conditions is satisfied:

(A) (No change.)

(B) the quantity of licensed radioactive material that the licensee releases into the sewer in one month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in

Table III of subsection (ggg)(2) of this section; and

(C)-(D) (No change.)

(2) (No change.)

(hh)-(ii) (No change.)

(jj) Transfer for disposal and manifests.

(1) The control of transfers of LLRW intended for disposal at a licensed low-level radioactive waste disposal facility, the establishment of a manifest tracking system, and additional requirements concerning transfers and recordkeeping for those wastes are found in §289.257(s)(5) of this title.

(2) (No change.)

(kk) (No change.)

(ll) General provisions for records.

(1) Each licensee shall use the SI units becquerel, gray, sievert, and coulomb per kilogram, or the special units curie, rad, rem, and roentgen, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by this section. Disintegrations per minute may be indicated on records of surveys performed to determine compliance with subsection (ggg)(6) of this section. To ensure compatibility with international transportation standards, all limits in this section are given in terms of dual units: The International System of Units (SI) followed or preceded by United States (U.S.) standard or customary units. The U.S. customary units are not exact equivalents, but are rounded to a convenient value, providing a functionally equivalent unit. For the purpose of this section, either unit may be used.

(2) (No change.)

(3) The licensee shall make a clear distinction among the quantities entered on the records required by this section, such as, total effective dose equivalent, total organ dose equivalent, shallow dose equivalent, lens dose equivalent, deep dose equivalent, or committed effective dose equivalent.

(4) Records required in accordance with §289.201(d) of this title, and subsections (mm)-(oo), (tt), and (uu) of this section shall include the date and the identification of individual(s) making the record, and, as applicable, a unique identification of survey instrument(s) used, and an exact description of the location of the survey. Records of receipt, transfer, and disposal of sources of radiation shall uniquely identify the source of radiation.

(5) Copies of records required in accordance with §289.201(d) of this title, and subsections (mm)-(uu) of this section, and by license condition that are relevant to operations at an additional authorized use/storage site shall be maintained at that site in addition to the main site specified on a license.

(mm) Records of radiation protection programs.

(1) Each licensee shall maintain records of the radiation protection program, including:

(A) the provisions of the program; and

(B) audits and other reviews of program content and implementation.

(2) The licensee shall retain the records required by paragraph (1)(A) of this subsection until the agency terminates each pertinent license requiring the record. The licensee shall retain the records required by paragraph (1)(B) of this subsection for three years after the record is made.

(nn) Records of surveys.

(1) Each licensee shall maintain records showing the results of surveys and calibrations required by subsections (p) and (ee)(2) of this section. The licensee shall retain these records for three years after the record is made.

(2) The licensee shall retain each of the following records until the agency terminates each pertinent license requiring the record:

(A) the results of surveys to determine the dose from external sources of radiation used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents; and

(B) results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose; and

(C) results of air sampling, surveys, and bioassays required in accordance with subsection (x)(1)(C)(*i*) and (*ii*) of this section; and

(D) results of measurements and calculations used to evaluate the release of radioactive effluents to the environment.

(oo) Records of tests for leakage or contamination of sealed sources. Records

of tests for leakage or contamination of sealed sources required by §289.201(g) of this title shall be kept in units of becquerel or microcurie and retained for inspection by the agency for five years after the records are made.

(pp) Records of lifetime cumulative occupational radiation dose. The licensee shall retain the records of lifetime cumulative occupational radiation dose as specified in subsection (k) of this section on BRC Form 202-2 or equivalent until the agency terminates each pertinent license requiring this record. The licensee shall retain records used in preparing BRC Form 202-2 or equivalent for three years after the record is made.

(qq) (No change.)

(rr) Records of individual monitoring results.

(1) Each licensee shall maintain records of doses received by all individuals for whom monitoring was required in accordance with subsection (q) of this section, and records of doses received during planned special exposures, accidents, and emergency conditions. Assessments of dose equivalent and records made using units in effect before January 1, 1994, need not be changed. These records shall include, when applicable:

(A) the deep dose equivalent to the whole body, lens dose equivalent, shallow dose equivalent to the skin, and shallow dose equivalent to the extremities;

(B) the estimated intake of radionuclides, see subsection (g) of this section;

(C) the committed effective dose equivalent assigned to the intake of radionuclides;

(D) the specific information used to calculate the committed effective dose equivalent in accordance with subsection (i)(1) and (3) of this section and when required by subsection (q)(1) of this section;

(E) the total effective dose equivalent when required by subsection (g) of this section;

(F) the total of the deep dose equivalent and the committed dose to the organ receiving the highest total dose; and

(G) the data used to make occupational dose assessments in accordance with subsection (j)(5) of this section.

(2) The licensee shall make entries of the records specified in paragraph (1) of this subsection at intervals not to exceed 1 year and within 60 days of the end of the year.

(3) The licensee shall maintain the records specified in paragraph (1) of this subsection on BRC Form 202-3, in accordance with the instructions for BRC Form 202-3, or in clear and legible records containing all the information required by BRC Form 202-3.

(4) The licensee shall maintain the records of dose to an embryo/fetus with the records of dose to the declared pregnant woman. The declaration of pregnancy, including the estimated date of conception, shall also be kept on file, but may be maintained separately from the dose records.

(5) The licensee shall retain each required form or record until the agency terminates each pertinent license requiring the record. The licensee shall retain records used in preparing BRC Form 202-3 or equivalent for three years after the record is made.

(ss) Records of dose to individual members of the public.

(1) Each licensee shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public. See subsection (n) of this section.

(2) The licensee shall retain the records required by paragraph (1) of this subsection until the agency terminates each pertinent license requiring the record.

(tt) (No change.)

(uu) Records of testing entry control devices for very high radiation areas.

(1) Each licensee shall maintain records of tests made in accordance with subsection (u)(2)(I) of this section on entry control devices for very high radiation areas. These records must include the date, time, and results of each such test of function.

(2) The licensee shall retain the records required by paragraph (1) of this subsection for three years after the record is made.

(vv) Form of records. Each record required by this chapter shall be legible throughout the specified retention period. The record shall be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period or 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, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(ww) Reports of stolen, lost, or missing licensed sources of radiation.

(1) Each licensee shall report to the agency by telephone as follows:

(A) immediately after its occurrence becomes known to the licensee, stolen, lost, or missing licensed radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in subsection (ggg)(3) of this section, under such circumstances that it appears to the licensee that an exposure could result to individuals in unrestricted areas; or

(B) within 30 days after its occurrence becomes known to the licensee, lost, stolen, or missing licensed radioactive material in an aggregate quantity greater than 10 times the quantity specified in subsection (ggg)(3) of this section that is still missing.

(2) Each licensee required to make a report in accordance with paragraph (1) of this subsection shall, within 30 days after making the telephone report, make a written report to the agency setting forth the following information:

(A) a description of the licensed source of radiation involved, including, for radioactive material, the kind, quantity, and chemical and physical form;

(B) a description of the circumstances under which the loss or theft occurred;

(C) a statement of disposition, or probable disposition, of the licensed source of radiation involved;

(D) exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible total effective dose equivalent to persons in unrestricted areas;

(E) actions that have been taken, or will be taken, to recover the source of radiation; and

(F) procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed sources of radiation.

(3) Subsequent to filing the written report, the licensee shall also report additional substantive information on the loss or theft within 30 days after the licensee learns of such information.

(4) The licensee shall prepare any report filed with the agency in accordance with this subsection so that names of individuals who may have received exposure to radiation are stated in a separate and detachable portion of the report.

(xx) Notification of incidents.

(1) Notwithstanding other requirements for notification, each licensee shall immediately report each event involving a source of radiation possessed by the licensee that may have caused or threatens to cause:

(A) an individual to receive:

(*i*) a total effective dose equivalent of 25 rems (0.25 Sv) or more;

(*ii*) a lens dose equivalent of 75 rems (0.75 Sv) or more; or

(*iii*) a shallow dose equivalent to the skin or extremities or a total organ dose equivalent of 250 rads (2.5 grays) or more; or

(B) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(2) Each licensee shall, within 24 hours of discovery of the event, report to the agency each event involving loss of control of a licensed source of radiation possessed by the licensee that may have caused, or threatens to cause:

(A) an individual to receive, in a period of 24 hours:

(*i*) a total effective dose equivalent exceeding 5 rems (0.05 Sv);

(*ii*) a lens dose equivalent exceeding 15 rems (0.15 Sv); or

(*iii*) a shallow dose equivalent to the skin or extremities or a total organ dose equivalent exceeding 50 rems (0.5 Sv); or

(B) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(3) Licensees shall make the initial notification reports required by paragraphs (1) and (2) of this subsection by telephone to the agency and shall confirm the initial notification report within 24 hours by telegram, mailgram, or facsimile to the agency.

(4) The licensee shall prepare each report filed with the agency in accordance with this section so that names of individuals who have received exposure to sources of radiation are stated in a separate and detachable portion of the report.

(5) (No change.)

(6) Each licensee shall notify the agency as soon as possible but not later than four hours after the discovery of an event that prevents immediate protective actions necessary to avoid exposures to radioactive materials that could exceed regulatory limits or releases of radioactive materials that could exceed regulatory limits (events may include fires, explosions, toxic gas releases, etc.).

(7) Each licensee shall notify the agency within 24 hours after the

discovery of any of the following events involving radioactive material:

(A) an unplanned contamination event that:

(*i*) requires access to the contaminated area, by workers or the public, to be restricted for more than 24 hours by imposing additional radiological controls or by prohibiting entry into the area;

(*ii*) involves a quantity of material greater than five times the lowest annual limit on intake specified in subsection (ggg)(2) of this section for the material; and

(*iii*) has access to the area restricted for a reason other than to allow isotopes with a half-life of less than 24 hours to decay prior to decontamination.

(B) an event in which equipment is disabled or fails to function as designed when:

(*i*) the equipment is required by rule or license condition to prevent releases exceeding regulatory limits, to prevent exposures to radioactive materials exceeding regulatory limits, or to mitigate the consequences of an accident;

(*ii*) the equipment is required to be available and operable when it is disabled or fails to function; and

(*iii*) no redundant equipment is available and operable to perform the required safety function;

(C) an event that requires unplanned medical treatment at a medical facility of an individual with spreadable radioactive contamination on the individual's clothing or body; or

(D) an unplanned fire or explosion damaging any radioactive material or any device, container, or equipment containing radioactive material when:

(*i*) the quantity of material involved is greater than five times the lowest annual limit on intake specified in subsection (ggg)(2) of this section for the material; and

(*ii*) the damage affects the integrity of the radioactive material or its container.

(8) Preparation and submission of reports. Reports made by licensees in response to the requirements of paragraphs (6) and (7) of this subsection shall be

made as follows.

(A) Licensees shall make reports required by paragraphs (6) and (7) of this subsection by telephone to the agency. To the extent that the information is available at the time of notification, the information provided in these reports shall include:

(*i*) the caller's name and call back telephone number;

(*ii*) a description of the event, including date and time;

(*iii*) the exact location of the event;

(*iv*) the isotopes, quantities, and chemical and physical form of the radioactive material involved; and

(*v*) any personnel radiation exposure data available.

(B) Each licensee who makes a report required by paragraphs (6) and (7) of this subsection shall submit to the agency a written follow-up report within 30 days of the initial report. Written reports prepared in accordance with other requirements of this chapter may be submitted to fulfill this requirement if the reports contain all of the necessary information and the appropriate distribution is made. The reports must include the following:

(*i*) a description of the event, including the probable cause and the manufacturer and model number (if applicable) of any equipment that failed or malfunctioned;

(*ii*) the exact location of the event;

(*iii*) the isotopes, quantities, and chemical and physical form of the radioactive material involved;

(*iv*) date and time of the event;

(*v*) corrective actions taken or planned and the results of any evaluations or assessments; and

(*vi*) the extent of exposure of individuals to radioactive materials without identification of individuals by name.

(yy) Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits.

(1) In addition to the notification required by subsection (xx) of this section, each licensee shall submit a written report within 30 days after learning of any of the following occurrences:

(A) incidents for which notification is required by subsection (xx) of this section;

(B) doses in excess of any of the following:

(*i*) the occupational dose limits for adults in subsection (f) of this section;

(*ii*) the occupational dose limits for a minor in subsection (l) of this section;

(*iii*) the limits for an embryo/fetus of a declared pregnant woman in subsection (m) of this section;

(*iv*) the limits for an individual member of the public in subsection (n) of this section;

(*v*) any applicable limit in the license **[or registration]**; or

(*vi*) the ALARA constraints for air emissions as required by subsection (e)(4) of this section;

(C) levels of radiation or concentrations of radioactive material in:

(*i*) a restricted area in excess of applicable limits in the license; or

(*ii*) an unrestricted area in excess of 10 times the applicable limit set forth in this section or in the license, whether or not involving exposure of any individual in excess of the limits in subsection (n) of this section; or

(D) for licensees subject to the provisions of the EPA's generally applicable environmental radiation standards in 40 CFR 190, levels of radiation or releases of radioactive material in excess of those standards, or of license conditions related to those requirements.

(2) Each report required by paragraph (1) of this subsection shall describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

(A)-(C) (No change.)

(D) corrective steps taken or planned to ensure against a recurrence, including the schedule for achieving conformance with applicable limits, ALARA constraints, generally applicable environmental standards, and associated license conditions.

(3) Each report filed in accordance with paragraph (1) of this subsection shall include for each **[occupationally overexposed]** individual exposed: the name, identification number **[social security number]**, and date of birth. With respect to the limit for the embryo/fetus in subsection (m) of this section, the identifiers should be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable portion of the report.

(4) All licensees who make reports in accordance with paragraph (1) of this subsection shall submit the report in writing to the agency.

(zz) (No change.)

(aaa) Notifications and reports to individuals.

(1) Requirements for notification and reports to individuals of exposure to sources of radiation are specified in §289.203 of this title.

(2) When a licensee is required in accordance with subsection (yy) or (zz) of this section to report to the agency any exposure of an identified occupationally exposed individual, or an identified member of the public, to sources of radiation, the licensee shall also notify the individual and provide a copy of the report submitted to the agency, to the individual. Such notice shall be transmitted at a time not later than the transmittal to the agency, and shall comply with the provisions of §289.203(d)(1) of this title.

(bbb) Reports of leaking or contaminated sealed sources. The licensee shall immediately notify the agency if the test for leakage or contamination required in accordance with §289.201(g) of this title indicates a sealed source is leaking or contaminated. A written report of a leaking or contaminated source shall be submitted to the agency within five days. The report shall include the equipment involved, the test

results and the corrective action taken.

(ccc) Vacating premises.

(1) Each licensee or person possessing non-exempt sources of radiation shall, no less than 30 days before vacating and relinquishing possession or control of premises, notify the agency, in writing, of the intent to vacate.

(2) The licensee or person possessing non-exempt radioactive material shall decommission the premises to a degree consistent with subsequent use as an unrestricted area and in accordance with the requirements of subsection (ddd) of this section or, for uranium recovery and byproduct material disposal facilities licensed in accordance with §289.260 of this title, subsection (eee) of this section.

(ddd) Radiological requirements for license termination.

(1) General provisions and scope.

(A) The requirements in this section apply to the decommissioning of facilities licensed in accordance with §289.252 of this title (relating to Licensing of Radioactive Material), §289.254 of this title (relating to Licensing of Radioactive Waste Processing and Storage Facilities), §289.255 of this title (relating to Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography), and §289.258 of this title (relating to Licensing and Radiation Safety Requirements for Irradiators). The requirements do not apply to uranium recovery and byproduct material disposal facilities already subject to the requirements of §289.260 of this title (relating to Licensing of Uranium Recovery and Byproduct Material Disposal Facilities).

(B) The requirements in this section do not apply to the following:

(*i*) sites that have been decommissioned prior to October 1, 2000, **[the effective date of the rule]** in accordance with requirements identified in this section and in §289.252 of this title; or

(*ii*) sites that have previously submitted and received approval on a decommissioning plan by October 1, 2000 **[the effective date of the rule]**.

(C) After a site has been decommissioned and the license terminated in accordance with the requirements in the subsection, the agency will require additional cleanup if **[only if, based on new information,]** it determines that the requirements of the subsection were not met and residual radioactivity remaining at

the site could result in significant threat to public health and safety.

(D) When calculating TEDE to the average member of the critical group, the licensee shall determine the peak annual TEDE dose expected within the first 1,000 years after decommissioning.

(2) Radiological requirements for unrestricted use. A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are ALARA. Determination of the levels that are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal.

(3) Alternate requirements for license termination.

(A) The agency may terminate a license using alternate requirements greater than the dose requirements specified in paragraph (2) of this subsection if the licensee does the following:

(*i*) provides assurance that public health and safety would continue to be protected, and that it is unlikely that the dose from all man-made sources combined, other than medical, would be more than the 1 mSv per year (100 mrem per year) limit specified in subsection (o) of this section, by submitting an analysis of possible sources of exposure;

(*ii*) reduces doses to ALARA levels, taking into consideration any detriments such as traffic accidents expected to potentially result from decontamination and waste disposal; and

(*iii*) has submitted a decommissioning plan to the agency indicating the licensee's intent to decommission in accordance with the requirements in §289.252(l)(7) of this title, and specifying that the licensee proposes to decommission by use of alternate requirements. The licensee shall document in the decommissioning plan how the advice of individuals and institutions in the community who may be affected by the decommissioning has been sought and addressed, as appropriate, following analysis of that advice. In seeking such advice, the licensee shall provide for the following:

(*I*) participation by representatives of a broad cross section of community interests who may be affected by the decommissioning;

(*II*) an opportunity for a comprehensive, collective discussion on the issues by the participants represented; and

(*III*) a publicly available summary of the results of all such discussions, including a description of the individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants on the issues.

(B) The use of alternate requirements to terminate a license requires the approval of the agency after consideration of the agency's recommendations that will address any comments provided by the EPA and any public comments submitted in accordance with paragraph (4) of this subsection.

(4) Public notification and public participation. Upon receipt of a decommissioning plan from the licensee, or a proposal from the licensee for release of a site in accordance with paragraph (3) of this subsection, or whenever the agency deems such notice to be in the public interest, the agency will do the following:

(A) notify and solicit comments from the following:

(*i*) local and state governments in the vicinity of the site and any Indian Nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning; and

(*ii*) the EPA for cases where the licensee proposes to release a site in accordance with paragraph (3) of this subsection; and

(B) publish a notice in the *Texas Register* and a forum, such as local newspapers, letters to state of local organizations, or other appropriate forum, that is readily accessible to individuals in the vicinity of the site, and solicit comments from affected parties.

(5) Minimization of contamination. Applicants for licenses, other than renewals, after October 1, 2000, **[the effective date of the rule]** shall describe in the application how facility design and procedures for operation will minimize, to the extent practical, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practical, the generation of LLRW.

(eee) Limits for contamination of soil, surfaces of facilities and equipment, and vegetation.

(1) No licensee shall possess, receive, use, or transfer radioactive material in such a manner as to cause contamination of surfaces of facilities or equipment in unrestricted areas to the extent that the contamination exceeds the limits specified in subsection (ggg)(6) of this section.

(2) No licensee shall possess, receive, use, or transfer radioactive material in such a manner as to cause contamination of soil in unrestricted areas, to the

extent that the contamination exceeds, on a dry weight basis, the concentration limits specified in:

(A) subsection (ggg)(8) of this section; or

(B) the effluent concentrations in Table II, Column 2 of subsection (ggg)(2)(F) of this section, with the units changed from microcuries per milliliter to microcuries per gram, for radionuclides not specified in subsection (ggg)(8) of this section or paragraph (4) of this subsection.

(3) Where combinations of radionuclides are involved, the sum of the ratios between the concentrations present and the limits specified in paragraph (2) of this subsection shall not exceed one.

(4) Notwithstanding the limits specified in paragraph (2) of this subsection, no licensee shall cause the concentration of radium-226 or radium-228 in soil in unrestricted areas, averaged over any 100 square meters (m^2), to exceed the background level by more than:

(A) 5 picocuries per gram (pCi/g) (0.185 becquerel per gram (Bq/g)), averaged over the first 15 cm of soil below the surface; and

(B) 15 pCi/g (0.555 Bq/g), averaged over 15 cm thick layers of soil more than 15 cm below the surface.

(5) No licensee shall possess, receive, use, or transfer radioactive material in such a manner as to cause contamination of vegetation in unrestricted areas to exceed 5 pCi/g (0.185 Bq/g), based on dry weight, for radium-226 or radium-228.

(6) Notwithstanding the limits specified in paragraph (2) of this subsection, no licensee shall cause the concentration of natural uranium with no daughters present, based on dry weight and averaged over any 100 m^2 of area, to exceed the following limits:

(A) 30 pCi/g (1.11 Bq/g), averaged over the top 15 cm of soil below the surface; and

(B) 150 pCi/g (5.55 Bq/g), average concentration at depths greater than 15 centimeters below the surface so that no individual member of the public will receive an effective dose equivalent in excess of 100 mrem (1 mSv) per year.

(fff) Exemption of specific wastes.

(1)-(3) (No change.)

(4) Any licensee may, upon agency approval of procedures required in paragraph (6) of this subsection, discard licensed material included in subsection (ggg)(7) of this section, provided that it does not exceed the concentration and total curie limits contained therein, in a Type I municipal solid waste site as defined in the Municipal Solid Waste Regulations of the authorized regulatory agency (31 Texas Administrative Code Chapter 330), unless such licensed material also contains hazardous waste, as defined in Section 3(15) of the Solid Waste Disposal Act, Health and Safety Code, Chapter 361. Any licensed material included in subsection (ggg)(7) of this section and which is a hazardous waste as defined in the Solid Waste Disposal Act may be discarded at a facility authorized to manage hazardous waste by the authorized regulatory agency.

(5)-(9) (No change.)

(ggg) Appendices.

(1) Protection factors for respirators. The following table contains protection factors for respirators[a]:

Figure: 25 TAC §289.202(ggg)(1)

(2)-(6) (No change.)

(7) Concentration and activity limits of nuclides for disposal in a Type I municipal solid waste site or a hazardous waste facility (for use in subsection (fff) of this section). The following table contains concentration and activity limits of nuclides for disposal in a Type I municipal solid waste site or a hazardous waste facility.

Figure: 25 TAC §289.202(ggg)(7)

(8) (No change.)

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(9) Cumulative occupational exposure form. The following, BRC Form 202-2, is to be used to document cumulative occupational exposure history: (Please find BRC Form 202-2 at the end of this section.)

Figure: 25 TAC §289.202(ggg)(9)

(10) Occupational exposure form. The following, BRC Form 202-3, is to be used to document occupational exposure record for a monitoring period: (Please find BRC Form 202-3 at the end of this section.)

Figure: 25 TAC §289.202(ggg)(10)

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LEGEND: (Final Amendment - With additional changes not proposed)
Double Underline = New language not proposed
[Bold, underline, and brackets] = Proposed new language now being deleted
Regular Print = Current language
(No change.) = No changes are being considered for the designated subdivision

§289.257 Packaging and Transportation of Radioactive Material.

(a) Purpose.

(1) (No change.)

(2) The packaging and transport of radioactive material are also subject to the requirements of **[§289.112 of this title (relating to Hearing and Enforcement Procedures), §289.114 of this title (relating to Notices, Instructions, and Reports to Workers; Inspections),]** §289.201 of this title (relating to General Provisions), §289.202 of this title (relating to Standards for Protection Against Radiation), §289.203 of this title (relating to Notices, Instructions, and Reports to Workers; Inspections), §289.204 of this title (relating to Fees for Certificates of Registration, Radioactive Material(s) Licenses, Emergency Planning and Implementation, and Other Regulatory Services), §289.205 of this title (relating to Hearing and Enforcement Procedures), §289.251 of this title (relating to Exemptions, General Licenses, and General License Acknowledgements), §289.252 of this title (relating to Licensing of Radioactive Material), **[and]** §289.254 of this title (relating to Licensing of Radioactive Waste Processing and Storage Facilities), and §289.260 of this title (relating to Licensing of Uranium Recovery and Byproduct material Disposal Facilities) and to the regulations of other agencies (e.g., the United States Department of Transportation (DOT) and the United States Postal Service) having jurisdiction over means of transport. The requirements of this section are in addition to, and not in substitution for, other requirements.

(b)-(c) (No change.)

(d) Definitions. The following words and terms when used in this section shall have the following meaning unless the context clearly indicates otherwise. To ensure compatibility with international transportation standards, all limits in this section are given in terms of dual units: The International System of Units (SI) followed or preceded by United States (U.S.) standard or customary units. The U.S. customary units are not exact equivalents, but are rounded to a convenient value, providing a functionally equivalent unit. For the purpose of this section, SI units shall be used.

(1)-(2) (No change.)

(3) BRC Forms 540, 540A, 541, 541A, 542, and 542A - Official agency

forms referenced in subsection (s)(5) of this section which includes the information required by DOT in 49 Code of Federal Regulations (CFR) Part 172. BRC Form 541B contains additional information for LLRW shipments to a Texas LLRW disposal facility. Licensees need not use originals of these forms as long as any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information. Upon agreement between the shipper and consignee, BRC Forms 541 (and 541A and 541B) and BRC Forms 542 (and 542A) may be completed, transmitted, and stored in electronic media. The electronic media must have the capability for producing legible, accurate, and complete records in the format of the uniform manifest.

[(3) Authority - The Texas Low-Level Radioactive Waste Disposal Authority (TLLRWDA).]

(4)-(18) (No change.)

(19) 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 10 CFR Part 61.2; and

(iii) subject to:

(I) concentration limits established in 10 CFR Part 61.55, or compatible rules adopted by the agency or the Texas Natural Resource Conservation Commission (TNRCC), as applicable; and

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

(B) LLRW does not include:

(i) high-level radioactive waste as defined in 10 CFR Part 60.2;

(ii) spent nuclear fuel as defined in 10 CFR Part 72.3;

(*iii*) byproduct material defined in the Act, §401.003(3)(B);

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

(*v*) oil and gas NORM waste.

[(19) Low-level radioactive waste (LLRW) - Waste containing radioactive material that:]

[(A) is acceptable for disposal in a LLRW disposal facility;]

[(B) is subject to the disposal criteria and concentration limits established by the agency or the commission;]

[(C) is discarded or unwanted and is not exempt by agency rule adopted under Section 401.106; and]

[(D) does not include:]

[(*i*) irradiated reactor fuel, high level radioactive waste, or spent nuclear fuel as defined by 10 CFR Part 61;]

[(*ii*) 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; or]

[(*iii*) NORM waste or oil and gas NORM waste.]

(20)-(28) (No change.)

(29) Shipper - The licensed entity (i.e., the waste generator, waste collector, or waste processor) who offers LLRW for transportation, typically consigning this type of waste to a licensed waste collector, waste processor, or land disposal facility operator. This definition applies only to shipments of LLRW shipped to a **[the]** Texas LLRW disposal facility.

(30)-(32) (No change.)

[(33) BRC Forms 540, 540A, 541, 541A, 542, and 542A - Official agency forms referenced in subsection (s)(5) of this section which includes the information required by DOT in 49 CFR Part 172. BRC Form 541B contains additional information for LLRW shipments to the Texas LLRW disposal facility.

Licensees need not use originals of these forms as long as any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information. Upon agreement between the shipper and consignee, BRC Forms 541 (and 541A and 541B) and BRC Forms 542 (and 542A) may be completed, transmitted, and stored in electronic media. The electronic media must have the capability for producing legible, accurate, and complete records in the format of the uniform manifest.]

(33) **[(34)]** Uniform Low-Level Radioactive Waste Manifest or uniform manifest - The combination of BRC Forms 540, 541, and, if necessary, 542, and their respective continuation sheets as needed, or equivalent.

(34) **[(35)]** Uranium - Natural, depleted, enriched:

(A) Natural uranium - Uranium with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium-235, and the remainder by weight essentially uranium-238).

(B) Depleted uranium - Uranium containing less uranium-235 than the naturally occurring distribution of uranium isotopes.

(C) Enriched uranium - Uranium containing more uranium-235 than the naturally occurring distribution of uranium isotopes.

(35) **[(36)]** Waste collector - An entity, operating under a NRC, agreement state, or agency license, whose principal purpose is to collect and consolidate waste generated by others, and to transfer this waste, without processing or repackaging the collected waste, to another licensed waste collector, licensed waste processor, or licensed land disposal facility.

(36) **[(37)]** Waste description - The physical, chemical and radiological description of a LLRW as called for on BRC Form 541.

(37) **[(38)]** Waste generator - An entity, operating under a NRC, agreement state, or agency license, who:

(A) possesses any material or component that contains radioactivity or is radioactively contaminated for which the licensee foresees no further use; and

(B) transfers this material or component to a licensed land disposal facility or to a licensed waste collector or processor for handling or treatment prior to disposal. A licensee performing processing or decontamination services may be a waste generator if the transfer of LLRW from its facility is defined as residual

waste.

(38) **[(39)]** Waste processor - An entity, operating under a NRC or agreement state license, whose principal purpose is to process, repackage, or otherwise treat LLRW or waste generated by others prior to eventual transfer of waste to a licensed LLRW land disposal facility.

(39) **[(40)]** Waste type - A waste within a disposal container having a unique physical description (i.e., a specific waste descriptor code or description; or a waste sorbed on or solidified in a specifically-defined **[specifically defined]** media).

(e) Transportation of radioactive material.

(1) Each licensee who transports radioactive material outside the site of usage as specified in the agency license, transports on public highways, or delivers radioactive material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 170-189 and 397 appropriate to the mode of transport. The licensee shall comply with the following, particularly noting DOT regulations as applicable in the following areas:

(A) Packaging - 49 CFR Part 173: Subparts A, B, and I.

(B) Marking and labeling - 49 CFR Part 172: Subpart D, §§172.400 - 172.407, §§172.436 - 172.440, and Subpart E.

(C) Placarding - 49 CFR Part 172: Subpart F, especially §§172.500 - 172.519, §172.556, and Appendices B and C.

(D) Accident reporting - 49 CFR Part 171: §171.15 and §171.16.

(E) Shipping papers and emergency information - 49 CFR Part 172: Subparts C and G.

(F) Hazardous material employee training - 49 CFR Part 172: Subpart H.

(G) Hazardous material shipper/carrier registration - 49 CFR Part 107: Subpart G.

(H) Routing - 49 CFR Part 397: Subpart D.

(2) (No change.)

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(f) (No change.)

(g) General license.

(1) NRC-approved package.

(A)-(C) (No change.)

(D) For radiography containers, a program for transport container inspection and maintenance limited to radiographic exposure devices, source changers, or packages transporting these devices and meeting the requirements of §289.255(i)(2)(B) of this title (relating to Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography), is deemed to satisfy the requirements of subparagraph (B) of this paragraph.

(2)-(4) (No change.)

(h)-(q) (No change.)

(r) Fees.

(1) Each shipper shall be assessed a fee for shipments of LLRW originating in Texas or out-of-state being shipped to a licensed Texas LLRW disposal facility and these fees shall be:

(A) (No change.)

(B) collected by the Commission **[Authority]** and deposited to the credit of the radiation and perpetual care fund; and

(C) (No change.)

(2)-(3) (No change.)

(s) (No change.)