

The Texas Natural Resource Conservation Commission (TNRCC or commission) adopts the amendments to §336.2, Definitions; §336.305, Occupational Dose Limits for Adults; §336.307, Determination of External Dose from Airborne Radioactive Material; §336.310, Planned Special Exposures; §336.312, Dose Equivalent to an Embryo/Fetus; §336.315, General Requirements for Surveys and Monitoring; §336.316, Conditions Requiring Individual Monitoring of External and Internal Occupational Dose; §336.319, Use of Process or Other Engineering Controls; §336.320, Use of Other Controls; §336.321, Use of Individual Respiratory Protection Equipment; §336.322, Further Restrictions on the Use of Respiratory Protection Equipment; §336.335, Reporting Requirements for Incidents; §336.341, General Recordkeeping Requirements for Licensees; §336.346, Records of Individual Monitoring Results; §336.358, Appendix A. Assigned Protection Factors for Respirators; §336.359, Appendix B. Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage; and §336.611, Public Notification and Public Participation. The commission is also adopting the repeal of Subchapter I, §336.801, Purpose and Scope; §336.802, Definitions; §336.803, Financial Assurance Requirements; §336.804, Financial Assurance Mechanisms; §336.805, Long-Term Care Requirements; §336.806, Wording of Financial Assurance Mechanisms; and §336.807, Appendix A. Wording of Financial Assurance Instruments. The amendments to §§336.2, 336.305, 336.307, 336.310, 336.312, 336.315, 336.316, 336.319 - 336.322, 336.335, 336.341, 336.346, 336.358, 336.359, and 336.611 and the repeal of §§336.801 - 336.807 are adopted without changes to the proposal as published in the June 8, 2001 issue of the *Texas Register* (26 TexReg 4052) and will not be republished.

BACKGROUND AND SUMMARY OF THE FACTUAL BASIS FOR THE ADOPTED RULES

Nearly all of the amendments to this chapter were derived from three United States Nuclear Regulatory Commission (NRC) rulemakings: 1.) Respiratory Protection and Controls to Restrict Internal Exposures, October 7, 1999 (64 FR 54543), and October 13, 1999 (64 FR 55524), effective February 4, 2000; 2.) Minor Corrections, Clarifying Changes, and a Minor Policy Change, July 23, 1998 (63 FR 39477), and August 26, 1998 (63 FR 45393), effective October 26, 1998; and, to a very limited extent, 3.) Resolution of Dual Regulation of Airborne Effluents of Radioactive Materials; Clean Air Act, December 10, 1996 (61 FR 65119), effective January 9, 1997, which was revisited to add a definition inadvertently omitted in an earlier rulemaking (in 1998). The commission must incorporate NRC rulemakings into its rules to preserve the status of Texas as an Agreement State authorized to administer a portion of the radiation control program in this state. NRC rules must be incorporated into the commission's rules within three years of their effective date.

The amendments from NRC's "Respiratory Protection and Controls to Restrict Internal Exposures" rulemaking make the regulations more consistent with the philosophy of controlling the sum of internal and external radiation exposure and reflect current guidance on respiratory protection from the American National Standards Institute (ANSI). The amendments are also consistent with recently effective revisions to the Occupational Safety and Health Administration's (OSHA's) respiratory protection rule and make requirements for radiological protection less prescriptive, while reducing unnecessary regulatory burden, without reducing worker protection. The amendments provide greater assurance that worker doses will be maintained as low as is reasonably achievable and that recent

technological advances in respiratory protection equipment and procedures are reflected in the regulations and clearly approved for use by licensees.

The amendments from NRC's "Minor Corrections, Clarifying Changes, and a Minor Policy Change" rulemaking make minor corrections and clarifying changes and are also intended to conform with the NRC's revised radiation protection standards. In addition, the rulemaking includes a minor policy change that raises the criteria for placement of monitoring devices on minors from 0.05 rem to 0.1 rem in a year and on declared pregnant women from 0.05 rem to 0.1 rem during their pregnancies. The 0.1 rem deep dose equivalent monitoring criterion represents a quantity more consistent with the measurement sensitivity of individual monitoring devices. (Minor Corrections, Clarifying Changes, and a Minor Policy Change, July 23, 1998 (63 FR 39478)). The NRC determined that the current criterion of 0.05 rem, if received uniformly in a year or throughout the gestation period, would result in an average monthly dose of less than 0.005 rem, and that the most routinely utilized monitoring devices cannot accurately measure doses below 0.01 rem, which is greater than the average monthly dose of 0.005 rem. These changes to the threshold for monitoring exposures to radiation and radioactive material do not change the total occupational dose limits for minors or declared pregnant women of 0.5 rem.

Lastly, the definition for "constraint (dose constraint)" from NRC's "Resolution of Dual Regulation of Airborne Effluents of Radioactive Materials; Clean Air Act" rulemaking was inadvertently omitted from a previous commission rulemaking (August 28, 1998 issue of the *Texas Register* (23 TexReg 8837)) and needs to be incorporated now to assure compatibility with the NRC regulations.

The commission also adopts in 30 Texas Administrative Code (TAC) Chapter 336, Radioactive Substance Rules, an update to one cross-reference in Subchapter D, an update to one cross-reference in Subchapter G, and a repeal of Subchapter I, which was made obsolete when its requirements were previously incorporated into 30 TAC Chapter 37, Subchapters S and T.

SECTION BY SECTION DISCUSSION

Subchapter A, General Provisions

All of the changes adopted in Subchapter A are derived from the federal rule changes.

The amendments to §336.2 are adopted to make it compatible with the latest version of Title 10 Code of Federal Regulations (CFR) §20.1003. New federal definitions are added for “Air-purifying respirator,” “Assigned protection factor (APF),” “Atmosphere-supplying respirator,” “Constraint (dose constraint),” “Demand respirator,” “Disposable respirator,” “Filtering facepiece (dust mask),” “Fit factor,” “Fit test,” “Helmet,” “Hood,” “Lens dose equivalent (LDE),” “Loose-fitting facepiece,” “Negative pressure respirator (tight fitting),” “Positive pressure respirator,” “Powered air-purifying respirator (PAPR),” “Pressure demand respirator,” “Qualitative fit test (QLFT),” “Quantitative fit test (QNFT),” “Self-contained breathing apparatus (SCBA),” “Supplied-air respirator (SAR) or airline respirator,” “Tight-fitting facepiece,” and “User seal check (fit check).” Also, per the NRC rules, the commission adopts the amendment of the definitions of “Declared pregnant woman,” “High radiation area,” “Individual monitoring devices,” and “Very high radiation area,” and the deletion of the definition of “Eye dose equivalent.” The new definition of “Constraint (dose constraint)” is added to make it clear that although a constraint is not the same as a limit, licensees are expected to develop

radiation programs to ensure that doses from air emissions are below ten mrem per year. The definition of “Declared pregnant woman” is revised to specify that the written declaration of pregnancy is to be given to the licensee rather than to the employer, unless the employer is also the licensee. This is necessary to ensure that the entity responsible for work assignments involving radiation exposure, the licensee, is aware of the declaration of pregnancy to facilitate timely and appropriate protective action. The revision also specifies that the declaration, as well as associated dose restrictions, remain in effect until withdrawn in writing or until the woman is no longer pregnant. The determination that a declared pregnant woman is no longer pregnant should be based on a discussion between the declared pregnant woman and the licensee. The definitions of “High radiation area” and “Very high radiation area” are revised to make it clear that these area designations exist solely to note radiation levels from sources external to an individual who may receive the dose. The existing definition of “Eye dose equivalent (EDE)” is deleted and replaced by the new definition of “Lens dose equivalent (LDE)” to avoid confusion between the acronyms for dose to the lens of the eye (EDE) and effective dose equivalent (EDE). This should pose no procedural burden on licensees because the required NRC Forms 4 and 5 for records and reports were revised in August 1995 to reflect the new terminology, and these forms or their equivalents are required to be used by the existing rules.

Subchapter D, Standards for Protection Against Radiation

All of the changes adopted in Subchapter D are derived from the federal rule changes, except the cross-reference update in §336.359.

Section 336.305(a)(2)(A) is amended by replacing the words “an eye” with the words “a lens.” This change is consistent with the previously adopted deletion of the definition of “Eye dose equivalent (EDE)” and its replacement by the new definition of “Lens dose equivalent (LDE)” in §336.2 to avoid confusion between the acronyms for dose to the lens of the eye (EDE) and effective dose equivalent (EDE). Section 336.305(c) is amended by changing "shall" to "must" for better readability and changing "eye" to "lens" for consistency with the change to §336.305(a)(2)(A). These changes will also update this section to make it consistent with the latest version of 10 CFR §20.1201.

Section 336.307(a) is amended in the second line to replace “eye” with “lens” for the same reason given in the discussion of §336.305(a)(2)(A) and to update this section to be consistent with the latest version of 10 CFR §20.1203.

Section 336.310(1) is amended by changing “higher exposure” to “dose estimated to result from the planned special exposure.” This amendment is intended to clarify what was intended by the words “higher exposure” used in the rule previously. The phrase applies to dose estimates performed prior to authorizing the planned special exposure (PSE). The new wording states that PSE’s are authorized only in exceptional situations when alternatives that might avoid the dose estimated to result from the PSE are unavailable or impractical. Improved clarification will avoid possible misinterpretation of a PSE criterion. This change will also make this section compatible with the latest version of 10 CFR §20.1206.

Section 336.312 title is changed to “Dose Equivalent to an Embryo/Fetus” to make it clear that the dose limit specifically applies to the dose equivalent, which is the technically correct term to denote effect of dose to an organ. Subsection (c)(2) is amended by adding the word “resulting” in front of the word “from” for greater clarity. Subsection (d) is amended by moving the phrase “by the time the woman declares pregnancy to the licensee” for greater clarity, by adding “equivalent” after the word “dose” in two places to use the technically correct expression “dose equivalent,” and by changing “has exceeded” to “is found to have exceeded” for greater clarity. These changes will also make this section compatible with the latest version of 10 CFR §20.1208.

Section 336.315 is amended to be consistent with the latest version of 10 CFR §20.1501. Subsection (a)(2)(A) is amended by adding at the beginning the words “magnitude and extent of” in front of “radiation levels” to clarify the intended meaning that surveys should evaluate both the area covering the dose field as well as the amount of dose in that area; and subsection (a)(2)(C) is amended by deleting the unnecessary words “that could be present.”

Section 336.316 is amended to make it consistent with the latest version of 10 CFR §20.1502. In paragraph (1), the words “from licensed and unlicensed radiation sources under the control of the licensee” are added after “exposure to radiation” to improve clarity and to make it clear that, in determining whether or not monitoring is required, a licensee need not take into account sources of radiation not under its control. In paragraphs (1) and (2), the criteria for monitoring minors and declared pregnant women in subparagraphs (B) are separated into two subparagraphs, (B) and new (C), and amended to make them consistent with §336.312 and technically correct. The criteria for

monitoring the deep dose equivalent are changed for minors and declared pregnant women from 0.05 rem to 0.1 rem. (Minor Corrections, Clarifying Changes, and a Minor Policy Change, July 23, 1998 (63 FR 39478)). The 0.1 rem in a year deep dose equivalent monitoring criterion is consistent with the public dose limit and is more consistent with the measurement sensitivity of individual monitoring devices. The NRC determined that the current criteria of 0.05 rem, if received uniformly in a year or throughout the gestation period would result in an average monthly dose of less than 0.005 rem, and that the most routinely utilized monitoring devices cannot accurately measure doses below 0.01 rem, which is greater than the average monthly dose of 0.005 rem. Changing the criteria for monitoring does not, in any way, change the dose limits for declared pregnant women, for the embryo/fetus, or for minors. This change constitutes a small licensee burden reduction while maintaining the current adequate level of protection of health and safety of minors and declared pregnant women.

Section 336.319 is amended by adding "decontamination" to the list of examples of process or engineering controls that licensees should consider for controlling the concentration of radioactive material in air. The NRC and the commission intend that licensees consider decontamination, consistent with maintaining total effective dose as low as reasonably achievable, to reduce resuspension of radioactive material in the work places as a means of controlling internal dose instead of using respirators. This amendment will make this section compatible with the latest version of 10 CFR §20.1701.

Section 336.320 is amended to add a subsection (b) to the section. This new subsection is added to clarify that if a licensee performs an as low as reasonably achievable dose analysis to determine whether

or not respirators should be used, the licensee may consider safety factors other than radiological. A reduction in the total effective dose equivalent for a worker is not reasonably achievable if, in the licensee's judgment, an attendant increase in the worker's industrial health and safety risk would exceed the benefit obtained by the reduction in the radiation risk. The NRC's Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," and NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Material" address how factors such as heat, discomfort, reduced vision, etc., associated with respirator use, might reduce efficiency or increase stress thereby increasing health risk. The NRC and the commission expect that licensees will exercise judgment in determining how non-radiological factors apply to selecting an appropriate level of respiratory protection. This new subsection will make this section compatible with the latest version of 10 CFR §20.1702.

Section 336.321 is amended to make it consistent with the latest version of 10 CFR §20.1703 and §20.1705. This section states the requirements for licensees who use respiratory protection equipment to limit intakes of radioactive material. The use of a respirator is, by definition, intended to limit intake of airborne radioactive materials, unless the device is clearly and exclusively used for protection against non-radiological airborne hazards. Whether or not credit is taken for the device in estimating doses, use of the respiratory protection device to limit intake of radioactive material and associated physiological stresses to the user activates the requirements of §336.321. Thus, this section defines the minimum respiratory protection program expected of any licensee who assigns or permits the use of respirators to limit intake.

Section 336.321(a) is amended to change “licensee uses respiratory protection equipment” to “licensee assigns or permits the use of respiratory equipment” to make it clear when this sections applies. This subsection is also amended to delete the reference to §336.320 because this language has been misinterpreted at times to mean that an approved respiratory protection program is not needed if respirators are used when concentrations of radioactive material in the air are already below values that define an airborne radioactivity area. The new language makes it clear that, if a licensee uses respiratory protection equipment to limit intakes, the minimum requirements of this section are applicable.

In §336.321(a)(1), the language is amended to add the acronym “NIOSH” and to delete “and the Mine Safety and Health Administration (NIOSH/MSHA)” so that licensees are permitted to use only respirators certified by the National Institute for Occupational Safety and Health.

Section 336.321(a)(2) is amended to delete “NIOSH/MSHA and has not had certification extended by NIOSH/MSHA” because all existing extensions have expired and no new extensions will be granted except for classes of respirators certified under 42 CFR Part 84 and to be consistent with the previous deletion of the Mine Safety and Health Administration as a respirator certifier. Also, further clarification of the language is adopted, including deletion of “including a demonstration by testing, or a demonstration on the basis of reliable test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use” and addition of “The application must include evidence that the material and performance characteristics of the equipment are capable of providing the proposed degree of

protection under anticipated conditions of use. This must be demonstrated either by licensee testing or on the basis of reliable test information.”

In §336.321(a)(3)(A) - (E), minor editing is adopted. Subparagraph (D) is amended to improve clarity, reorder priorities, and bring together in one subparagraph all of the elements required in written procedures. Subparagraph (E) is amended to clarify that the worker’s medical evaluation for using non-face sealing respirators occurs before the first field use, not before first fitting (as required for tight fitting respirators) because fit testing is not needed for these types.

Section 336.321(a)(3)(F) is added to require fit testing before first field use of tight-fitting, face sealing respirators and periodically after the first use. This new language clarifies when and how often fit testing is required. The NRC and the commission require that the licensee specify a frequency of retest in the procedures, that may not exceed one year. The new language also specifies existing NRC staff guidance and ANSI recommendations regarding the test “fit factors” that must be achieved to use the assigned protection factors (APFs). Specifically, fit testing with “fit factors” greater than or equal to ten times the APF is required for tight fitting, negative pressure devices. A fit factor greater than or equal to 500 is required for all tight fitting face pieces used with positive pressure, continuous flow, and pressure-demand devices. ANSI recommended a fit factor of 100 for these devices, but OSHA selected 500 to provide an additional safety margin. The NRC agrees with the OSHA position and, in the interest of consistency, this fit factor is specified as 500. This provision is intended to maintain a sufficient margin of safety to accommodate the greater difficulty in maintaining a good “fit” under field and work conditions as compared to fit test environments. It is important to note that all tight fitting

facepieces are to be fit tested in the negative pressure mode regardless of the mode in which they will be used.

Section 336.321(a)(4) is deleted because it is not needed. All of the elements that were required to be in the policy statement are already found in Subchapter D and in the requirement for licensees to have and implement written procedures in §336.321(3)(D).

Newly renumbered §336.321(a)(5) is clarified and expanded to emphasize the existing requirements that provisions be made for vision correction, adequate communications, and low-temperature work environments. A licensee is required to account for the effects of adverse environmental conditions on the equipment and the wearer. The NRC considers the inability of the respirator wearer to read postings, to operate equipment and/or instrumentation, and to properly identify hazards to be an unacceptable degradation of personnel safety. Also, a requirement for licensees to consider low-temperature work environments when selecting respiratory protection devices is added. The NRC believes that this requirement is needed because the moisture from exhaled air when temperatures are below freezing could cause the exhalation valve on negative pressure respirators to freeze in the open position. The open valve would provide a pathway for unfiltered air into the respirator inlet covering without the user being aware of the malfunction. Lens fogging that reduces vision in a full facepiece respirator is another problem that can be caused by low temperature. The reference to adequate skin protection has been removed. The NRC does not consider skin protection to be an appropriate reason for the use of respirators (with the exception of air supplied suits). Limitation of skin dose is currently dealt with elsewhere in the regulations (in §336.305). It may be inconsistent with maintaining the dose

as low as reasonably achievable to use tight fitting respirators solely to prevent facial contamination. Other protective measures such as the use of faceshields instead of respirators or decontamination should be considered.

Section 336.321(b) is amended by deleting existing obsolete language in subsection (b)(1), by moving the language in subsection (b)(2) to new subsection (f), and by adding a new requirement for standby rescue persons. This new language requires standby rescue persons to be present whenever one-piece atmosphere-supplying suits, or any other combination of supplied air respirator device and protective equipment is used that is difficult for the wearer to take off without assistance. Standby rescue persons would also need to be in continuous communication with the workers, be equipped with appropriate protective clothing and devices and be immediately available to provide needed assistance if the air supply fails. Without continuous air supply, unconsciousness can occur within seconds to minutes.

Section 336.321(c) is amended by deleting existing obsolete language and adding new language. The new language specifies the minimum quality of supplied breathing air, as defined by the Compressed Gas Association (CGA) in their publication G-7.1, "Commodity Specification for Air," 1997, that must be provided whenever atmosphere-supplying respirators are used. This change, which recognizes the CGA recommendations for air quality, was initiated by NIOSH and endorsed by ANSI. The quantity of air supplied, as a function of air pressure or flow rate, would be specified in the NIOSH approval certificate for each particular device and is not addressed in the rule.

Section 336.321(d) is amended by deleting existing obsolete language and adding new language. The new language prohibits the use of respirators whenever any objects, materials, or substances such as facial hair, or any other conditions interfere with the seal of the respirator. The intent of this provision is to prevent the presence of facial hair, cosmetics, spectacle earpieces, surgeon's caps, and other things from interfering with the respirator seal, exhalation valves, and/or proper operation of the respirator.

New §336.321(e) is amended to provide the provisions for changing intake estimates if later, more accurate measurements show that intake was greater or less than initially estimated. Protection factors for use in these calculations are specified in §336.358 (relating to Appendix A. Assigned Protection Factors for Respirators).

New §336.321(f) is amended to contain language moved from deleted §336.321(b)(2) with slight modification, such as changing "commission" to "executive director." This amendment provides compatibility with NRC regulations in 10 CFR §20.1705 in that the authorization for a licensee to assign respiratory protection factors in excess of those specified in §336.358 does not require an amendment of the license. The amendment clarifies that the authorization may be approved by the executive director. The licensee may file with the chief clerk a motion to overturn, under §50.139(b) - (g) of this title (relating to Motion to Overturn Executive Director's Decision), of the executive director's decision on an application for authorization to use higher assigned protection factors.

Section 336.322(1) is amended to clarify that the commission will use "keeping doses as low as reasonably achievable" considerations in any additional restrictions imposed by the commission on the

use of respiratory protection equipment for the purpose of limiting exposures of individuals to airborne radioactive materials. This amendment will also make this section consistent with the latest version of 10 CFR §20.1704.

Section 336.335 is amended to make it consistent with the latest version of 10 CFR §20.2202.

Subsections (a)(1)(B) and (b)(1)(B) are amended by changing “eye dose equivalent” to “lens dose equivalent” to be consistent with previous similar changes.

Section 336.341 is amended to make it consistent with the latest version of 10 CFR §20.2101. A new subsection (b) is added to permit licensees to add the new International System of Units (SI) units to the old (special) units of dose on records required by this chapter. Each of the recorded dose quantities is to be recorded in the appropriate special unit and, if so desired, followed by the appropriate SI unit in parentheses. Also, in newly designated subsection (d), “eye dose equivalent” is replaced by “lens dose equivalent” to be consistent with previous similar changes. Subsequent subsections are renumbered to account for the addition of the new subsection and in new subsection (c) the SI acronym is now used rather than first defining the SI acronym here.

Section 336.346 is amended to make it consistent with the latest version of 10 CFR §20.2106. In subsection (a)(1), “eye dose equivalent” is changed to “lens dose equivalent” to be consistent with previous similar changes. Also, in subsection (a)(2) and (3), the words “or body burden” are deleted because this expression is now obsolete. Subsection (a)(4) is amended by adding a reference to §336.308(a), that requires licensees to take measurements of: 1.) concentrations of radioactive

materials in air in work areas; or 2.) quantities of radionuclides in the body; or 3.) quantities of radionuclides excreted from the body; or 4.) combinations of these measurements to determine internal dose. This, in effect, uses recorded concentrations of radioactive material in the air, quantities of radioactive material determined to be in the body or excreta, or any combination of these that would be needed, for assessing the committed effective dose equivalent (CEDE). The NRC believes that this information is necessary to support the recorded results of the licensee's calculation of CEDE. Adding this reference would not impose any additional record keeping burden on licensees because they are required to obtain this information to calculate CEDE under §336.308. Section 336.316 is added as a reference to indicate when assessment of committed effective dose is required.

Section 336.358 is amended to make it consistent with the latest version of 10 CFR Part 20, Appendix A. The title is amended to add "Assigned" before "Protection Factors." A new version of the figure contained in §336.358, Appendix A, which has been modified extensively, is substituted for the old version. In the new figure, new devices are recognized, assigned protection factors are revised to be consistent with current ANSI guidance and technical knowledge, and the footnotes to Appendix A are moved elsewhere in the rule, deleted, revised, or adjusted so that only those necessary to explain the table remain.

Section 336.359 title is amended by adding a period after "Appendix B" for punctuation consistency throughout the chapter. Subsection (d) is amended to update the cross-reference to §336.333 to §336.215 because the requirements in §336.333 were moved to §336.215 in a previous rulemaking.

Subchapter G, Decommissioning Standards

Section 336.611 is amended to update the reference to §39.313 to §39.713 because §39.313 was repealed in a previous rulemaking and its requirements moved to §39.713.

Subchapter I, Financial Assurance

Subchapter I is repealed because its requirements were moved to Chapter 37, Subchapters S and T in a previous rulemaking.

FINAL REGULATORY IMPACT ANALYSIS DETERMINATION

The commission reviewed the adopted rulemaking in light of the regulatory analysis requirements of Texas Government Code, §2001.0225, and determined that the rulemaking is not subject to §2001.0225 because it does not meet the definition of a “major environmental rule” as defined in the act. “Major environmental rule” means a rule, the specific intent of which, is to protect the environment or reduce risks to human health from environmental exposure and that may adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state. The adopted amendments to Chapter 336 are not anticipated to adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state because there were no significant requirements added to radioactive material disposal facilities. The adopted rulemaking maintains consistency with NRC requirements and provides clarity to existing rules by updating cross-references and deleting obsolete financial assurance provisions.

Furthermore, the adopted rulemaking does not meet any of the four applicability requirements listed in §2001.0225(a). Section 2001.0225 only applies to a major environmental rule, the result of which is to: 1.) exceed a standard set by federal law, unless the rule is specifically required by state law; 2.) exceed an express requirement of state law, unless the rule is specifically required by federal law; 3.) exceed a requirement of a delegation agreement or contract between the state and an agency or representative of the federal government to implement a state and federal program; or 4.) adopt a rule solely under the general powers of the agency instead of under a specific state law. The adopted rulemaking does not exceed a standard set by federal law, an express requirement of state law, a requirement of a delegation agreement, nor adopt a rule solely under the general powers of the agency.

The Texas Health and Safety Code (THSC), Texas Radiation Control Act (TRCA), Chapter 401, authorizes the commission to regulate the disposal of most radioactive material in Texas. Sections 401.051, 401.103, and 401.104 authorize the commission to adopt rules for the control of sources of radiation and the licensing of the disposal of radioactive materials. In addition, the state of Texas is an Agreement State, authorized by the NRC to administer a radiation control program under the AEA. The NRC requirements must be implemented by the commission to preserve the status as an Agreement State. The commission believes that the adopted rules do not exceed the standards set by federal law. The adopted rulemaking clarifies existing rules, implements changes in federal respiratory protection requirements, and modifies threshold monitoring requirements for minors and declared pregnant women.

The commission believes that the adopted rules do not exceed an express requirement of state law. The THSC, TRCA, Chapter 401, establishes general requirements for the licensing and disposal of radioactive materials. However, the TRCA does not provide specific requirements or technical limitations for respiratory protection or threshold monitoring requirements.

The commission has also determined that the adopted rules do not exceed a requirement of a delegation agreement or contract between the state and an agency of the federal government. The State of Texas has been designated as an Agreement State by the Nuclear Regulatory Commission under the authority of the AEA. The AEA requires that the NRC find that the state radiation control program is compatible with the NRC's requirements for the regulation of radioactive materials and is adequate to protect health and safety. The commission believes that the adopted rules do not exceed the NRC's requirements nor exceed the requirements for retaining status as an Agreement State.

The commission also believes that these rules are adopted under specific authority of the THSC, TRCA, Chapter 401. Sections 401.051, 401.103, and 401.104 authorize the commission to adopt rules for the control of sources of radiation and the licensing of the disposal of radioactive materials.

The commission invited public comment on this regulatory impact determination; however, no public comments were received.

TAKINGS IMPACT ASSESSMENT

The commission evaluated these adopted rules and performed a final assessment of whether Texas Government Code, Chapter 2007 is applicable. The commission's final assessment indicates that Texas Government Code, Chapter 2007 does not apply to these adopted rules because this is an action that is reasonably taken to fulfill an obligation mandated by federal law, which is exempt under Texas Government Code, §2007.003(b)(4). The State of Texas has received authorization as an Agreement State from the NRC to administer a radiation control program under the AEA. The AEA requires the NRC to find that the state's program is compatible with NRC requirements for the regulation of radioactive materials and is adequate to protect health and safety. The adopted rulemaking will provide consistency with federal regulations.

Nevertheless, the commission further evaluated these adopted rules and performed a final assessment of whether these adopted rules constitute a taking under Texas Government Code, Chapter 2007. The following is a summary of that evaluation and final assessment. The primary purpose of these adopted rules is to implement changes to federal requirements for the regulation and licensing of radioactive material. The adopted rules substantially advance this purpose by clarifying existing rules, implementing new federal requirements for respiratory protection, and modifying threshold monitoring requirements for minors and declared pregnant women.

Promulgation and enforcement of these adopted rules would be neither a statutory nor a constitutional taking of private real property. The subject adopted regulations do not affect a landowner's rights in private real property because this rulemaking does not burden (constitutionally), nor restrict or limit, the owner's right to property and reduce its value by 25% or more beyond which would otherwise exist

in the absence of the regulations. The adopted rules primarily implement clarifications to existing rules. In addition, the adopted rules reduce burdens on licensees for respiratory protection and threshold monitoring requirements.

COASTAL MANAGEMENT PROGRAM CONSISTENCY REVIEW

The commission has reviewed the adopted rulemaking and found that the rules are neither identified in Coastal Coordination Act Implementation Rules, 31 TAC §505.11, relating to Actions and Rules Subject to the Texas Coastal Management Program (CMP), nor will they affect any action/authorization identified in Coastal Coordination Act Implementation Rules, 31 TAC §505.11. Therefore, the adoption is not subject to the CMP.

HEARING AND COMMENTERS

No public hearing was held on this rulemaking; therefore, no oral comments were received. Also, no written comments were received. Further, the NRC has reviewed the proposal and has informed staff, by letter dated March 5, 2001, that if the proposed regulations are adopted without significant change, they would meet the NRC's compatibility and health and safety requirements.

STATUTORY AUTHORITY

The amendment is adopted under the THSC, TRCA, Chapter 401; THSC, §401.011, which provides the commission the authority to regulate and license the disposal of radioactive substances; §401.051, which authorizes the commission to adopt rules and guidelines relating to control of sources of radiation; §401.103, which authorizes the commission to adopt rules and guidelines that provide for

licensing and registration for the control of sources of radiation; §401.104, which requires the commission to provide rules for licensing for the disposal of radioactive material; §401.201, which provides authority to the commission to regulate the disposal of low-level radioactive waste; and §401.412, which provides authority to the commission to regulate licenses for the disposal of radioactive substances. The adopted amendment is also authorized by the TWC, §5.103, which provides the commission with the authority to adopt rules necessary to carry out its powers and duties under the TWC and other laws of the state.

SUBCHAPTER A: GENERAL PROVISIONS

§336.2

§336.2. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings, or as described in Chapter 3 of this title (relating to Definitions), unless the context clearly indicates otherwise. Additional definitions used only in a certain subchapter will be found in that subchapter.

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

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

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

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

(5) **Agreement state** - Any state with which the United States Nuclear Regulatory Commission (NRC) or the Atomic Energy Commission has entered into an effective agreement under the Atomic Energy Act of 1954, §274b, as amended through October 24, 1992 (Public Law 102-486).

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

(7) **Airborne radioactivity area** - A room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations:

(A) in excess of the derived air concentrations (DACs) specified in §336.359, Appendix B, Table I, Column 1, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage); or

(B) to a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6% of the ALI or 12 DAC-hours.

(8) **Air-purifying respirator** - A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

(9) **Annual limit on intake (ALI)** - The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the "reference man" that would result in a committed effective dose equivalent of 5 rems (0.05 sievert) or a committed dose equivalent of 50 rems (0.5 sievert) to any individual organ or tissue. ALI values for intake by ingestion and by inhalation of selected radionuclides are given in Table I, Columns 1 and 2, of §336.359, Appendix B, of this title.

(10) **As low as is reasonably achievable (ALARA)** - Making every reasonable effort to maintain exposures to radiation as far below the dose limits in this chapter 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 radioactive materials in the public interest.

(11) **Assigned protection factor (APF)** - The expected workplace level of respiratory protection that would be provided by a properly functioning respirator or a class of respirators to properly fitted and trained users. Operationally, the inhaled concentration can be estimated by dividing the ambient airborne concentration by the APF.

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

(13) **Background radiation** - Radiation from cosmic sources; non-technologically enhanced naturally-occurring radioactive material, including radon (except as a decay product of source or special nuclear material) and global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents such as Chernobyl that contribute to background radiation and are not under the control of the licensee. "Background radiation" does not include radiation from radioactive materials regulated by the commission, Texas Department of Health, NRC, or an Agreement State.

(14) **Becquerel (Bq)** - See §336.4 of this title (relating to Units of Radioactivity).

(15) **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 the rules in this chapter, "radiobioassay" is an equivalent term.

(16) **Byproduct material** -

(A) A radioactive material, other than special nuclear material, that is produced in or made radioactive by exposure to radiation incident to the process of producing or using special nuclear material; or

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

(17) **CFR** - Code of Federal Regulations.

(18) **Class** - A classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. Materials are classified as D, W, or Y, which applies to a range of clearance half-times: for Class D (Days) of less than ten days, for Class W (Weeks) from 10 to 100 days, and for Class Y (Years) of greater than 100 days. For purposes of the rules in this chapter, "lung class" and "inhalation class" are equivalent terms.

(19) **Collective dose** - The sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

(20) **Committed dose equivalent ($H_{T,50}$) (CDE)** - 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 ($H_{E,50}$) (CEDE)** - 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.

(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)** - See §336.4 of this title.

(25) **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 withdraws the declaration in writing or is no longer pregnant.

(26) **Decommission** - To remove (as a facility) safely from service and reduce residual radioactivity to a level that permits:

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

(B) release of the property under restricted conditions and termination of the license.

(27) **Deep-dose equivalent (H_d) (which applies to external whole-body exposure)** -

The dose equivalent at a tissue depth of one centimeter (1,000 milligrams/square centimeter).

(28) **Demand respirator** - An atmosphere-supplying respirator that admits breathing

air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

(29) **Depleted uranium** - The source material uranium in which the isotope uranium-

235 is less than 0.711%, by weight, of the total uranium present. Depleted uranium does not include special nuclear material.

(30) **Derived air concentration (DAC)** - The concentration of a given radionuclide in

air which, if breathed by the "reference man" for a working year of 2,000 hours under conditions of light work (inhalation rate of 1.2 cubic meters of air/hour), results in an intake of one ALI. DAC values are given in Table I, Column 3, of §336.359, Appendix B, of this title.

(31) **Derived air concentration-hour (DAC-hour)** - The product of the concentration

of radioactive material in air (expressed as a fraction or multiple of the derived air concentration for

each radionuclide) and the time of exposure to that radionuclide, in hours. A licensee shall take 2,000 DAC-hours to represent one ALI, equivalent to a committed effective dose equivalent of five rems (0.05 sievert).

(32) **Disposal** - With regard to low-level radioactive waste, the isolation or removal of low-level radioactive waste from mankind and mankind's environment without intent to retrieve that low-level radioactive waste later.

(33) **Disposable respirator** - A respirator for which maintenance is not intended and that is designed to be discarded after excessive breathing resistance, sorbent exhaustion, physical damage, or end-of-service-life renders it unsuitable for use. Examples of this type of respirator are a disposable half-mask respirator or a disposable escape-only self-contained breathing apparatus (SCBA).

(34) **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, in similar materials using adequate measurement technology, survey, and statistical techniques.

(35) **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 the rules in this chapter, "radiation dose" is an equivalent term.

(36) **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 rem and sievert (Sv).

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

(38) **Dosimetry processor** - An individual or organization that processes and evaluates individual monitoring devices in order to determine the radiation dose delivered to the monitoring devices.

(39) **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.

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

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

(42) **Exposure** - Being exposed to ionizing radiation or to radioactive material.

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

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

(45) **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.

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

(47) **Fit factor** - A quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

(48) **Fit test** - The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

(49) **General license** - An authorization granted by an agency under its rules which is effective without the filing of an application with that agency or the issuance of a licensing document to the particular person.

(50) **Generally applicable environmental radiation standards** - Standards issued by the EPA under the authority of the Atomic Energy Act of 1954, as amended through October 4, 1996, that impose limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.

(51) **Gray (Gy)** - See §336.3 of this title (relating to Units of Radiation Exposure and Dose).

(52) **Helmet** - A rigid respiratory inlet covering that also provides head protection against impact and penetration.

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

(54) **Hood** - A respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

(55) **Individual** - Any human being.

(56) **Individual monitoring** - The assessment of:

(A) dose equivalent by the use of individual monitoring devices; or

(B) committed effective dose equivalent by bioassay or by determination of the time-weighted air concentrations to which an individual has been exposed, that is, DAC-hours; or

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

(57) **Individual monitoring devices** - Devices designed to be worn by a single individual for the assessment of dose equivalent such as film badges, thermoluminescence dosimeters (TLDs), pocket ionization chambers, and personal ("lapel") air sampling devices.

(58) **Inhalation class** - See "Class."

(59) **Inspection** - An official examination and/or observation including, but not limited to, records, tests, surveys, and monitoring to determine compliance with the Texas Radiation Control Act (TRCA) and rules, orders, and license conditions of the commission.

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

(61) **Land disposal facility** - The land, buildings and structures, and equipment which are intended to be used for the disposal of low-level radioactive wastes into the subsurface of the land. For purposes of this chapter, a "geologic repository" as defined in 10 CFR §60.2 as amended through October 27, 1988 (53 FedReg 43421) (relating to Definitions - high-level radioactive wastes in geologic repositories) is not considered a "land disposal facility."

(62) **Lens dose equivalent (LDE)** - The external exposure of the lens of the eye and is taken as the dose equivalent at a tissue depth of 0.3 centimeter (300 mg/cm^2).

(63) **License** - See "Specific license."

(64) **Licensed material** - Radioactive material received, possessed, used, processed, transferred, or disposed of under a license issued by the commission.

(65) **Licensee** - Any person who holds a license issued by the commission in accordance with the TRCA and the rules in this chapter. For purposes of the rules in this chapter, "radioactive material licensee" is an equivalent term. Unless stated otherwise, "licensee" as used in the rules of this chapter means the holder of a "specific license."

(66) **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 which has been designated as such by the Conference of Radiation Control Program Directors, Inc.

(67) **Loose-fitting facepiece** - A respiratory inlet covering that is designed to form a partial seal with the face.

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

(69) **Low-level radioactive waste** -

(A) Except as provided by subparagraph (B) of this paragraph, low-level radioactive waste means radioactive material that:

(i) is discarded or unwanted and is not exempt by a Texas Department of Health rule adopted under the Texas Health and Safety Code, §401.106;

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

(iii) is subject to:

(I) concentration limits established under this chapter; and

(II) disposal criteria established under this chapter.

(B) Low-level radioactive waste does not include:

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

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

(iii) transuranic waste as defined by paragraph (128) of this section;

(iv) byproduct material as defined by paragraph (16)(B) of this section;

(v) naturally occurring radioactive material (NORM) waste; or

(vi) oil and gas NORM waste.

(C) When used in this section, the references to 10 CFR sections mean those CFR sections as they existed on September 1, 1999, as required by Texas Health and Safety Code, §401.005.

(70) **Lung class** - See "Class."

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

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

(73) **Monitoring** - The measurement of radiation levels, 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 the rules in this chapter, "radiation monitoring" and "radiation protection monitoring" are equivalent terms.

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

(75) **Naturally occurring radioactive material (NORM) waste** - Solid, liquid, or gaseous material or combination of materials, excluding source material, special nuclear material, and byproduct material, that:

(A) in its natural physical state spontaneously emits radiation;

(B) is discarded or unwanted; and

(C) is not exempt under rules of the Texas Department of Health adopted under Texas Health and Safety Code, §401.106.

(76) **Near-surface disposal facility** - A land disposal facility in which low-level radioactive waste is disposed of in or within the upper 30 meters of the earth's surface.

(77) **Negative pressure respirator (tight fitting)** - A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

(78) **Nonstochastic effect** - A health effect, the severity of which varies with the dose and for which a threshold is believed to exist. Radiation-induced cataract formation is an example of a nonstochastic effect. For purposes of the rules in this chapter, "deterministic effect" is an equivalent term.

(79) **Occupational dose** - The dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to radiation and/or to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include dose received from background radiation, as a patient from medical practices, from voluntary participation in medical research programs, or as a member of the public.

(80) **Oil and gas naturally occurring radioactive material (NORM) waste** - Naturally occurring radioactive material (NORM) waste that constitutes, is contained in, or has contaminated oil and gas waste as that term is defined in the Texas Natural Resources Code, §91.1011.

(81) **On-site** - The same or geographically contiguous property that may be divided by public or private rights-of-way, provided the entrance and exit between the properties is at a cross-roads intersection, and access is by crossing, as opposed to going along, the right-of-way. Noncontiguous properties owned by the same person but connected by a right-of-way that the property owner controls and to which the public does not have access, is also considered on-site property.

(82) **Personnel monitoring equipment** - See "Individual monitoring devices."

(83) **Planned special exposure** - An infrequent exposure to radiation, separate from and in addition to the annual occupational dose limits.

(84) **Positive pressure respirator** - A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

(85) **Powered air-purifying respirator (PAPR)** - An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

(86) **Pressure demand respirator** - A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

(87) **Principal activities** - Activities authorized by the license which are essential to achieving the purpose(s) for which the license is 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.

(88) **Public dose** - The dose received by a member of the public from exposure to radiation and/or radioactive material released by a licensee, or to any other source of radiation under the control of the licensee. It does not include occupational dose or doses received from background radiation, as a patient from medical practices, or from voluntary participation in medical research programs.

(89) **Qualitative fit test (QLFT)** - A pass/fail test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

(90) **Quality factor (Q)** - The modifying factor listed in Table I or II of §336.3 of this title that is used to derive dose equivalent from absorbed dose.

(91) **Quantitative fit test (QNFT)** - An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

(92) **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.

(93) **Rad** - See §336.3 of this title.

(94) **Radiation** - Alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. For purposes of the rules in this chapter, "ionizing radiation" is an equivalent term. Radiation, as used in this chapter, does not include non-ionizing radiation, such as radio- or microwaves or visible, infrared, or ultraviolet light.

(95) **Radiation and Perpetual Care Fund** - A fund established in the treasury of the State of Texas for the purposes set forth in the TRCA, §401.305.

(96) **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 millisievert) in one hour at 30 centimeters from the source of radiation or from any surface that the radiation penetrates.

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

(98) **Radioactive material** - A naturally-occurring or artificially-produced solid, liquid, or gas that emits radiation spontaneously.

(99) **Radioactive substance** - Includes byproduct material, radioactive material, low-level radioactive waste, source material, special nuclear material, source of radiation, and NORM waste, excluding oil and gas NORM waste.

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

(101) **Radiobioassay** - See "Bioassay."

(102) **Reference man** - A hypothetical aggregation of human physical and physiological characteristics determined by international consensus. These characteristics shall be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base. A description of "reference man" is contained in the International Commission on Radiological Protection report, ICRP Publication 23, "Report of the Task Group on Reference Man."

(103) **Rem** - See §336.3 of this title.

(104) **Residual radioactivity** - 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 10 CFR Part 20.

(105) **Respiratory protection equipment** - An apparatus, such as a respirator, used to reduce an individual's intake of airborne radioactive materials. For purposes of the rules in this chapter, "respiratory protective device" is an equivalent term.

(106) **Restricted area** - An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive

materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building shall be set apart as a restricted area.

(107) **Roentgen (R)** - See §336.3 of this title.

(108) **Sanitary sewerage** - A system of public sewers for carrying off waste water and refuse, but excluding sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee.

(109) **Sealed source** - Radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material under the most severe conditions that are likely to be encountered in normal use and handling.

(110) **Self-contained breathing apparatus (SCBA)** - An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

(111) **Shallow-dose equivalent (H_s) (which applies to the external exposure of the skin or an extremity)** - The dose equivalent at a tissue depth of 0.007 centimeter (seven milligrams/square centimeter) averaged over an area of one square centimeter.

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

(113) **Sievert (Sv)** - See §336.3 of this title.

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

(115) **Source material** -

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

(B) ores that contain, by weight, 0.05% or more of uranium, thorium, or any combination thereof. Source material does not include special nuclear material.

(116) **Special form radioactive material** - Radioactive material which is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule and which has at least one dimension not less than five millimeters and which satisfies the test requirements of 10 CFR §71.75 as amended through September 28, 1995 (60 FedReg 50264) (Transportation of License Material).

(117) **Special nuclear material** -

(A) Plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the NRC, under the provisions of the Atomic Energy Act of 1954, §51, as amended through November 2, 1994 (Public Law 103-437), determines to be special nuclear material, but does not include source material; or

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

(118) **Special nuclear material in quantities not sufficient to form a critical mass -** Uranium enriched in the isotope 235 in quantities not exceeding 350 grams of contained uranium-235; uranium-233 in quantities not exceeding 200 grams; plutonium in quantities not exceeding 200 grams; or any combination of these in accordance with the following formula: For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified above for the same kind of special nuclear material. The sum of such ratios for all of the kinds of special nuclear material in combination shall not exceed 1. For example, the following quantities in combination would not exceed the limitation: (175 grams contained U-235/350 grams) + (50 grams U-233/200 grams) + (50 grams Pu/200 grams) = 1.

(119) **Specific license -** A licensing document issued by an agency upon an application filed under its rules. For purposes of the rules in this chapter, "radioactive material license" is an equivalent term. Unless stated otherwise, "license" as used in this chapter means a "specific license."

(120) **State** - The State of Texas.

(121) **Stochastic effect** - A health effect that occurs randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects. For purposes of the rules in this chapter, "probabilistic effect" is an equivalent term.

(122) **Supplied-air respirator (SAR) or airline respirator** - An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

(123) **Survey** - An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, and/or presence of radioactive materials or other sources of radiation. When appropriate, this evaluation includes, but is not limited to, physical examination of the location of radioactive material and measurements or calculations of levels of radiation or concentrations or quantities of radioactive material present.

(124) **Termination** - As applied to a license, a release by the commission 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.

(125) **Tight-fitting facepiece** - A respiratory inlet covering that forms a complete seal with the face.

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

(127) **Total organ dose equivalent (TODE)** - The sum of the deep-dose equivalent and the committed dose equivalent to the organ receiving the highest dose as described in §336.346(a)(6) of this title (relating to Records of Individual Monitoring Results).

(128) **Transuranic waste** - For the purposes of this chapter, wastes containing alpha emitting transuranic radionuclides with a half-life greater than five years at concentrations greater than 100 nanocuries/gram.

(129) **Type A quantity (for packaging)** - A quantity of radioactive material, the aggregate radioactivity of which does not exceed A_1 for special form radioactive material or A_2 for normal form radioactive material, where A_1 and A_2 are given in or shall be determined by procedures in Appendix A to 10 CFR Part 71 as amended through September 28, 1995 (60 FedReg 50264) (Packaging and Transportation of Radioactive Material).

(130) **Type B quantity (for packaging)** - A quantity of radioactive material greater than a Type A quantity.

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

(132) **Unrestricted area** - Any area that is not a restricted area.

(133) **User seal check (fit check)** - An action conducted by the respirator user to determine if the respirator is properly seated to the face. Examples include negative pressure check, positive pressure check, irritant smoke check, or isoamyl acetate check.

(134) **Very high radiation area** - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads (five grays) in one hour at one meter from a source of radiation or one meter from any surface that the radiation penetrates.

(135) **Violation** - An infringement of any provision of the TRCA or of any rule, order, or license condition of the commission issued under the TRCA or this chapter.

(136) **Week** - Seven consecutive days starting on Sunday.

(137) **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: 30 TAC §336.2(137)

Organ Dose Weighting Factors

<u>Organ or Tissue</u>	<u>W_T</u>
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30 ¹
<hr/>	
Whole body	1.00 ²
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1. The value 0.30 results from 0.06 for each of five remainder organs, excluding the skin and the lens of the eye, that receive the highest doses.

2. For the purpose of weighting the external whole body dose (for adding it to the internal dose) a single weighting factor, $w_T = 1.0$, has been specified. The use of other weighting factors for external exposure will be approved on a case-by-case basis until such time as specific guidance is issued.

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

(139) **Worker** - An individual engaged in activities under a license issued by the commission and controlled by a licensee, but does not include the licensee.

(140) **Working level (WL)** - Any combination of short-lived radon daughters in one 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.

(141) **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).

(142) **Year** - The period of time beginning in January used to determine compliance with the provisions of the rules in this chapter. The licensee shall 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.

SUBCHAPTER D: STANDARDS FOR PROTECTION AGAINST RADIATION

**§§336.305, 336.307, 336.310, 336.312, 336.315, 336.316, 336.319 - 336.322, 336.335, 336.341,
336.346, 336.358, 336.359**

STATUTORY AUTHORITY

The amendments are adopted under the THSC, TRCA, Chapter 401; THSC, §401.011, which provides the commission the authority to regulate and license the disposal of radioactive substances; §401.051, which authorizes the commission to adopt rules and guidelines relating to control of sources of radiation; §401.103, which authorizes the commission to adopt rules and guidelines that provide for licensing and registration for the control of sources of radiation; §401.104, which requires the commission to provide rules for licensing for the disposal of radioactive material; §401.201, which provides authority to the commission to regulate the disposal of low-level radioactive waste; and §401.412, which provides authority to the commission to regulate licenses for the disposal of radioactive substances. The adopted amendments are also authorized by the TWC, §5.103, which provides the commission with the authority to adopt rules necessary to carry out its powers and duties under the TWC and other laws of the state.

§336.305. Occupational Dose Limits for Adults.

(a) The licensee shall control the occupational dose to individual adults, except for planned special exposures under §336.310 of this title (relating to Planned Special Exposures), to the following dose limits:

(1) an annual limit, which is the more limiting of:

(A) the total effective dose equivalent being equal to 5 rems (0.05 sievert); or

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

(2) the annual limits to the lens of the eye, to the skin, and to the extremities which are:

(A) a lens dose equivalent of 15 rems (0.15 sievert), and

(B) a shallow-dose equivalent of 50 rems (0.5 sievert) to the skin or to any extremity.

(b) Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime. See §336.310(5)(A) and (B) of this title (relating to Planned Special Exposures).

(c) The assigned deep-dose equivalent and shallow-dose equivalent must be for the part of the body receiving the highest exposure. The deep-dose equivalent, lens dose equivalent, and shallow-dose equivalent may be assessed from surveys or other radiation measurements for the purpose of

demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure or the results of individual monitoring are unavailable.

(d) Derived air concentration (DAC) and annual limit on intake (ALI) values are specified in Table I of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage) and may be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits. See §336.346 of this title (relating to Records of Individual Monitoring Results).

(e) In addition to the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to 10 milligrams in a week in consideration of chemical toxicity. See note 3 of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage).

(f) 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 §336.309(e) of this title (relating to Determination of Prior Occupational Dose).

§336.307. Determination of External Dose from Airborne Radioactive Material.

(a) Licensees shall, when determining the dose from airborne radioactive material, include the contribution to the deep-dose equivalent, lens dose equivalent, and shallow-dose equivalent from external exposure to the radioactive cloud. See notes 1 and 2 of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage).

(b) Airborne radioactivity measurements and DAC values shall not be used as the primary means to assess the deep-dose equivalent when the airborne radioactive material includes radionuclides other than noble gases or if the cloud of airborne radioactive material is not relatively uniform. The determination of the deep-dose equivalent to an individual shall be based upon measurements using instruments or individual monitoring devices.

§336.310. 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 §336.305 of this title (relating to Occupational Dose Limits for Adults) 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 dose 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; and

(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 as low as is reasonably achievable considering other risks that may be present.

(4) Before permitting an individual to participate in a planned special exposure, the licensee ascertains prior doses as required by §336.309(b) of this title (relating to Determination of Prior Occupational Dose) during the lifetime of the individual for each individual involved.

(5) Subject to §336.305(b) of this title, 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 §336.305(a) of this title in any year; and

(B) five times the annual dose limits in §336.305(a) of this title during the individual's lifetime.

(6) The licensee maintains records of the conduct of a planned special exposure in accordance with §336.345 of this title (relating to Records of Planned Special Exposures) and submits a written report to the executive director in accordance with §336.353 of this title (relating to Reports of Planned Special Exposures).

(7) 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 under §336.305(a) of this title but shall be included in evaluations required by paragraphs (4) and (5) of this section.

§336.312. Dose Equivalent to an Embryo/Fetus.

(a) The licensee shall ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 millisieverts). See §336.346 of this title (relating to Records of Individual Monitoring Results) for recordkeeping requirements.

(b) 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 subsection (a) of this section. (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 millisievert) to the embryo/fetus be received in any one month.)

(c) The dose to an embryo/fetus shall be taken as the sum of:

(1) the deep-dose equivalent to the declared pregnant woman; and

(2) the dose to the embryo/fetus resulting from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

(d) If the dose equivalent to the embryo/fetus is found to have exceeded 0.5 rem (5 millisieverts) or is within 0.05 rem (0.5 millisievert) of this dose, by the time the woman declares the

pregnancy to the licensee, the licensee shall be deemed to be in compliance with subsection (a) of this section if the additional dose equivalent to the embryo/fetus does not exceed 0.05 rem (0.5 millisievert) during the remainder of the pregnancy.

§336.315. General Requirements for Surveys and Monitoring.

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

(1) are necessary for the licensee to comply with the rules in this chapter or conditions of the license; and

(2) are reasonable under the circumstances to evaluate:

(A) the magnitude and extent of radiation levels;

(B) concentrations or quantities of radioactive material; and

(C) the potential radiological hazards.

(b) The licensee shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated:

(1) by a person licensed by the Texas Department of Health, another Agreement State, a Licensing State, or the United States Nuclear Regulatory Commission to perform this service;

(2) at intervals not to exceed 12 months, unless a more restrictive time interval is specified in another part of this chapter or in the license; and

(3) for the types of radiation measured and at appropriate energies.

(c) All personnel dosimeters, except for direct and indirect reading pocket ionization chambers and those dosimeters 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 §336.305 of this title (relating to Occupational Dose Limits for Adults), with other applicable provisions of this chapter, or with conditions specified in a license shall be processed and evaluated by a dosimetry processor:

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

(2) 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.

(d) Each licensee shall ensure that individuals who are required to use an individual monitoring device follow appropriate procedures in regard to selection of the type of device, location where it is worn, period of use, and precautions to prevent exposures that are not occupational dose to that individual.

§336.316. Conditions Requiring Individual Monitoring of External and Internal Occupational Dose.

Each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this subchapter. As a minimum, the following monitoring is required:

(1) Each licensee shall monitor occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the licensee 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 §336.305(a) of this title (relating to Occupational Dose Limits for Adults);

(B) minors likely to receive, in one year from sources external to the body, a deep dose equivalent in excess of 0.1 rem (one millisievert), a lens dose equivalent in excess of 0.15

rem (1.5 millisievert), or a shallow dose equivalent to the skin or to the extremities in excess of 0.5 rem (five millisievert);

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

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

(2) Each licensee shall monitor (see §336.308 of this title (relating to Determination of Internal Exposure)) 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(s) in Table I, Columns 1 and 2, of §336.359, Appendix B, of this title (relating to Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage); and

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

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

§336.319. Use of Process or Other Engineering Controls.

The licensee shall use, to the extent practical, process or other engineering controls (e.g., containment, decontamination, or ventilation) to control the concentrations of radioactive material in air.

§336.320. Use of Other Controls.

(a) When it is not practical to apply process or other engineering controls to control the concentrations of radioactive material in air to values below those that define an airborne radioactivity area, the licensee shall, consistent with maintaining the total effective dose equivalent as low as is reasonably achievable (ALARA), increase monitoring and limit intakes by one or more of the following means:

- (1) control of access;
- (2) limitation of exposure times;
- (3) use of respiratory protection equipment; or

(4) other controls.

(b) If the licensee performs an ALARA analysis to determine whether or not respirators should be used, the licensee may consider safety factors other than radiological factors. The licensee should also consider the impact of respirator use on workers' industrial health and safety.

§336.321. Use of Individual Respiratory Protection Equipment.

(a) If the licensee assigns or permits the use of respiratory protection equipment to limit the intake of radioactive material:

(1) The licensee shall use only respiratory protection equipment that is tested and certified by the National Institute for Occupational Safety and Health (NIOSH), except as provided in paragraph (2) of this subsection.

(2) If the licensee wishes to use equipment that has not been tested or certified by NIOSH, or for which there is no schedule for testing or certification, the licensee shall submit an application for authorized use of this equipment, except as provided in this section. The application must include evidence that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use. This must be demonstrated either by licensee testing or on the basis of reliable test information.

(3) The licensee shall implement and maintain a respiratory protection program that includes:

(A) air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate doses;

(B) surveys and bioassays, as necessary, to evaluate actual intakes;

(C) testing of respirators for operability (user seal check for face sealing devices and functional check for others) immediately before each use;

(D) written procedures regarding:

(i) monitoring, including air sampling and bioassays;

(ii) supervision and training of respirator users;

(iii) fit testing;

(iv) respirator selection;

(v) breathing air quality;

(vi) inventory and control:

(vii) storage, issuance, maintenance, repair, testing, and quality assurance of respiratory protection equipment;

(viii) recordkeeping; and

(ix) limitations on periods of respirator use and relief from respirator use;

(E) determination by a physician that the individual user is medically fit to use respiratory protection equipment before:

(i) the initial fitting of a face sealing respirator;

(ii) the first field use of non-face sealing respirators; and

(iii) either every 12 months thereafter, or periodically at a frequency determined by a physician.

(F) fit testing, with fit factor greater than or equal to ten times the assigned protection factor for negative pressure devices, and a fit factor greater than or equal to 500 for any

positive pressure, continuous flow, and pressure-demand devices, before the first field use of tight fitting, face-sealing respirators and periodically thereafter at a frequency not to exceed one year. Fit testing must be performed with the facepiece operating in the negative pressure mode.

(4) The licensee shall advise each respirator user that the user may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other conditions that might require this relief.

(5) The licensee shall also consider limitations appropriate to the type and mode of use. When selecting respiratory devices, the licensee shall provide for vision correction, adequate communication, low-temperature work environments, and the concurrent use of other safety or radiological protection equipment. The licensee shall use equipment in such a way as not to interfere with the proper operation of the respirator.

(b) Standby rescue persons are required whenever one-piece atmosphere-supplying suits, or any combination of supplied air respiratory protection device and personnel protective equipment are used from which an unaided individual would have difficulty extricating himself or herself. The standby persons must be equipped with respiratory protection devices or other apparatus appropriate for the potential hazards. The standby rescue persons shall observe or otherwise maintain continuous communication with the workers (visual, voice, signal line, telephone, radio or other suitable means), and be immediately available to assist them in case of a failure of the air supply or for any other reason

that requires relief from distress. A sufficient number of standby rescue persons must be immediately available to assist all users of this type of equipment and to provide effective emergency rescue if needed.

(c) Atmosphere-supplying respirators must be supplied with respirable air of Grade D quality or better as defined by the Compressed Gas Association in publication G-7.1, "Commodity Specification for Air," 1997 and included in the regulations of the Occupational Safety and Health Administration (Title 29 Code of Federal Regulations §1910.134(i)(1)(ii)(A) - (E)). Grade D quality air criteria include:

- (1) oxygen content (v/v) of 19.5-23.5%;
- (2) hydrocarbon (condensed) content of five milligrams per cubic meter of air or less;
- (3) carbon monoxide (CO) content of ten parts per million (ppm) or less;
- (4) carbon dioxide content of 1,000 ppm or less; and
- (5) lack of noticeable odor.

(d) The licensee shall ensure that no objects, materials, or substances, such as facial hair, or any conditions that interfere with the face-facepiece seal or valve function, and that are under the

control of the respirator wearer, are present between the skin of the wearer's face and the sealing surface of a tight-fitting respirator facepiece.

(e) In estimating the dose to individuals from intake of airborne radioactive materials, the concentration of radioactive material in the air that is inhaled when respirators are worn is initially assumed to be the ambient concentration in air without respiratory protection, divided by the assigned protection factor specified in §336.358 of this title (relating to Appendix A. Assigned Protection Factors for Respirators). If the dose is later found to be greater than the estimated dose, the corrected value must be used. If the dose is later found to be less than the estimated dose, the corrected value may be used.

(f) The licensee shall obtain authorization from the executive director before using assigned protection factors in excess of those specified in §336.358 of this title (relating to Appendix A. Assigned Protection Factors for Respirators). The executive director may authorize a licensee to use higher assigned protection factors on receipt of an application that:

- (1) describes the situation for which a need exists for higher protection factors; and
- (2) demonstrates that the respiratory protection equipment provides these higher protection factors under the proposed conditions of use.

§336.322. Further Restrictions on the Use of Respiratory Protection Equipment.

The commission may impose restrictions in addition to those in §336.320 of this title (relating to Use of Other Controls), §336.321 of this title (relating to Use of Individual Respiratory Protection Equipment), and §336.358, Appendix A, of this title (relating to Protection Factors for Respirators) to:

(1) ensure that the respiratory protection program of the licensee is adequate to limit doses to individuals from intakes of airborne radioactive materials consistent with maintaining the total effective dose equivalent as low as reasonably achievable; and

(2) limit the extent to which a licensee may use respiratory protection equipment instead of process or other engineering controls.

§336.335. Reporting Requirements for Incidents.

(a) Immediate notification. Each licensee shall notify the executive director 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 radiation or radioactive materials that could exceed regulatory limits or releases of radioactive materials that could exceed limits (e.g., events may include fires, explosions, toxic gas releases, etc.). Notwithstanding any other requirements for notification, each licensee shall immediately report to the executive director each event involving licensed radioactive

material possessed by the licensee that may have caused or threatens to cause any of the following conditions:

(1) an individual to receive:

(A) a total effective dose equivalent of 25 rems (0.25 sievert) or more;

(B) a lens dose equivalent of 75 rems (0.75 sievert) or more; or

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

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

(b) Twenty-four hour notification. Each licensee shall, within 24 hours of discovery of the event, report to the executive director any event involving loss of control of licensed material possessed by the licensee that may have caused, or threatens to cause, any of the following conditions:

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

(A) total effective dose equivalent exceeding five rems (0.05 sievert);

(B) a lens dose equivalent exceeding 15 rems (0.15 sievert); or

(C) a shallow-dose equivalent to the skin or extremities or a total organ dose equivalent exceeding 50 rems (0.5 sievert); or

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

(3) an unplanned contamination event that:

(A) 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;

(B) involves a quantity of material greater than five times the lowest annual limit on intake specified in §336.359 of this title (relating to Appendix B. Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage); and

(C) 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; or

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

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

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

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

(5) 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

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

(A) the quantity of material involved is greater than five times the lowest annual limit on intake specified in §336.359 of this title; and

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

(c) Preparation and submission of reports. Reports made by licensees in response to the requirements of this section must be made as follows.

(1) Telephone report. Licensees shall make reports required by subsections (a) and (b) of this section by telephone, accompanied by a facsimile, to the executive director. To the extent that the information is available at the time of notification, the information provided in these reports must include:

(A) the caller's name and telephone number;

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

(C) the exact location of the event;

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

(E) any personnel radiation exposure data available.

(2) Written report. Each licensee who makes a report required by subsections (a) and (b) of this section shall submit a written follow-up report to the executive director within 30 days of the initial report. Written reports prepared under other regulations may be submitted to fulfill this requirement if the reports contain all of the necessary information. These written reports must be sent to the executive director. The reports must include:

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

(B) the exact location of the event;

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

(D) date and time of the event;

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

(F) the extent of exposure of individuals to radiation or to radioactive materials. The licensee shall prepare the report so that names of individuals are stated in a separate and detachable part of the report.

(d) Confirmation of notification. Licensees shall make the reports required by subsections (a) and (b) of this section by telephone and shall confirm the telephone report within 24 hours by telegram, mailgram, or facsimile.

(e) Exception to notification. The provisions of this section do not apply to doses that result from planned special exposures, provided those doses are within the limits for planned special exposures and are reported under §336.353 of this title (relating to Reports of Planned Special Exposures).

§336.341. General Recordkeeping Requirements for Licensees.

(a) Each licensee shall use the units curie, rad, and rem, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by this subchapter. Disintegrations per minute may be indicated on records of surveys performed to determine compliance with §336.605 of this title (relating to Surface Contamination Limits for Facilities, Equipment, and Materials) and §336.364, Appendix G, of this title (relating to Acceptable Surface Contamination Levels).

(b) In the records required by this chapter, the licensee may record quantities in International System of Units (SI) units in parentheses following each of the units specified in subsection (a) of this section. However, all quantities must be recorded as stated in subsection (a) of this section.

(c) Notwithstanding the requirements of subsection (a) of this section, information on shipment manifests for wastes received at a licensed land disposal facility, as required by §336.331(h) of this title (relating to Transfer of Radioactive Material), shall be recorded in SI units (becquerel, gray, and sievert) or in SI and units as specified in subsection (a) of this section.

(d) The licensee shall make a clear distinction among the quantities entered on the records required by this subchapter, such as total effective dose equivalent, shallow-dose equivalent, lens dose equivalent, deep-dose equivalent, and committed effective dose equivalent.

(e) Each licensee shall maintain records showing the receipt, transfer, and disposal of all source material, byproduct material, or other licensed radioactive material. Each licensee shall also maintain any records and make any reports as may be required by the conditions of the license, by the rules in this chapter, or by orders of the commission. Copies of any records or reports required by the license, rules, or orders shall be submitted to the executive director or commission on request. All records and reports required by the license, rules, or orders shall be complete and accurate.

(f) The licensee shall retain each record that is required by the rules in this chapter or by license conditions for the period specified by the appropriate rule or license condition. If a retention

period is not otherwise specified, each record shall be maintained until the commission terminates each pertinent license requiring the record.

(g) If there is a conflict between the commission's rules, license condition, or other written approval or authorization from the executive director pertaining to the retention period for the same type of record, the longest retention period specified takes precedence.

(h) The executive director may require the licensee to provide the commission with copies of all records prior to termination of the license.

§336.346. Records of Individual Monitoring Results.

(a) Record keeping requirement. Each licensee shall maintain records of doses received by all individuals for whom monitoring was required under §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose) 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:

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

(2) the estimated intake of radionuclides (see §336.306 of this title (relating to Compliance with Requirements for Summation of External and Internal Doses));

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

(4) the specific information used to assess the committed effective dose equivalent under §336.308(a) and (c) of this title (relating to Determination of Internal Exposure), and when required by §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose);

(5) the total effective dose equivalent when required by §336.306 of this title; and

(6) the total of the deep-dose equivalent and the committed dose to the organ receiving the highest total dose.

(b) Recordkeeping frequency. The licensee shall make entries of the records specified in subsection (a) of this section at intervals not to exceed one-year.

(c) Recordkeeping format. The licensee shall maintain the records specified in subsection (a) of this section on form "Occupational Exposure Record for a Monitoring Period" (see §336.368, Appendix K of this title (relating to Occupational Exposure Record for a Monitoring Period)), in

accordance with the instructions for that form, or in clear and legible records containing all the information required by form.

(d) Recordkeeping maintenance. 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.

(e) Recordkeeping retention. The licensee shall retain each required form or record until the commission terminates each pertinent license requiring the form or record. This includes records required under the standards for protection against radiation in effect before January 1, 1994.

§336.358. Appendix A. Assigned Protection Factors for Respirators.

Assigned Protection factors are as follows.

Figure: 30 TAC §336.358

	Operating Mode	Assigned Protection Factors (APFs) ^a
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I. Air Purifying Respirators (Particulate ^b only) ^c :		
Filtering facepiece disposable	Negative Pressure	(d)
Facepiece, half ^e	Negative Pressure	10
Facepiece, full	Negative Pressure	100
Facepiece, half	Powered air-purifying respirators	50
Facepiece, full	Powered air-purifying respirators	1000
Helmet/hood	Powered air-purifying respirators	1000
Facepiece, loose-fitting	Powered air-purifying respirators	25
II. Atmosphere supplying respirators (particulate, gases, and vapors ^f)		
1. Air-line respirator:		
Facepiece, half	Demand	10
Facepiece, half	Continuous Flow	50
Facepiece, half	Pressure Demand	50
Facepiece, full	Demand	100
Facepiece, full	Continuous Flow	1000
Facepiece, full	Pressure Demand	1000
Helmet/hood	Continuous Flow	1000
Facepiece, loose-fitting	Continuous Flow	25
Suit	Continuous Flow	(g)
2. Self-contained breathing apparatus (SCBA):		
Facepiece, full	Demand	^h 100
Facepiece, full	Pressure Demand	ⁱ 10,000
Facepiece, full	Demand, Recirculating	^h 100
Facepiece, full	Positive Pressure Recirculating	ⁱ 10,000

III. Combination Respirators:

Any combination of air-purifying and atmosphere-supplying respirators.	Assigned protection factor for type and mode of operation as listed above.
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^a These assigned protection factors apply only in a respiratory protection program that meets the requirements of this subchapter. They are applicable only to airborne radiological hazards and may not be appropriate to circumstances when chemical or other respiratory hazards exist instead of, or in addition to, radioactive hazards. Selection and use of respirators for such circumstances must also comply with Department of Labor regulations.

Radioactive contaminants for which the concentration values in §336.359 of this title (relating to Appendix B Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage) are based on internal dose due to inhalation may, in addition, present external exposure hazards at higher concentrations. Under these circumstances, limitations on occupancy may have to be governed by external dose limits.

^b Air purifying respirators with $APF < 100$ must be equipped with particulate filters that are at least 95% efficient. Air purifying respirators with $APF = 100$ must be equipped with particulate filters that are at least 99% efficient. Air purifying respirators with $APFs > 100$ must be equipped with particulate filters that are at least 99.97% efficient.

^c The licensee may apply to the executive director for the use of an APF greater than one for sorbent cartridges as protection against airborne radioactive gases and vapors (e.g., radioiodine).

^d Licensees may permit individuals to use this type of respirator who have not been medically screened or fit tested on the device provided that no credit be taken for their use in estimating intake or dose. It is also recognized that it is difficult to perform an effective positive or negative pressure pre-use user seal check on this type of device. All other respiratory protection program requirements listed in §336.321 of this title (relating to Use of Individual Respiratory Protection Equipment) apply. An assigned protection factor has not been assigned for these devices. However, an APF equal to 10 may be used if the licensee can demonstrate a fit factor of at least 100 by use of a validated or evaluated, qualitative or quantitative fit test.

^e Under-chin type only. No distinction is made in this Appendix between elastomeric half-masks with replaceable cartridges and those designed with the filter medium as an integral part of the facepiece (e.g., disposable or reusable disposable). Both types are acceptable so long as the seal area of the latter contains some substantial type of seal-enhancing material such as rubber or plastic, the two or more suspension straps are adjustable, the filter medium is at least 95% efficient and all other requirements of this subchapter are met.

^f The assigned protection factors for gases and vapors are not applicable to radioactive contaminants that present an absorption or submersion hazard. For tritium oxide vapor, approximately one-third of the intake occurs by absorption through the skin so that an overall protection factor of three is appropriate when atmosphere-supplying respirators are used to protect against tritium oxide.

Exposure to radioactive noble gases is not considered a significant respiratory hazard, and protective actions for these contaminants should be based on external (submersion) dose considerations.

^g No NIOSH approval schedule is currently available for atmosphere supplying suits. This equipment may be used in an acceptable respiratory protection program as long as all the other minimum program requirements, with the exception of fit testing, are met (i.e., §336.321 of this title (relating to Use of Individual Respiratory Protection Equipment)).

^h The licensee should implement institutional controls to assure that these devices are not used in areas immediately dangerous to life or health.

ⁱ This type of respirator may be used as an emergency device in unknown concentrations for protection against inhalation hazards. External radiation hazards and other limitations to permitted exposure such as skin absorption shall be taken into account in these circumstances. This device may not be used by any individual who experiences perceptible outward leakage of breathing gas while wearing the device.

§336.359. Appendix B. Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage.

(a) Introduction. For each radionuclide, Table I indicates the chemical form that is to be used for selecting the appropriate ALI or DAC value. The ALIs and DACs for inhalation are given for an aerosol with an activity median aerodynamic diameter (AMAD) of 1 micrometer and for three classes (D,W,Y) of radioactive material, which refer to their retention (approximately days, weeks, or years) in the pulmonary region of the lung. This classification applies to a range of clearance half-times for D of less than 10 days, for W from 10 to 100 days, and for Y greater than 100 days.

(1) The class (D, W, or Y) given in the column headed "Class" applies only to the inhalation ALIs and DACs given in Table I, Columns 2 and 3. Table II provides concentration limits for airborne and liquid effluents released to the general environment. Table III provides concentration limits for discharges to sanitary sewerage.

(2) The values in Tables I, II, and III are presented in the computer "E" notation. In this notation, a value of 6E-02 represents a value of 6×10^{-2} or 0.06, 6E+2 represents 6×10^2 or 600, and 6E+0 represents 6×10^0 or 6. Values are given in units of microcuries (μCi) or microcuries per milliliter ($\mu\text{Ci/ml}$), as indicated.

(b) Table I, "Occupational Values". Note that the columns in Table I of this appendix captioned "Oral Ingestion ALI," "Inhalation ALI," and "DAC," are applicable to occupational exposure to radioactive material.

(1) The ALIs in this appendix are the annual intakes of a given radionuclide by "reference man" that would result in either a committed effective dose equivalent of 5 rems (0.05 sievert) (stochastic ALI) or a committed dose equivalent of 50 rems (0.5 sievert) to an organ or tissue (non-stochastic ALI). The stochastic ALIs were derived to result in a risk, due to irradiation of organs and tissues, comparable to the risk associated with deep dose equivalent to the whole body of 5 rems (0.05 sievert). The derivation includes multiplying the committed dose equivalent to an organ or tissue by a weighting factor, w_T . This weighting factor is the proportion of the risk of stochastic effects resulting from irradiation of the organ or tissue, T, to the total risk of stochastic effects when the whole body is irradiated uniformly. The values of w_T are listed under the definition of "weighting factor" in §336.2 of this title (relating to Definitions). The non-stochastic ALIs were derived to avoid non-stochastic effects, such as prompt damage to tissue or reduction in organ function.

(2) A value of $w_T = 0.06$ is applicable to each of the five organs or tissues in the "remainder" category receiving the highest dose equivalents, and the dose equivalents of all other remaining tissues may be disregarded. The following parts of the GI tract -- stomach, small intestine, upper large intestine, and lower large intestine -- are to be treated as four separate organs.

(3) Note that the dose equivalents for an extremity, skin, and lens of the eye are not considered in computing the committed effective dose equivalent but are subject to limits that must be met separately. When an ALI is defined by the stochastic dose limit, this value alone is given.

(4) When an ALI is determined by the non-stochastic dose limit to an organ, the organ or tissue to which the limit applies is shown, and the ALI for the stochastic limit is shown in parentheses. The following abbreviated organ or tissue designations are used:

(A) LLI wall = lower large intestine wall;

(B) St wall = stomach wall;

(C) Blad wall = bladder wall; and

(D) Bone surf = bone surface.

(5) The use of the ALIs listed first, the more limiting of the stochastic and non-stochastic ALIs, will ensure that non-stochastic effects are avoided and that the risk of stochastic effects is limited to an acceptably low value. If, in a particular situation involving a radionuclide for which the non-stochastic ALI is limiting, use of that non-stochastic ALI is considered unduly conservative, the licensee may use the stochastic ALI to determine the committed effective dose equivalent. However, the licensee shall also ensure that the 50-rem (0.5 sievert) dose equivalent limit for any organ or tissue is not exceeded by the sum of the external deep dose equivalent plus the internal committed dose equivalent to that organ (not the effective dose). For the case where there is no external dose contribution, this would be demonstrated if the sum of the fractions of the nonstochastic ALIs (ALI_{ns}) that contribute to the committed dose equivalent to the organ receiving the highest dose does not exceed

1 (i.e., \sum (intake in μCi of each radionuclide/ ALI_{ns}) ≤ 1.0). If there is an external deep-dose equivalent contribution of H_d , then this sum must be less than $1 - (H_d/50)$, instead of ≤ 1.0 .

(6) The DAC values are derived limits intended to control chronic occupational exposures. The relationship between the DAC and the ALI is given by: Figure 1: 30 TAC §336.359(b)(6)

$$\text{DAC} = \text{ALI}(\text{in } \mu\text{Ci}) / (2000 \text{ hours per working year} \times 60 \text{ minutes/hour} \times 2 \times 10^4 \text{ ml per minute}) = (\text{ALI} / 2.4 \times 10^9) \mu\text{Ci/ml},$$

where 2×10^4 ml is the volume of air breathed per minute at work by "reference man" under working conditions of light work.

(7) The DAC values relate to one of two modes of exposure: either external submersion or the internal committed dose equivalents resulting from inhalation of radioactive materials. The DAC values based upon submersion are for immersion in a semi-infinite cloud of uniform concentration and apply to each radionuclide separately.

(8) The ALI and DAC values include contributions to exposure by the single radionuclide named and any in-growth of daughter radionuclides produced in the body by decay of the parent. However, intakes that include both the parent and daughter radionuclides shall be treated by the general method appropriate for mixtures.

(9) The values of ALI and DAC do not apply directly when the individual both ingests and inhales a radionuclide, when the individual is exposed to a mixture of radionuclides by either inhalation or ingestion or both, or when the individual is exposed to both internal and external irradiation (see §336.306 of this title (relating to Compliance with Requirements for Summation of External and Internal Doses)). When an individual is exposed to radioactive materials which fall under several of the translocation classifications of the same radionuclide (i.e., Class D, Class W, or Class Y), the exposure may be evaluated as if it were a mixture of different radionuclides.

(10) It shall be noted that the classification of a compound as Class D, W, or Y is based on the chemical form of the compound and does not take into account the radiological half-life of different radionuclides. For this reason, values are given for Class D, W, and Y compounds, even for very short-lived radionuclides.

(c) Table II, "Effluent Concentrations." The columns in Table II of this appendix captioned "Effluent Concentrations," "Air," and "Water" are applicable to the assessment and control of dose to the public, particularly in the implementation of the provisions of §336.314 of this title (relating to Compliance with Dose Limits for Individual Members of the Public). The concentration values given in Columns 1 and 2 of Table II are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (0.5 millisievert).

(1) Consideration of non-stochastic limits has not been included in deriving the air and water effluent concentration limits because non-stochastic effects are presumed not to occur at or below the dose levels established for individual members of the public. For radionuclides, where the non-stochastic limit was governing in deriving the occupational DAC, the stochastic ALI was used in deriving the corresponding airborne effluent limit in Table II. For this reason, the DAC and airborne effluent limits are not always proportional.

(2) The air concentration values listed in Table II, Column 1, were derived by one of two methods. For those radionuclides for which the stochastic limit is governing, the occupational stochastic inhalation ALI was divided by 2.4×10^9 ml, relating the inhalation ALI to the DAC and then divided by a factor of 300. The factor of 300 is composed of a factor of 50 to relate the 5-rem (0.05 sievert) annual occupational dose limit to the 0.1 rem (1 millisievert) limit for members of the public, a factor of 3 to adjust for the difference in exposure time and the inhalation rate for a worker and that for members of the public; and a factor of 2 to adjust the occupational values (derived for adults) so that they are applicable to other age groups.

(3) For those radionuclides for which submersion (external dose) is limiting, the occupational DAC in Table I, Column 3, was divided by 219. The factor of 219 is composed of a factor of 50 and a factor of 4.38 relating occupational exposure for 2,000 hours/year to full-time exposure (8,760 hours/year). Note that an additional factor of 2 for age considerations is not warranted in the submersion case.

(4) The water concentrations were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^7 ml. The factor of 7.3×10^7 ml is composed of the factors of 50 and 2 and a factor of 7.3×10^5 ml which is the annual water intake of "reference man."

(5) Note 6 of this appendix provides groupings of radionuclides that are applicable to unknown mixtures of radionuclides. These groupings, including occupational inhalation ALIs and DACs, air and water effluent concentrations, and releases to sewerage, require demonstrating that the most limiting radionuclides in successive classes are absent. The limit for the unknown mixture is defined when the presence of one of the listed radionuclides cannot be definitely excluded either from knowledge of the radionuclide composition of the source or from actual measurements.

(d) Table III, "releases to sewers." The monthly average concentrations for release to sanitary sewerage are applicable to the provisions in §336.215 of this title (relating to Disposal by Release into Sanitary Sewerage). The concentration values were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^6 ml. The factor of 7.3×10^6 ml is composed of a factor of 7.3×10^5 ml, the annual water intake by "reference man," and a factor of 10, such that the concentrations, if the sewage released by the licensee were the only source of water ingested by a "reference man" during a year, would result in a committed effective dose equivalent of 0.5 rem (5 millisieverts).

Figure: 30 TAC §336.359(d) (No change.)

SUBCHAPTER G: DECOMMISSIONING STANDARDS

§336.611

STATUTORY AUTHORITY

The amendment is adopted under the THSC, TRCA, Chapter 401; THSC, §401.011, which provides the commission the authority to regulate and license the disposal of radioactive substances; §401.051, which authorizes the commission to adopt rules and guidelines relating to control of sources of radiation; §401.103, which authorizes the commission to adopt rules and guidelines that provide for licensing and registration for the control of sources of radiation; §401.104, which requires the commission to provide rules for licensing for the disposal of radioactive material; §401.201, which provides authority to the commission to regulate the disposal of low-level radioactive waste; and §401.412, which provides authority to the commission to regulate licenses for the disposal of radioactive substances. The adopted amendment is also authorized by the TWC, §5.103, which provides the commission with the authority to adopt rules necessary to carry out its powers and duties under the TWC and other laws of the state.

§336.611. Public Notification and Public Participation.

Upon the receipt of a decommissioning plan from the licensee, or a proposal by the licensee for release of a site under §336.607 of this title (relating to Criteria for License Termination under Restricted Conditions) or §336.609 of this title (relating to Alternate Criteria for License Termination), or whenever the commission deems notice to be in the public interest, the commission shall publish notice in accordance with §39.713 of this title (relating to Public Notification and Public Participation).

SUBCHAPTER I: FINANCIAL ASSURANCE

§§336.801 - 336.807

STATUTORY AUTHORITY

The repeals are adopted under the THSC, TRCA; §§401.011, 401.051, 501.057, 501.101, 401.103(b) and (c), 401.104(b) - (e), 401.106(b) and (c), 401.201 - 401.203, 401.303, 401.412, and 401.413; and TWC, §5.103.

§336.801. Purpose and Scope.

§336.802. Definitions.

§336.803. Financial Assurance Requirements.

§336.804. Financial Assurance Mechanisms.

§336.805. Long-Term Care Requirements.

§336.806. Wording of Financial Assurance Mechanisms.

§336.807. Appendix A. Wording of Financial Assurance Instruments.