

SUBCHAPTER D: STANDARDS FOR PROTECTION AGAINST RADIATION
§§336.301 - 336.332, 336.335, 336.336, 336.338, 336.339, 336.341 -
336.347, 336.350 - 336.360, 336.362 - 336.365, 336.367, 336.368
Effective December 8, 2016

§336.301. Purpose and Scope.

(a) This subchapter establishes standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the commission and establishes minimum standards for all persons who dispose of radioactive materials.

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

(c) Except as specifically provided in other parts of this chapter, this subchapter applies to persons licensed by the commission to receive, possess, use, transfer, or dispose of radioactive material. The limits in this subchapter do not apply to doses due to background radiation, to exposure of patients to radiation for the purpose of medical diagnosis or therapy, or to voluntary participation in medical research programs.

(d) Nothing in this subchapter relieves the licensee from complying with other applicable federal, state, and local regulations governing any other toxic or hazardous properties of materials that shall be disposed of under the rules in this chapter.

Adopted August 23, 2000

Effective September 14, 2000

§336.302. Definitions.

Terms used in this subchapter are defined in §336.2 of this title (relating to Definitions). Additional terms used in this subchapter and in §336.363, Appendix F, of this title (relating to Requirements for Receipt of Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Manifests) are given in that section.

Adopted May 14, 1997

Effective June 5, 1997

§336.303. Implementation.

(a) The applicable section of this subchapter must be used in lieu of requirements in the standards for protection against radiation in effect before January 1, 1994, that are cited in license conditions, except as specified in subsections (b), (c), and (d) of this section. If the requirements of this subchapter are more restrictive than the existing license condition, then the licensee shall comply with this subchapter unless exempted by subsection (c) of this section.

(b) Any existing license condition that is more restrictive than a requirement in this subchapter remains in force until there is an amendment or renewal of the license.

(c) If a license condition exempted a licensee from a requirement in the standards for protection against radiation in effect before January 1, 1994, it also exempts the licensee from the corresponding provision of this subchapter.

(d) If a license condition cites provisions in requirements in the standards for protection against radiation in effect before January 1, 1994, and there are no corresponding provisions in this subchapter, the license condition remains in force until there is an amendment or renewal of the license that modifies or removes this condition.

Adopted May 14, 1997

Effective June 5, 1997

§336.304. Radiation Protection Programs.

(a) Each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this subchapter. See §336.342 of this title (relating to Records of Radiation Protection Programs) for requirements for maintaining records relating to these programs.

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

(c) The licensee shall, at intervals not to exceed 12 months, review the radiation protection program content and implementation.

(d) To implement the ALARA requirement of subsection (b) of this section, and notwithstanding the requirements in §336.313 of this title (relating to Dose Limits for Individual Members of the Public), a constraint on air emissions of

radioactive material to the environment, excluding Radon-222 and its daughters, shall be established by licensees other than nuclear power reactors, such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 mrem (0.1 mSv) per year from these emissions. If a licensee subject to this requirement exceeds this dose constraint, the licensee shall report the exceedence as provided in §336.352 of this title (relating to Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits) and promptly take appropriate corrective action to ensure against recurrence.

Adopted July 29, 1998

Effective September 3, 1998

§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 of the whole body, and to the skin of 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 of the whole body or to the skin of 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.

(c) When the external exposure is determined by measurement with an external personal monitoring device, the deep-dose equivalent must be used in place of the effective dose equivalent, unless the effective dose equivalent is determined by a dosimetry method approved by the executive director. The

assigned deep-dose equivalent must be for the part of the body receiving the highest exposure. The assigned shallow-dose equivalent must be the dose averaged over the contiguous ten square centimeters of skin 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 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 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.

(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).

Adopted January 11, 2012

Effective February 2, 2012

§336.306. Compliance with Requirements for Summation of External and Internal Doses.

(a) If the licensee is required to monitor under both §336.316(1) and (2) of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose), the licensee shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee is required to monitor only under §336.316(1) of this title or only under §336.316(2) of this title, then summation is not required to demonstrate compliance with the dose limits. The licensee may demonstrate compliance with the requirements for summation of external and internal doses by meeting the conditions specified in subsections (b), (c), and (d) of this section. (The dose equivalents for the lens of the eye, the skin, and the extremities are not included in the summation but are subject to separate limits.)

(b) If the only intake of radionuclides is by inhalation, the total effective dose equivalent limit is not exceeded if the sum of the deep-dose equivalent divided by the total effective dose equivalent limit and one of the following does not exceed 1:

(1) the sum of the fractions of the inhalation annual limits on intake (ALI) for each radionuclide; or

(2) the total number of derived air concentration-hours (DAC-hours) for all radionuclides divided by 2,000; or

(3) the sum of the calculated committed effective dose equivalents to all significantly irradiated organs or tissues (T) calculated from bioassay data using appropriate biological models and expressed as a fraction of the annual limit. For purposes of this requirement, an organ or tissue is deemed to be significantly irradiated if, for that organ or tissue, the product of the weighting factor (w_T) and the committed dose equivalent ($H_{T,50}$) per unit intake is greater than 10% of the maximum weighted value of $H_{T,50}$ (i.e., $w_T H_{T,50}$) per unit intake for any organ or tissue.

(c) If the occupationally-exposed individual also receives an intake of radionuclides by oral ingestion greater than 10% of the applicable oral ALI, the licensee shall account for this intake and include it in demonstrating compliance with the limits.

(d) The licensee shall evaluate and, to the extent practical, account for intakes through wounds or skin absorption. (The intake through intact skin has been included in the calculation of DAC for hydrogen-3 and does not need to be further evaluated under this subsection.)

Adopted May 14, 1997

Effective June 5, 1997

§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.

Adopted August 8, 2001

Effective August 30, 2001

§336.308. Determination of Internal Exposure.

(a) For purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee shall, when required under §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose), take suitable and timely 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.

(b) Unless respiratory protection equipment is used, as provided in §336.321 of this title (relating to Use of Individual Respiratory Protection Equipment), or the assessment of intake is based on bioassays, the licensee shall assume that an individual inhales radioactive material at the airborne concentration in which the individual is present.

(c) When specific information on the physical and biochemical properties of the radionuclides taken into the body or the behavior of the material in an individual is known, the licensee may:

(1) use that information to calculate the committed effective dose equivalent and shall document that information, if used, in the individual's record; and

(2) upon prior approval in the license by the commission, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material (e.g., aerosol size distribution or density); and

(3) separately assess the contribution of fractional intakes of Class D, W, or Y compounds of a given radionuclide to the committed effective dose equivalent. See §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).

(d) If the licensee chooses to assess intakes of Class Y material using the measurements given in subsection (a)(2) or (3) of this section, the licensee shall delay the recording and reporting of the assessments for periods up to seven months, unless otherwise required by §336.335 of this title (relating to Reporting Requirements for Incidents) or §336.352 of this title (relating to Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits). This delay permits the licensee to make additional measurements basic to the assessments.

(e) If the identity and concentration of each radionuclide in a mixture are known, the fraction of the DAC applicable to the mixture for use in calculating DAC-hours shall be either:

(1) the sum of the ratios of the concentration to the appropriate DAC value (e.g., D, W, or Y) from §336.359, Appendix B, of this title for each radionuclide in the mixture; or

(2) the ratio of the total concentration for all radionuclides in the mixture to the most restrictive DAC value for any radionuclide in the mixture.

(f) If the identity of each radionuclide in a mixture is known, but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

(g) When a mixture of radionuclides in air exists, a licensee may disregard certain radionuclides in the mixture if:

(1) The licensee uses the total activity of the mixture in demonstrating compliance with the dose limits in §336.305 of this title (relating to Occupational Dose Limits for Adults) and in complying with the monitoring requirements in §336.316(2) of this title; and

(2) The concentration of any radionuclide disregarded is less than 10% of its DAC; and

(3) The sum of these percentages for all of the radionuclides disregarded in the mixture does not exceed 30%.

(h) When determining the committed effective dose equivalent, the following information may be considered:

(1) To calculate the committed effective dose equivalent, the licensee may assume that the inhalation of one ALI, or an exposure of 2,000 DAC-hours, results in a committed effective dose equivalent of 5 rems (0.05 sievert) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

(2) When the ALI (and the associated DAC) is determined by the nonstochastic organ dose limit of 50 rems (0.5 sievert), the intake of radionuclides that would result in a committed effective dose equivalent of 5 rems (0.05 sievert) (the stochastic ALI) is listed in parentheses in Table I of §336.359, Appendix B, of this title. In this case, the licensee may, as a simplifying assumption, use the stochastic ALI to determine committed effective dose equivalent. However, if the licensee uses the stochastic ALI, the licensee shall also demonstrate that the limit in §336.305(a)(1)(B) of this title is met.

Adopted August 23, 2000

Effective September 14, 2000

§336.309. Determination of Prior Occupational Dose.

(a) For each individual who is likely to receive in a year an occupational dose requiring monitoring under §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose), the licensee shall determine the occupational radiation dose received during the current year

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

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

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

(c) In complying with the requirements of subsection (a) or (b) of this section, a licensee may:

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

(2) accept, as the record of lifetime cumulative radiation dose, an up-to-date form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title (relating to Appendix J. Cumulative Occupational Exposure History)) or

equivalent, signed by the individual and countersigned by an appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee; and

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

(d) The licensee shall record individual exposure histories.

(1) The licensee shall record the exposure history of each individual, as required by subsection (a) or (b) of this section, on form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or other clear and legible record which includes all of the information required on that form. The form or record shall show each period in which the individual received occupational exposure to radiation or radioactive material and shall be signed by the individual who received the exposure. For each period for which the licensee obtains reports, the licensee shall use the dose shown in the report in preparing form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or equivalent. For any period for which the licensee does not obtain a report, the licensee shall place a notation on form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or equivalent indicating the periods of time for which data are not available.

(2) Licensees are not required to separate historical dose, obtained and recorded before January 1, 1994, into external dose equivalent(s) and internal committed dose equivalent(s). Further, occupational exposure histories obtained and recorded on form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or equivalent before January 1, 1994, would not have included effective dose equivalent but may be used in the absence of specific information on the intake of radionuclides by the individual.

(e) If the licensee is unable to obtain a complete record of an individual's current and previously accumulated occupational dose, the licensee shall assume:

(1) in establishing administrative controls under §336.305(f) of this title (relating to Occupational Dose Limits for Adults) for the current year, that the allowable dose limit for the individual is reduced by 1.25 rems (12.5 millisieverts) for each quarter for which records are unavailable and that the individual was engaged in activities that could have resulted in occupational radiation exposure; and

(2) that the individual is not available for planned special exposures.

(f) The licensee shall retain the records on form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) or equivalent until the executive director terminates each pertinent license requiring this record. The licensee shall retain records used in preparing form "Cumulative Occupational Exposure History" (see §336.367, Appendix J of this title) for three years after the record is made. This includes records required under the standards for protection against radiation in effect prior to January 1, 1994.

Adopted January 11, 2012

Effective February 2, 2012

§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.

Adopted August 8, 2001

Effective August 30, 2001

§336.311. Occupational Dose Limits for Minors.

The annual occupational dose limits for minors are 10% of the annual occupational dose limits specified for adult workers in §336.305 of this title (relating to Occupational Dose Limits for Adults).

Adopted May 14, 1997

Effective June 5, 1997

§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.

Adopted August 8, 2001

Effective August 30, 2001

§336.313. Dose Limits for Individual Members of the Public.

(a) Each licensee shall conduct operations so that:

(1) The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (one millisievert) in a year, exclusive of the dose contribution from the licensee's disposal of radioactive material into sanitary sewerage in accordance with §336.215 of this title (relating to Disposal by Release into Sanitary Sewerage); and

(2) The dose in any unrestricted area from external sources does not exceed 0.002 rem (0.02 millisievert) in any one hour.

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

(c) A licensee or an applicant for a license shall apply for prior commission authorization to operate up to an annual dose limit for an individual member of the public of 0.5 rem (five millisieverts). The licensee or applicant shall include the following information in this application:

(1) demonstration of the need for and the expected duration of operations in excess of the limit in subsection (a) of this section;

(2) the licensee's or applicant's program to assess and control dose within the 0.5 rem (five millisieverts) annual limit; and

(3) the procedures to be followed to maintain the dose as low as is reasonably achievable.

(d) In addition to the requirements of this chapter, a licensee shall also be subject to the provisions of the EPA's generally applicable environmental radiation standards in 40 Code of Federal Regulations Part 190 (Environmental Radiation Protection Standards for Nuclear Power Operations).

(e) The commission may impose additional restrictions on radiation levels in unrestricted areas and on the total quantity of radionuclides that a licensee may release in effluents in order to restrict the collective dose.

Adopted August 23, 2000

Effective September 14, 2000

§336.314. Compliance with Dose Limits for Individual Members of the Public.

(a) The licensee shall make or cause to be made, as appropriate, surveys of radiation levels in unrestricted areas and radioactive materials in effluents released to unrestricted areas to demonstrate compliance with the dose limits for individual members of the public in §336.313 of this title (relating to Dose Limits for Individual Members of the Public).

(b) A licensee shall show compliance with the annual dose limit in §336.313 of this title by:

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

(2) demonstrating that:

(A) the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in Table II 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) if an individual were continually present in an unrestricted area, the dose from external sources would not exceed 0.002 rem (0.02 millisievert) in an hour and 0.05 rem (0.5 millisievert) in a year.

(c) Upon approval in the license by the commission, the licensee may adjust the effluent concentration values in §336.359, Appendix B, Table II, of this title for members of the public, to take into account the actual physical and chemical characteristics of the effluents (e.g., aerosol size distribution, solubility, density, radioactive decay equilibrium, and chemical form).

Adopted May 14, 1997

Effective June 5, 1997

§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 of the radiation levels and residual radioactivity detected.

(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 State Health Services, 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.

(e) Regardless of §336.343(a) of this title (relating to Records of Surveys), records from surveys describing the location and amount of subsurface residual radioactivity identified at the site must be kept with records important for decommissioning, and such records must be retained in accordance with §336.621 of this title (relating to Recordkeeping for Decommissioning), as applicable.

Adopted November 16, 2016

Effective December 8, 2016

§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).

Adopted August 8, 2001

Effective August 30, 2001

§336.317. Control of Access to High Radiation Areas.

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

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

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

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

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

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

(d) The licensee shall establish the controls required by subsections (a) and (c) of this section in a way that does not prevent individuals from leaving a high radiation area.

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

(1) the packages do not remain in the area longer than 3 days; and

(2) the dose rate at 1 meter from the external surface of any package does not exceed 0.01 rem (0.1 millisievert) per hour.

Adopted May 14, 1997

Effective June 5, 1997

§336.318. Control of Access to Very High Radiation Areas.

In addition to the requirements in §336.317 of this title (relating to Control of Access to High Radiation Areas), the licensee shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 500 rads (5 grays) or more in one hour at 1 meter from a source of radiation or any surface through which the radiation penetrates.

Adopted May 14, 1997

Effective June 5, 1997

§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.

Adopted August 8, 2001

Effective August 30, 2001

§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.

Adopted August 8, 2001

Effective August 30, 2001

§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.

Adopted August 8, 2001

Effective August 30, 2001

§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.

Adopted August 8, 2001

Effective August 30, 2001

§336.323. Security of Stored Radioactive Material.

The licensee shall secure from unauthorized removal or access licensed radioactive materials that are stored in unrestricted areas.

Adopted May 14, 1997

Effective June 5, 1997

§336.324. Control of Radioactive Material Not in Storage.

The licensee shall control and maintain constant surveillance of licensed radioactive material that is in an unrestricted area and that is not in storage.

Adopted May 14, 1997

Effective June 5, 1997

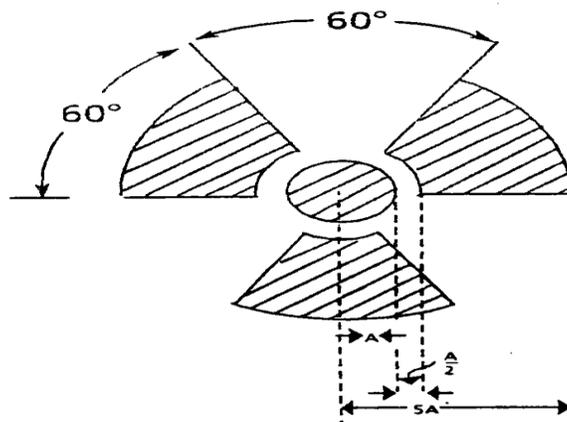
§336.325. Caution Signs.

(a) Standard radiation symbol. Unless otherwise authorized by the commission, the symbol prescribed by this section shall use the colors magenta, or purple, or black on yellow background. The symbol prescribed is the three-bladed design as follows:

Figure 1: 30 TAC §336.325(a)

RADIATION SYMBOL

- (1) Cross-hatched area is to be magenta, or purple, or black, and
- (2) The background is to be yellow.



(b) Additional information on signs and labels. In addition to the contents of signs and labels prescribed in this subchapter, the licensee shall provide, on or near the required signs and labels, additional information, as appropriate, to make individuals aware of potential radiation exposures and to minimize the exposures.

Adopted May 14, 1997

Effective June 5, 1997

§336.326. Posting Requirements.

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

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

(c) Posting of very high radiation areas. The licensee shall post each very high radiation area with a conspicuous sign or signs bearing the radiation symbol and words "GRAVE DANGER, VERY HIGH RADIATION AREA."

(d) Posting of airborne radioactivity areas. The licensee shall post each airborne radioactivity area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVITY AREA."

(e) Posting of areas or rooms in which licensed radioactive material is used or stored. The licensee shall post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in §336.360, Appendix C, of this title (relating to Quantities of Licensed Material Requiring Labeling) with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)."

Adopted May 14, 1997

Effective June 5, 1997

§336.327. Exceptions to Posting Requirements.

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

(1) The materials are constantly attended during these periods by an individual who takes the precautions necessary to prevent the exposure of individuals to radiation or radioactive materials in excess of the limits established in this subchapter; and

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

Adopted May 14, 1997

Effective June 5, 1997

§336.328. Labeling Containers.

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

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

Adopted May 14, 1997

Effective June 5, 1997

§336.329. Exemptions to Labeling Requirements.

A licensee is not required to label:

(1) containers holding licensed material in quantities less than those listed in §336.360, Appendix C, of this title (relating to Quantities of Licensed Material Requiring Labeling);

(2) containers holding licensed material in concentrations less than those specified in Table III 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);

(3) containers attended by an individual who takes the precautions necessary to prevent the exposure of individuals in excess of the limits established by this subchapter;

(4) containers when they are in transport and packaged and labeled in accordance with the rules of the United States Department of Transportation (labeling of packages containing radioactive material is required by the United States Department of Transportation if the amount and type of radioactive material exceeds the limits for an excepted quantity or article as defined and limited by rules in 49 CFR 173.403(m) and (w) as amended through September 29, 1989, and 49 CFR 172.436-172.440 as amended through December 20, 1991);

(5) containers that are accessible only to individuals authorized to handle or use them, or to work in the vicinity of the containers, if the contents are identified to these individuals by a readily available written record. (Examples of containers of this type are containers in locations such as water-filled canals, storage vaults, or hot cells.) The record shall be retained as long as the containers are in use for the purpose indicated on the record; or

(6) installed manufacturing or process equipment, such as piping and tanks.

Adopted May 14, 1997

Effective June 5, 1997

§336.330. Procedures for Receiving and Opening Packages.

(a) Each licensee who expects to receive a package containing quantities of radioactive material in excess of a Type A quantity, as defined in §336.2 of this title (relating to Definitions), shall make arrangements to receive:

(1) the package when the carrier offers it for delivery; or

(2) notification of the arrival of the package at the carrier's terminal and to take possession of the package expeditiously.

(b) Each licensee shall monitor the external surfaces of a labeled (labeled with a Radioactive White I, Yellow II, or Yellow III label, as specified in United States Department of Transportation rules in 49 CFR 172.403 as amended through December 21, 1990, and 49 CFR 172.436-172.440 as amended through December 20, 1991) package for radioactive contamination unless the package contains:

(1) only radioactive material in the form of gas or in special form, as defined in §336.2 of this title; and

(2) quantities of radioactive material that are less than or equal to the Type A quantity, as defined in §336.2 of this title; and

(3) monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if there is evidence of degradation of package integrity, such as packages that are crushed, wet, or damaged.

(c) The licensee shall perform the monitoring required by subsection (b) of this section as soon as practical after receipt of the package, but not later than 3 hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours, or not later than 3 hours after the beginning of the next working day if it is received after working hours.

(d) The licensee shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the executive director and the Texas Department of Health when:

(1) Removable radioactive surface contamination exceeds the limits of 10 CFR 71.87(i) as amended through September 28, 1995 (60 FedReg 50264) (relating to Routine Determinations).

(2) External radiation levels exceed the limits of 10 CFR §71.47 as amended through September 28, 1995 (60 FedReg 50264) (relating to External Radiation Standards for All Packages).

(e) Each licensee shall:

(1) establish, maintain, and retain written procedures for safely opening packages in which radioactive material is received; and

(2) ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened.

Adopted May 14, 1997

Effective June 5, 1997

§336.331. Transfer of Radioactive Material.

(a) The licensee shall not transfer source material, byproduct material, or other licensed radioactive material except as authorized under the rules in this subchapter.

(b) Except as otherwise provided in the license and subject to the provisions of subsections (c) and (d) of this section, a licensee shall transfer source material, byproduct material, or other licensed radioactive material:

(1) to the agency (A licensee shall transfer material to the agency only after receiving prior approval from the agency. If the material to be transferred is special nuclear material, the quantity must not be sufficient to form a critical mass.);

(2) to the United States Department of Energy;

(3) to any person exempt from licensing requirements by the Texas Department of State Health Services (DSHS) under the Texas Health and Safety Code, §401.106(a), the rules in this chapter, or exempt from the licensing requirements of the United States Nuclear Regulatory Commission (NRC) or an Agreement State, to the extent permitted by those exemptions;

(4) to any person authorized to receive this material under terms of a specific or a general license or its equivalent issued by the commission, DSHS, NRC, or any Agreement State, or to any person authorized to receive this material by the federal government; or

(5) as otherwise authorized by the commission in writing by DSHS, any Agreement State, or the federal government.

(c) Before transferring source material, byproduct material, or other radioactive material to a specific licensee of the commission, DSHS, NRC, or an Agreement State or to a general licensee who is required to register with DSHS, NRC, or an Agreement State prior to receipt of the source material, byproduct material, or other radioactive material, the licensee transferring the material shall verify that the transferee's license authorizes the receipt of the type, form, and quantity of radioactive material to be transferred.

(d) The following methods for the verification required by subsection (c) of this section are acceptable.

(1) The transferor shall possess and have read a current copy of the transferee's specific license or certificate of registration.

(2) The transferor may possess a written certification by the transferee that the transferee is authorized by the license or certificate of registration to receive the type, form, and quantity of radioactive material to be transferred, specifying the license or certificate of registration number, issuing agency, and expiration date.

(3) For emergency shipments, the transferor may accept oral certification by the transferee that the transferee is authorized by license or certificate of registration to receive the type, form, and quantity of radioactive material to be transferred, specifying the license or certificate of registration number, issuing agency, and expiration date, provided that the oral certification is confirmed in writing within ten days.

(4) The transferor may obtain other sources of information compiled by a reporting service from official records of the commission, DSHS, NRC, or an Agreement State as to the identity of licensees and registrants and the scope and expiration dates of licenses and registrations.

(5) When none of the methods of verification described in paragraphs (1) - (4) of this subsection are readily available or when a transferor desires to verify that information received by one of these methods is correct or up-to-date, the transferor may obtain and record confirmation from the commission, DSHS,

NRC, or an Agreement State that the transferee is licensed to receive the source material, byproduct material, or other radioactive material.

(e) Transportation of radioactive material shall also be subject to applicable rules of the United States Department of Transportation, United States Postal Service, NRC, or DSHS.

(f) The licensee shall keep records showing the transfer of any source material, byproduct material, or other radioactive material.

(g) Transfer of low-level radioactive waste by a waste generator, waste collector, or waste processor who ships this waste either directly, or indirectly through a collector or processor, to a licensed land disposal facility shall also be subject to applicable rules of DSHS. A commission licensee who transfers low-level radioactive waste for disposal at a licensed land disposal facility shall also be subject to applicable rules of DSHS with respect to transfers.

(h) A licensed land disposal facility operator shall use and comply with the requirements of §336.363 of this title (relating to Appendix F. Requirements for Receipt of Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Uniform Manifests).

(i) Any licensee shipping byproduct material, as defined in §336.2(16)(C) - (E) of this title (relating to Definitions) concerning the definition of byproduct material, intended for ultimate disposal must document the information required on the shipping manifest and transfer this recorded manifest information to the intended consignee.

Adopted January 11, 2012

Effective February 2, 2012

§336.332. Preparation of Radioactive Material for Transport.

(a) No licensee shall deliver any source material, byproduct material, or other licensed radioactive material to a carrier for transport, unless:

(1) the licensee complies with the applicable requirements of the rules, appropriate to the mode of transport, of the United States Department of Transportation insofar as those rules relate to the packing of radioactive material and to the monitoring, marking, and labeling of those packages or containers;

(2) the licensee establishes procedures for opening and closing packages and containers in which radioactive material is transported to provide safety and to assure that, prior to the delivery to a carrier for transport, each package or container is properly closed for transport; and

(3) the licensee assures that any special instructions needed to safely open the package or container are sent to or have been made available to the consignee prior to delivery of a package or container to a carrier for transport.

(b) For the purpose of subsection (a) of this section, licensees who transport their own licensed material as private carriers are considered to have delivered the material to a carrier for transport.

Adopted August 23, 2000

Effective September 14, 2000

§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;

the (C) the isotopes, quantities, and chemical and physical form of 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).

Adopted August 8, 2001

Effective August 30, 2001

§336.336. Tests.

(a) Each licensee shall perform, upon instructions from the executive director, or shall permit the executive director to perform such tests as the executive director deems appropriate or necessary for the administration of the rules in this chapter including, but not limited to, tests of:

(1) source material, byproduct material, or other licensed radioactive material;

(2) facilities where these materials are used, stored, or disposed;

(3) radiation detection and monitoring instruments; and

(4) other equipment and devices used in connection with utilization, storage, or disposal of source material, byproduct material, or other licensed radioactive material.

(b) The requirements of this section do not apply to licenses issued under Subchapter H of this chapter (relating to Licensing Requirements for Near-Surface Land Disposal of Low-Level Radioactive Waste).

Adopted August 23, 2000

Effective September 14, 2000

§336.338. General Recordkeeping Requirements for Disposal.

(a) Each person who possesses or uses a source of radiation shall maintain:

(1) records of the disposal of sources of radiation, including special wastes and transferred wastes, by incineration, by sanitary sewerage, by any alternate method of disposal, or by burial in soil including burials authorized under the Atomic Energy Act by the Atomic Energy Commission or the United States Nuclear Regulatory Commission and by the Texas Department of Health rules before May 1977;

(2) appropriate records that show the radiation exposure of each individual for whom personnel monitoring is required by the agency's rules, licenses, registrations, and orders; and

(3) other records the agency requires.

(b) Copies of records required to be maintained under subsection (a) of this section shall be submitted to the agency on request.

(c) A person who possesses or uses a source of radiation shall furnish to each employee for whom personnel monitoring is required a copy of the employee's personal exposure record at any time the employee has received exposure that exceeds the maximum permissible levels provided by the agency's rules and on termination of employment. The person shall furnish to an employee on request a copy of the employee's annual exposure record.

Adopted August 23, 2000

Effective September 14, 2000

§336.339. Form of Records.

Each record required by this subchapter shall be legible throughout the specified retention period. The record shall be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

Adopted August 23, 2000

Effective September 14, 2000

§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.

Adopted August 8, 2001

Effective August 30, 2001

§336.342. Records of Radiation Protection Programs.

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

- (1) the provisions of the program; and
- (2) audits and other reviews of program content and implementation.

(b) The licensee shall retain the records required by subsection (a)(1) of this section until the commission terminates each pertinent license requiring the record. The licensee shall retain the records required by subsection (a)(2) of this section for 3 years after the record is made.

Adopted May 14, 1997

Effective June 5, 1997

§336.343. Records of Surveys.

(a) Each licensee shall maintain records showing the results of surveys and calibrations required by §336.315 of this title (relating to General Requirements for Surveys and Monitoring) and §336.330(b) of this title (relating to Procedures for Receiving and Opening Packages). The licensee shall retain these records for 3 years after the record is made.

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

(1) results of surveys to determine the dose from external sources of radiation and used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents. This includes those records of results of surveys to determine the dose from external sources and used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents required under the standards for protection against radiation in effect before January 1, 1994;

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

dose. This includes those records of the results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose required under the standards for protection against radiation in effect before January 1, 1994.

(3) results of air sampling, surveys, and bioassays required under §336.321(a)(3)(A) and (B) of this title (relating to Use of Individual Respiratory Protection Equipment). This includes those records showing the results of air sampling, surveys, and bioassays required under the standards for protection against radiation in effect before January 1, 1994.

(4) results of measurements and calculations used to evaluate the release of radioactive effluents to the environment. This includes those records of the results of measurements and calculations used to evaluate the release of radioactive effluents to the environment required under the standards for protection against radiation in effect before January 1, 1994.

Adopted May 14, 1997

Effective June 5, 1997

§336.344. Records of Prior Occupational Dose.

The licensee shall retain the records of prior occupational radiation dose and exposure history as specified in §336.309 of this title (relating to Determination of Prior Occupational Dose) on form "Cumulative Occupational Exposure History" (§336.367, Appendix J of this title (relating to Cumulative Occupational Exposure History)) or equivalent until the commission terminates each pertinent license requiring this record. The licensee shall retain records used in preparing form "Cumulative Occupational Exposure History" (§336.367, Appendix J of this title) or equivalent for 3 years after the record is made. This includes records required under the standards for protection against radiation in effect before January 1, 1994.

Adopted May 14, 1997

Effective June 5, 1997

§336.345. Records of Planned Special Exposures.

(a) For each use of the provisions of §336.310 of this title (relating to Planned Special Exposures) for planned special exposures, the licensee shall maintain records that describe:

(1) the exceptional circumstances requiring the use of a planned special exposure;

(2) the name of the management official who authorized the planned special exposure and a copy of the signed authorization;

(3) what actions were necessary;

(4) why the actions were necessary;

(5) what precautions were taken to assure that doses were maintained as low as is reasonable achievable;

(6) what individual and collective doses were expected to result; and

(7) the doses actually received in the planned special exposure.

(b) The licensee shall retain the records until the commission terminates each pertinent license requiring these records.

Adopted May 14, 1997

Effective June 5, 1997

§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.

Adopted August 8, 2001

Effective August 30, 2001

§336.347. Records of Dose to Individual Members of the Public.

(a) Each licensee shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public. See §336.313 of this title (relating to Dose Limits for Individual Members of the Public).

(b) The licensee shall retain the records required by subsection (a) of this section until the commission terminates each pertinent license requiring the record.

Adopted May 14, 1997

Effective June 5, 1997

§336.350. Reports of Stolen, Lost, or Missing Licensed Radioactive Material.

(a) Telephone reports. Each licensee shall report to the executive director or staff by telephone as follows:

(1) immediately after its occurrence becomes known to the licensee, any stolen, lost, or missing licensed radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in §336.360, Appendix C, of this title (relating to Quantities of Licensed Material Requiring Labeling) under those circumstances that it appears to the licensee that an exposure could result to individuals in unrestricted areas; or

(2) within 30 days after its occurrence becomes known to the licensee, any stolen, lost, or missing licensed radioactive material in an aggregate quantity greater than 10 times the quantity specified in §336.360, Appendix C, of this title that is still missing.

(b) Written reports. Each licensee required to make a report under subsection (a) of this section shall, within 30 days after making the telephone report, make a written report to the executive director setting forth the following information:

(1) a description of the licensed radioactive material involved, including the kind, quantity, and chemical and physical form;

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

(3) a statement of disposition, or probable disposition, of the licensed material involved;

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

(5) actions that have been taken, or will be taken, to recover the licensed material; and

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

(c) Supplemental reports. Subsequent to filing the written report, the licensee shall also report any additional substantive information on the loss or theft within 30 days after the licensee learns of this information.

(d) Exposure reports. The licensee shall prepare any report filed with the executive director under this section so that names of individuals who may have received exposure to radiation or radioactive material are stated in a separate and detachable part of the report.

Adopted May 14, 1997

Effective June 5, 1997

§336.351. Reports of Transactions Involving Nationally Tracked Sources.

(a) Each licensee who manufactures, transfers, receives, disassembles, or disposes of a nationally tracked source shall complete and submit to the United States Nuclear Regulatory Commission (NRC) a National Source Tracking Transaction Report as specified in paragraphs (1) - (6) of this subsection for each type of transaction.

(1) Each licensee who manufactures a nationally tracked source shall complete and submit to NRC a National Source Tracking Transaction Report. The report must include the following information:

- (A) the name, address, and license number of the reporting licensee;
- (B) the name of the individual preparing the report;
- (C) the manufacturer, model, and serial number of the source;
- (D) the radioactive material in the source;
- (E) the initial source strength in becquerels (curies) at the time of manufacture; and
- (F) the manufacture date of the source.

(2) Each licensee that transfers a nationally tracked source to another person shall complete and submit to NRC a National Source Tracking Transaction Report. The report shall include the following information:

- (A) the name, address, and license number of the reporting licensee;
- (B) the name of the individual preparing the report;
- (C) the name and license number of the recipient facility and the shipping address;
- (D) the manufacturer, model, and serial number of the source or, if not available, other information to uniquely identify the source;
- (E) the radioactive material in the source;

(F) the initial or current source strength in becquerels (curies);

(G) the date for which the source strength is reported;

(H) the shipping date;

(I) the estimated arrival date; and

(J) for nationally tracked sources transferred as waste under a Uniform Low-Level Radioactive Waste Manifest, the waste manifest number and the container identification of the container with the nationally tracked source.

(3) Each licensee that receives a nationally tracked source shall complete and submit to NRC a National Source Tracking Transaction Report. The report shall include the following information:

(A) the name, address, and license number of the reporting licensee;

(B) the name of the individual preparing the report;

(C) the name, address, and license number of the person that provided the source;

(D) the manufacturer, model, and serial number of the source or, if not available, other information to uniquely identify the source;

(E) the radioactive material in the source;

(F) the initial or current source strength in becquerels (curies);

(G) the date for which the source strength is reported;

(H) the date of receipt; and

(I) for material received under a Uniform Low-Level Radioactive Waste Manifest, the waste manifest number and the container identification with the nationally tracked source.

(4) Each licensee that disassembles a nationally tracked source shall complete and submit to NRC a National Source Tracking Transaction Report. The report shall include the following information:

(A) the name, address, and license number of the reporting licensee;

(B) the name of the individual preparing the report;

(C) the manufacturer, model, and serial number of the source or, if not available, other information to uniquely identify the source;

(D) the radioactive material in the source;

(E) the initial or current source strength in becquerels (curies);

(F) the date for which the source strength is reported; and

(G) the disassemble date of the source.

(5) Each licensee who disposes of a nationally tracked source shall complete and submit to NRC a National Source Tracking Transaction Report. The report shall include the following information:

licensee;

(A) the name, address, and license number of the reporting

(B) the name of the individual preparing the report;

(C) the waste manifest number;

source;

(D) the container identification with the nationally tracked

(E) the date of disposal; and

(F) the method of disposal.

(6) The reports discussed in paragraphs (1) - (6) of this subsection shall be submitted to NRC by the close of the next business day after the transaction. A single report may be submitted for multiple sources and transactions. The reports shall be submitted to the National Source Tracking System by using the following:

(A) the on-line National Source Tracking System;

(B) electronically using a computer-readable format;

(C) by facsimile;

(D) by mail to the address on the National Source Tracking Transaction Report Form (NRC Form 748); or

(E) by telephone with follow-up by facsimile or mail.

(7) Each licensee shall correct any error in previously filed reports or file a new report for any missed transaction within five business days of the discovery of the error or missed transaction. Such errors may be detected by a variety of methods such as administrative reviews or by physical inventories required by regulation. In addition, each licensee shall reconcile the inventory of nationally tracked sources possessed by the licensee against that licensee's data in the National Source Tracking System. The reconciliation shall be conducted during the month of January in each year. The reconciliation process shall include resolving any discrepancies between the National Source Tracking System and the actual inventory by filing the reports identified by paragraphs (1) - (6) of this subsection. By January 31 of each year, each licensee shall submit to the National Source Tracking System confirmation that the data in the National Source Tracking System is correct.

(8) Each licensee that possesses Category 1 or Category 2 nationally tracked sources listed in subsection (b) of this section shall report its initial inventory of Category 1 or Category 2 nationally tracked sources to the National Source Tracking System by January 31, 2009. The information may be submitted to NRC by using any of the methods identified by paragraph (6)(A) - (E) of this subsection. The initial inventory report shall include the following information:

(A) the name, address, and license number of the reporting licensee;

(B) the name of the individual preparing the report;

(C) the manufacturer, model, and serial number of each nationally tracked source or, if not available, other information to uniquely identify the source;

(D) the radioactive material in the sealed source;

(E) the initial or current source strength in becquerels (curies);
and

(F) the date for which the source strength is reported.

(b) Nationally tracked source thresholds. The Terabecquerel (TBq) values are the regulatory standards. The curie values specified are obtained by converting from the TBq value. The curie values are provided for practical usefulness only and

are rounded after conversion. The following table contains nationally tracked source thresholds.

Figure: 30 TAC §336.351(b)

Nationally Tracked Sources Threshold				
Radioactive Material	Category 1 (TBq)	Category 1 (Ci)	Category 2 (TBq)	Category 2 (Ci)
Actinium-227	20	540	0.2	5.4
Americium-241	60	1,600	0.6	16.0
Americium-241/Be	60	1,600	0.6	16.0
Californium-252	20	540	0.2	5.4
Cobalt-60	30	810	0.3	8.1
Curium-244	50	1,400	0.5	14.0
Cesium-137	100	2,700	1.0	27.0
Gadolinium-153	1,000	27,000	10.0	270.0
Iridium-192	80	2,200	0.8	22.0
Plutonium-238	60	1,600	0.6	16.0
Plutonium-239/Be	60	1,600	0.6	16.0
Polonium-210	60	1,600	0.6	16.0
Promethium-147	40,000	1,100,000	400.0	11,000.0
Radium-226	40	1,100	0.4	11.0
Selenium-75	200	5,400	2.0	54.0
Strontium-90	1,000	27,000	10.0	270.0
Thorium-228	20	540	0.2	5.4
Thorium-229	20	540	0.2	5.4
Thulium-170	20,000	540,000	200.0	5,400.0
Ytterbium-169	300	8,100	3.0	81.0

TBq - Terabecquerel

Ci - Curie

Adopted January 11, 2012

Effective February 2, 2012

§336.352. Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits.

(a) Reportable events. In addition to the notification required by §336.335 of this title (relating to Reporting Requirements for Incidents), each licensee shall submit a written report to the executive director within 30 days after learning of any of the following occurrences:

(1) any incident for which notification is required by §336.335 of this title; or

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

(A) the occupational dose limits for adults in §336.305 of this title (relating to Occupational Dose Limits for Adults);

(B) the occupational dose limits for minors in §336.311 of this title (relating to Occupational Dose Limits for Minors);

(C) the limits for an embryo/fetus of a declared pregnant woman in §336.312 of this title (relating to Dose to an Embryo/Fetus);

(D) the limits for an individual member of the public in §336.313 of this title (relating to Dose Limits for Individual Members of the Public);
or

(E) any applicable limit in the license; or

(F) the ALARA constraints for air emissions established under §336.304(d); or

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

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

(B) an unrestricted area in excess of 10 times any applicable limit set forth in this subchapter or in the license, whether or not involving exposure of any individual in excess of the limits in §336.313 of this title; or

(4) for licensees subject to the provisions of the United States Environmental Protection Agency's generally applicable environmental radiation standards in 40 CFR Part 190 as amended through January 13, 1977 (42 FedReg 2860) (Environmental Radiation Protection Standards for Nuclear Power Operations), levels of radiation or releases of radioactive material in excess of those standards or of license conditions related to those standards.

(b) Contents of reports.

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

(A) estimates of each individual's dose;

(B) the levels of radiation and concentrations of radioactive material involved;

(C) the cause of the elevated exposures, dose rates, or concentrations; and

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

(2) Each report filed under subsection (a) of this section shall include for each occupationally overexposed individual: the name, social security number, and date of birth. With respect to the limit for the embryo/fetus in §336.312 of this title, the identifiers should be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable part of the report.

Adopted August 23, 2000

Effective September 14, 2000

§336.353. Reports of Planned Special Exposures.

The licensee shall submit a written report to the executive director within 30 days following any planned special exposure conducted in accordance with §336.310 of this title (relating to Planned Special Exposures), informing the executive director that a planned special exposure was conducted and indicating the date the planned special exposure occurred and the information required by §336.345 of this title (relating to Records of Planned Special Exposures).

Adopted May 14, 1997

Effective June 5, 1997

§336.354. Reports to Individuals.

(a) Reports to individuals of exceeding dose limits. When a licensee is required, under the provisions of §336.352 of this title (relating to Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits), §336.353 of this title (relating to Reports of Planned Special Exposures), or §336.355 of this title (relating to Reports of Individual Monitoring), to report to the executive director any exposure of an identified occupationally-exposed individual, or an identified member of the public, to radiation or radioactive material, the licensee shall also provide a copy of the report submitted to the executive director to the individual. This report must be transmitted at a time not later than the transmittal to the executive director.

(b) Notifications and reports to individuals. In addition to the reports to individuals under subsection (a) of this section, each licensee shall provide notification and reports to individuals of exposure to radiation or radioactive material as specified in §336.405 of this title (relating to Notifications and Reports to Individuals).

Adopted May 14, 1997

Effective June 5, 1997

§336.355. Reports of Individual Monitoring.

(a) Each person licensed by the commission to receive low-level radioactive waste from other persons for disposal under Subchapter H of this chapter (relating to Licensing Requirements for Near-Surface Land Disposal of Low-Level Radioactive Waste) shall submit an annual report of the results of individual monitoring carried out by the licensee for each individual for whom monitoring was required by §336.316 of this title (relating to Conditions Requiring Individual Monitoring of External and Internal Occupational Dose) during that year. The licensee may include additional data for individuals for whom monitoring was provided but not required. The licensee may use the form "Occupational Exposure Record for a Monitoring Period" (see §336.368 of this title (relating to Appendix K. Occupational Exposure Record for a Monitoring Period)) or a clear and legible record containing all the information required by that form.

(b) The licensee shall submit the report required by subsection (a) of this section, covering the preceding year, to the executive director on or before April 30 of each year.

Adopted August 23, 2000

Effective September 14, 2000

§336.356. Soil and Vegetation Contamination Limits.

(a) No licensee may possess, receive, use, or transfer licensed radioactive material in such a manner as to cause contamination of soil or vegetation in unrestricted areas that causes a member of the public to receive a total effective dose equivalent in excess of 25 mrem/year from all pathways (excluding radium and its decay products) and to the extent that the contamination exceeds the background level by more than:

(1) for radium-226 or radium-228 in soil, the following limits, based on dry weight, averaged over any 100 square meters of area:

(A) 5 picocuries/gram (pCi/g), averaged over the first 15 centimeters of soil below the surface;

(B) 15 pCi/g, averaged over each 15-centimeter thick layer of soil below the first 15 centimeters below the surface; and

(2) for radium-226 or radium-228 in vegetation, 5 pCi/g, based on dry weight.

(b) Notwithstanding the limits set forth in subsection (a) of this section, each licensee shall make every reasonable effort to maintain any contamination of soil or vegetation as low as is reasonably achievable (ALARA).

(c) If contamination caused by the licensee is detected in an unrestricted area, the licensee shall decontaminate any unrestricted area which is contaminated above the limits specified in subsection (a) of this section.

Adopted July 29, 1998

Effective September 3, 1998

§336.357. Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material.

(a) Specific exemption. A licensee that possesses radioactive waste that contains category 1 or category 2 quantities of radioactive material is exempt from the requirements of subsections (b) - (w) of this section. However, any radioactive waste that contains discrete sources, ion-exchange resins, or activated material that weighs less than 2,000 kilograms (4,409 pounds) is not exempt from the requirements of subsections (b) - (w) of this section. The licensee shall implement the following requirements to secure the radioactive waste:

(1) use continuous physical barriers that allow access to the radioactive waste only through established access control points;

(2) use a locked door or gate with monitored alarm at the access control point;

(3) assess and respond to each actual or attempted unauthorized access to determine whether an actual or attempted theft, sabotage, or diversion occurred; and

(4) immediately notify the local law enforcement agency (LLEA) and request an armed response from the LLEA upon determination that there was an actual or attempted theft, sabotage, or diversion of the radioactive waste that contains category 1 or category 2 quantities of radioactive material.

(b) Personnel access authorization requirements for category 1 or category 2 quantities of radioactive material.

(1) General.

(A) Each licensee that possesses an aggregated quantity of radioactive material at or above the category 2 threshold shall establish, implement, and maintain its access authorization program in accordance with the requirements of this subsection and subsections (c) - (h) of this section.

(B) An applicant for a new license and each licensee, upon application for modification of its license, that would become newly subject to the requirements of this subsection and subsections (c) - (h) of this section, shall implement the requirements of this subsection and subsections (c) - (h) of this section, as appropriate, before taking possession of an aggregated category 1 or category 2 quantity of radioactive material.

(C) Any licensee that has not previously implemented the Security Orders or been subject to the provisions of this subsection and subsections (c) - (h) of this section shall implement the provisions of this subsection and subsections (c) - (h) of this section before aggregating radioactive material to a quantity that equals or exceeds the category 2 threshold.

(2) General performance objective. The licensee's access authorization program must ensure that the individuals specified in paragraph (3)(A) of this subsection are trustworthy and reliable.

(3) Applicability.

(A) Licensees shall subject the following individuals to an access authorization program:

(i) any individual whose assigned duties require unescorted access to category 1 or category 2 quantities of radioactive material or to any device that contains the radioactive material; and

(ii) reviewing officials.

(B) Licensees need not subject the categories of individuals listed in subsection (f)(1) of this section to the investigation elements of the access authorization program.

(C) Licensees shall approve for unescorted access to category 1 or category 2 quantities of radioactive material only those individuals with job duties that require unescorted access to category 1 or category 2 quantities of radioactive material.

(D) Licensees may include individuals needing access to safeguards information-modified handling under 10 Code of Federal Regulations (CFR) Part 73, in the access authorization program under this subsection and subsections (c) - (h) of this section.

(c) Access authorization program requirements.

(1) Granting unescorted access authorization.

(A) Licensees shall implement the requirements of subsection (b) of this section, this subsection, and subsections (d) - (h) of this section for granting initial or reinstated unescorted access authorization.

(B) Individuals determined to be trustworthy and reliable shall also complete the security training required by subsection (j)(3) of this section before being allowed unescorted access to category 1 or category 2 quantities of radioactive material.

(2) Reviewing officials.

(A) Reviewing officials are the only individuals who may make trustworthiness and reliability determinations that allow individuals to have unescorted access to category 1 or category 2 quantities of radioactive materials possessed by the licensee.

(B) Each licensee shall name one or more individuals to be reviewing officials. After completing the background investigation on the reviewing official, the licensee shall provide under oath or affirmation, a certification that the reviewing official is deemed trustworthy and reliable by the licensee. The fingerprints of the named reviewing official must be taken by a law enforcement agency, Federal or State agencies that provide fingerprinting services to the public, or commercial fingerprinting services authorized by a State to take fingerprints. The

licensee shall recertify that the reviewing official is deemed trustworthy and reliable every 10 years in accordance with subsection (d)(3) of this section.

(C) Reviewing officials must be permitted to have unescorted access to category 1 or category 2 quantities of radioactive materials or access to safeguards information or safeguards information-modified handling, if the licensee possesses safeguards information or safeguards information-modified handling.

(D) Reviewing officials cannot approve other individuals to act as reviewing officials.

(E) A reviewing official does not need to undergo a new background investigation before being named by the licensee as the reviewing official if:

(i) the individual has undergone a background investigation that included fingerprinting and a Federal Bureau of Investigations (FBI) criminal history records check and has been determined to be trustworthy and reliable by the licensee; or

(ii) the individual is subject to a category listed in subsection (f)(1) of this section.

(3) Informed consent.

(A) Licensees may not initiate a background investigation without the informed and signed consent of the subject individual. This consent must include authorization to share personal information with other individuals or organizations as necessary to complete the background investigation. Before a final adverse determination, the licensee shall provide the individual with an opportunity to correct any inaccurate or incomplete information that is found during the background investigation. Licensees do not need to obtain signed consent from those individuals that meet the requirements of subsection (d)(2) of this section. A signed consent must be obtained prior to any reinvestigation.

(B) The subject individual may withdraw his or her consent at any time. Licensees shall inform the individual that:

(i) if an individual withdraws his or her consent, the licensee may not initiate any elements of the background investigation that were not in progress at the time the individual withdrew his or her consent; and

(ii) the withdrawal of consent for the background investigation is sufficient cause for denial or termination of unescorted access authorization.

(4) Personal history disclosure. Any individual who is applying for unescorted access authorization shall disclose the personal history information that is required by the licensee's access authorization program for the reviewing official to make a determination of the individual's trustworthiness and reliability. Refusal to provide, or the falsification of, any personal history information required by subsection (b) of this section, this subsection, and subsections (d) - (h) of this section is sufficient cause for denial or termination of unescorted access.

(5) Determination basis.

(A) The reviewing official shall determine whether to permit, deny, unfavorably terminate, maintain, or administratively withdraw an individual's unescorted access authorization based on an evaluation of all of the information collected to meet the requirements of subsection (b) of this section, this subsection, and subsections (d) - (h) of this section.

(B) The reviewing official may not permit any individual to have unescorted access until the reviewing official has evaluated all of the information collected to meet the requirements of subsection (b) of this section, this subsection, and subsections (d) - (h) of this section and determined that the individual is trustworthy and reliable. The reviewing official may deny unescorted access to any individual based on information obtained at any time during the background investigation.

(C) The licensee shall document the basis for concluding whether or not there is reasonable assurance that an individual is trustworthy and reliable.

(D) The reviewing official may terminate or administratively withdraw an individual's unescorted access authorization based on information obtained after the background investigation has been completed and the individual granted unescorted access authorization.

(E) Licensees shall maintain a list of persons currently approved for unescorted access authorization. When a licensee determines that a person no longer requires unescorted access or meets the access authorization requirements, the licensee shall remove the person from the approved list as soon as possible, but no-later-than seven working days, and take prompt measures to ensure that the individual is unable to have unescorted access to the material.

(6) Procedures. Licensees shall develop, implement, and maintain written procedures for implementing the access authorization program. The procedures must include provisions for the notification of individuals who are denied unescorted access. The procedures must include provisions for the review, at the

request of the affected individual, of a denial or termination of unescorted access authorization. The procedures must contain a provision to ensure that the individual is informed of the grounds for the denial or termination of unescorted access authorization and allow the individual an opportunity to provide additional relevant information.

(7) Right to correct and complete information.

(A) Prior to any final adverse determination, licensees shall provide each individual subject to subsection (b) of this section, this subsection, and subsections (d) - (h) of this section with the right to complete, correct, and explain information obtained as a result of the licensee's background investigation. Confirmation of receipt by the individual of this notification must be maintained by the licensee for a period of one year from the date of the notification.

(B) If, after reviewing his or her criminal history record, an individual believes that it is incorrect or incomplete in any respect and wishes to change, correct, update, or explain anything in the record, the individual may initiate challenge procedures. These procedures include direct application by the individual challenging the record to the law enforcement agency that contributed the questioned information or a direct challenge as to the accuracy or completeness of any entry on the criminal history record to the Federal Bureau of Investigation, Criminal Justice Information Services (CJIS) Division, ATTN: SCU, Mod. D-2, 1000 Custer Hollow Road, Clarksburg, WV 26306, as set forth in 28 CFR §§16.30 - 16.34. In the latter case, the FBI will forward the challenge to the agency that submitted the data, and will request that the agency verify or correct the challenged entry. Upon receipt of an official communication directly from the agency that contributed the original information, the FBI Identification Division will make any changes necessary in accordance with the information supplied by that agency. Licensees must provide at least 10 days for an individual to initiate action to challenge the results of an FBI criminal history records check after the record is made available for his or her review. The licensee may make a final adverse determination based upon the criminal history records only after receipt of the FBI's confirmation or correction of the record.

(8) Records.

(A) The licensee shall retain documentation regarding the trustworthiness and reliability of individual employees for three years from the date the individual no longer requires unescorted access to category 1 or category 2 quantities of radioactive material.

(B) The licensee shall retain a copy of the current access authorization program procedures as a record for three years after the procedure is

no longer needed. If any portion of the procedure is superseded, the licensee shall retain the superseded material for three years after the record is superseded.

(C) The licensee shall retain the list of persons approved for unescorted access authorization for three years after the list is superseded or replaced.

(d) Background investigations.

(1) Initial investigation. Before allowing an individual unescorted access to category 1 or category 2 quantities of radioactive material or to the devices that contain the material, licensees shall complete a background investigation of the individual seeking unescorted access authorization. The scope of the investigation must encompass at least the seven years preceding the date of the background investigation or since the individual's eighteenth birthday, whichever is shorter. The background investigation must include at a minimum:

(A) fingerprintings and an FBI identification and criminal history records check in accordance with subsection (e) of this section;

(B) verification of true identity. Licensees shall verify the true identity of the individual applying for unescorted access authorization to ensure that the applicant is who he or she claims to be. A licensee shall review official identification documents (e.g., driver's license; passport; government identification; certificate of birth issued by the state, province, or country of birth) and compare the documents to personal information data provided by the individual to identify any discrepancy in the information. Licensees shall document the type, expiration, and identification number of the identification document, or maintain a photocopy of identifying documents on file in accordance with subsection (g) of this section. Licensees shall certify in writing that the identification was properly reviewed and shall maintain the certification and all related documents for review upon inspection;

(C) employment history verification. Licensees shall complete an employment history verification, including military history. Licensees shall verify the individual's employment with each previous employer for the most recent seven years before the date of application;

(D) verification of education. Licensees shall verify the individual's education during the claimed period;

(E) character and reputation determination. Licensees shall complete reference checks to determine the character and reputation of the individual who has applied for unescorted access authorization. Unless other references are not available, reference checks may not be conducted with any

person who is known to be a close member of the individual's family, including but not limited to the individual's spouse, parents, siblings, or children, or any individual who resides in the individual's permanent household. Reference checks under subsections (b) and (c) of this section, this subsection, and subsections (e) - (h) of this section must be limited to whether the individual has been and continues to be trustworthy and reliable;

(F) the licensee shall also, to the extent possible, obtain independent information to corroborate the information provided by the individual (e.g., seek references not supplied by the individual); and

(G) if a previous employer, educational institution, or any other entity with which the individual claims to have been engaged fails to provide information or indicates an inability or unwillingness to provide information within a time frame deemed appropriate by the licensee, but at least after 10 business days of the request or if the licensee is unable to reach the entity, the licensee shall document the refusal, unwillingness, or inability in the record of investigation and attempt to obtain the information from an alternate source.

(2) Grandfathering.

(A) Individuals who have been determined to be trustworthy and reliable for unescorted access to category 1 or category 2 quantities of radioactive material under the Fingerprint Orders may continue to have unescorted access to category 1 and category 2 quantities of radioactive material without further investigation. These individuals shall be subject to the reinvestigation requirement.

(B) Individuals who have been determined to be trustworthy and reliable under the provisions of 10 CFR Part 73 or the Security Orders for access to safeguards information, safeguards information-modified handling, or risk-significant material may have unescorted access to category 1 and category 2 quantities of radioactive material without further investigation. The licensee shall document that the individual was determined to be trustworthy and reliable under the provisions of 10 CFR Part 73 or a Security Order. Security Order, in this context, refers to any order that was issued by the United States Nuclear Regulatory Commission (NRC) that required fingerprints and an FBI criminal history records check for access to safeguards information, safeguards information-modified handling, or risk significant material such as special nuclear material or large quantities of uranium hexafluoride. These individuals shall be subject to the reinvestigation requirement.

(3) Reinvestigations. Licensees shall conduct a reinvestigation every 10 years for any individual with unescorted access to category 1 or category 2 quantities of radioactive material. The reinvestigation shall consist of fingerprinting

and an FBI identification and criminal history records check in accordance with subsection (e) of this section. The reinvestigations must be completed within 10 years of the date on which these elements were last completed.

(e) Requirements for criminal history records checks of individuals granted unescorted access to category 1 or category 2 quantities of radioactive material.

(1) General performance objective and requirements.

(A) Except for those individuals listed in subsection (f) of this section and those individuals grandfathered under subsection (d)(2) of this section, each licensee subject to the provisions of subsections (b) - (d) of this section, this subsection, and subsections (f) - (h) of this section shall fingerprint each individual who is to be permitted unescorted access to category 1 or category 2 quantities of radioactive material. Licensees shall transmit all collected fingerprints to the NRC for transmission to the FBI. The licensee shall use the information received from the FBI as part of the required background investigation to determine whether to grant or deny further unescorted access to category 1 or category 2 quantities of radioactive materials for that individual.

(B) The licensee shall notify each affected individual that his or her fingerprints will be used to secure a review of his or her criminal history record and shall inform him or her of the procedures for revising the record or adding explanations to the record.

(C) Fingerprinting is not required if a licensee is reinstating an individual's unescorted access authorization to category 1 or category 2 quantities of radioactive materials if:

(i) the individual returns to the same facility that granted unescorted access authorization within 365 days of the termination of his or her unescorted access authorization; and

(ii) the previous access was terminated under favorable conditions.

(D) Fingerprints do not need to be taken if an individual who is an employee of a licensee, contractor, manufacturer, or supplier has been granted unescorted access to category 1 or category 2 quantities of radioactive material, access to safeguards information, or safeguards information-modified handling by another licensee, based upon a background investigation conducted under this section, the Fingerprint Orders, or 10 CFR Part 73. An existing criminal history records check file may be transferred to the licensee asked to grant unescorted access in accordance with the provisions of subsection (g)(3) of this section.

(E) Licensees shall use the information obtained as part of a criminal history records check solely for the purpose of determining an individual's suitability for unescorted access authorization to category 1 or category 2 quantities of radioactive materials, access to safeguards information, or safeguards information-modified handling.

(2) Prohibitions.

(A) Licensees may not base a final determination to deny an individual unescorted access authorization to category 1 or category 2 quantities of radioactive material solely on the basis of information received from the FBI involving:

(i) an arrest more than one year old for which there is no information of the disposition of the case; or

(ii) an arrest that resulted in dismissal of the charge or an acquittal.

(B) Licensees may not use information received from a criminal history records check obtained under subsections (b) - (d) of this section, this subsection, and subsections (f) - (h) of this section in a manner that would infringe upon the rights of any individual under the First Amendment to the Constitution of the United States nor shall licensees use the information in any way that would discriminate among individuals on the basis of race, religion, national origin, gender, or age.

(3) Procedures for processing of fingerprint checks.

(A) For the purpose of complying with subsections (b) - (d) of this section, this subsection, and subsections (f) - (h) of this section, licensees shall use an appropriate method listed in 10 CFR §37.7 to submit to the United States Nuclear Regulatory Commission, Director, Division of Facilities and Security, 11545 Rockville Pike, ATTN: Criminal History Program/Mail Stop T-03B46M, Rockville, Maryland 20852-2738, one completed, legible standard fingerprint card (Form FD-258, ORIMDNRCOOOZ), electronic fingerprint scan or, where practicable, other fingerprint record for each individual requiring unescorted access to category 1 or category 2 quantities of radioactive material. Copies of these forms may be obtained by writing the Office of the Chief Information Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; by calling (630) 829-9565; or by e-mail to FORMS.Resource@nrc.gov. Guidance on submitting electronic fingerprints can be found at <http://www.nrc.gov/site-help/e-submittals.html>.

(B) Fees for the processing of fingerprint checks are due upon application. Licensees shall submit payment with the application for the processing

of fingerprints through corporate check, certified check, cashier's check, money order, or electronic payment, made payable to "U.S. NRC." (For guidance on making electronic payments, contact the Security Branch, Division of Facilities and Security at (301) 415-7513.) Combined payment for multiple applications is acceptable. The NRC publishes the amount of the fingerprint check application fee on the NRC's public website. (To find the current fee amount, go to the Electronic Submittals page at <http://www.nrc.gov/site-help/e-submittals.html> and see the link for the Criminal History under Electronic Submission Systems.)

(C) The NRC will forward to the submitting licensee all data received from the FBI as a result of the licensee's application(s) for criminal history records checks.

(f) Relief from fingerprinting, identification, and criminal history records checks and other elements of background investigations for designated categories of individuals permitted unescorted access to certain radioactive materials.

(1) Fingerprinting, and the identification and criminal history records checks required by §149 of the Atomic Energy Act of 1954, as amended, and other elements of the background investigation, are not required for the following individuals prior to granting unescorted access to category 1 or category 2 quantities of radioactive materials:

(A) an employee of the NRC or of the Executive Branch of the United States (U.S.) Government who has undergone fingerprinting for a prior U.S. Government criminal history records check;

(B) a Member of Congress;

(C) an employee of a member of Congress or Congressional committee who has undergone fingerprinting for a prior U.S. Government criminal history records check;

(D) the Governor of a State or his or her designated State employee representative;

(E) Federal, State, or local law enforcement personnel;

(F) State Radiation Control Program Directors and State Homeland Security Advisors or their designated State employee representatives;

(G) Agreement State employees conducting security inspections on behalf of the NRC under an agreement executed under §274.i. of the Atomic Energy Act;

(H) representatives of the International Atomic Energy Agency (IAEA) engaged in activities associated with the U.S./IAEA Safeguards Agreement who have been certified by the NRC;

(I) emergency response personnel who are responding to an emergency;

(J) commercial vehicle drivers for road shipments of category 1 and category 2 quantities of radioactive material;

(K) package handlers at transportation facilities such as freight terminals and railroad yards;

(L) any individual who has an active federal security clearance, provided that he or she makes available the appropriate documentation. Written confirmation from the agency/employer that granted the federal security clearance or reviewed the criminal history records check must be provided to the licensee. The licensee shall retain this documentation for a period of three years from the date the individual no longer requires unescorted access to category 1 or category 2 quantities of radioactive material; and

(M) any individual employed by a service provider licensee for which the service provider licensee has conducted the background investigation for the individual and approved the individual for unescorted access to category 1 or category 2 quantities of radioactive material. Written verification from the service provider must be provided to the licensee. The licensee shall retain the documentation for a period of three years from the date the individual no longer requires unescorted access to category 1 or category 2 quantities of radioactive material; and

(2) Fingerprinting, and the identification and criminal history records checks required by §149 of the Atomic Energy Act of 1954, as amended, are not required for an individual who has had a favorably adjudicated U.S. Government criminal history records check within the last five years, under a comparable U.S. Government program involving fingerprinting and an FBI identification and criminal history records check provided that he or she makes available the appropriate documentation. Written confirmation from the agency/employer that reviewed the criminal history records check must be provided to the licensee. The licensee shall retain this documentation for a period of three years from the date the individual no longer requires unescorted access to category 1 or category 2 quantities of radioactive material. These programs include, but are not limited to:

(A) National Agency Check;

(B) Transportation Worker Identification Credentials under 49 CFR Part 1572;

(C) Bureau of Alcohol, Tobacco, Firearms, and Explosives background check and clearances under 27 CFR Part 555;

(D) Health and Human Services security risk assessments for possession and use of select agents and toxins under 42 CFR Part 73;

(E) Hazardous Material security threat assessment for hazardous material endorsement to commercial drivers license under 49 CFR Part 1572; and

(F) Customs and Border Protection's Free and Secure Trade Program.

(g) Protection of information.

(1) Each licensee who obtains background information on an individual under subsections (b) - (f) of this section, this subsection, and subsection (h) of this section shall establish and maintain a system of files and written procedures for protection of the records and the personal information from unauthorized disclosure.

(2) The licensee may not disclose the record or personal information collected and maintained to persons other than the subject individual, his or her representative, or to those who have a need to have access to the information in performing assigned duties in the process of granting or denying unescorted access to category 1 or category 2 quantities of radioactive material, safeguards information, or safeguards information-modified handling. No individual authorized to have access to the information may disseminate the information to any other individual who does not have a need to know.

(3) The personal information obtained on an individual from a background investigation may be provided to another licensee:

(A) upon the individual's written request to the licensee holding the data to disseminate the information contained in his or her file; and

(B) the recipient licensee verifies information such as name, date of birth, social security number, gender, and other applicable physical characteristics.

(4) The licensee shall make background investigation records obtained under subsections (b) - (f) of this section, this subsection, and subsection (h) of

this section available for examination by an authorized representative of the commission to determine compliance with the regulations and laws.

(5) The licensee shall retain all fingerprint and criminal history records (including data indicating no record) received from the FBI or a copy of these records if the individual's file has been transferred on an individual for three years from the date the individual no longer requires unescorted access to category 1 or category 2 quantities of radioactive material.

(h) Access authorization program review.

(1) Each licensee shall be responsible for the continuing effectiveness of the access authorization program. Each licensee shall ensure that access authorization programs are reviewed to confirm compliance with the requirements of subsections (b) - (g) of this section and this subsection and that comprehensive actions are taken to correct any noncompliance identified. The review program shall evaluate all program performance objectives and requirements. Each licensee shall periodically (at least annually) review the access authorization program content and implementation.

(2) The results of the reviews, along with any recommendations, must be documented. Each review report must identify conditions that are adverse to the proper performance of the access authorization program, the cause of the condition(s), and, when appropriate, recommend corrective actions, and corrective actions taken. The licensee shall review the findings and take any additional corrective actions necessary to preclude repetition of the condition, including reassessment of the deficient areas where indicated.

(3) Review records must be maintained for three years.

(i) Security program.

(1) Applicability.

(A) Each licensee that possesses an aggregated category 1 or category 2 quantity of radioactive material shall establish, implement, and maintain a security program in accordance with the requirements of this subsection and subsections (j) - (q) of this section.

(B) An applicant for a new license, and each licensee that would become newly subject to the requirements of this subsection and subsections (j) - (q) of this section upon application for modification of its license, shall implement the requirements of this subsection and subsections (j) - (q) of this section, as appropriate, before taking possession of an aggregated category 1 or category 2 quantity of radioactive material.

(C) Any licensee that has not previously implemented the Security Orders or been subject to the provisions of this subsection and subsections (j) - (q) of this section shall provide written notification to the commission at least 90 days before aggregating radioactive material to a quantity that equals or exceeds the category 2 threshold.

(2) General performance objective. Each licensee shall establish, implement, and maintain a security program that is designed to monitor and, without delay, detect, assess, and respond to an actual or attempted unauthorized access to category 1 or category 2 quantities of radioactive material.

(3) Program features. Each licensee's security program must include the program features, as appropriate, described in subsections (j) - (p) of this section.

(j) General security program requirements.

(1) Security plan.

(A) Each licensee identified in subsection (i)(1) of this section shall develop a written security plan specific to its facilities and operations. The purpose of the security plan is to establish the licensee's overall security strategy to ensure the integrated and effective functioning of the security program required by subsection (i) of this section, this subsection, and subsections (k) - (q) of this section. The security plan must, at a minimum:

(i) describe the measures and strategies used to implement the requirements of subsection (i) of this section, this subsection, and subsections (k) - (q) of this section; and

(ii) identify the security resources, equipment, and technology used to satisfy the requirements of subsection (i) of this section, this subsection, and subsections (k) - (q) of this section.

(B) The security plan must be reviewed and approved by the individual with overall responsibility for the security program.

(C) A licensee shall revise its security plan as necessary to ensure the effective implementation of the executive director's requirements. The licensee shall ensure that:

(i) the revision has been reviewed and approved by the individual with overall responsibility for the security program; and

(ii) the affected individuals are instructed on the revised plan before the changes are implemented.

(D) The licensee shall retain a copy of the current security plan as a record for three years after the security plan is no longer required. If any portion of the plan is superseded, the licensee shall retain the superseded material for three years after the record is superseded.

(2) Implementing procedures.

(A) The licensee shall develop and maintain written procedures that document how the requirements of subsection (i) of this section, this subsection, and subsections (k) - (q) of this section and the security plan will be met.

(B) The implementing procedures and revisions to these procedures must be approved in writing by the individual with overall responsibility for the security program.

(C) The licensee shall retain a copy of the current procedure as a record for three years after the procedure is no longer needed. Superseded portions of the procedure must be retained for three years after the record is superseded.

(3) Training.

(A) Each licensee shall conduct training to ensure that those individuals implementing the security program possess and maintain the knowledge, skills, and abilities to carry out their assigned duties and responsibilities effectively. The training must include instruction in:

(i) the licensee's security program and procedures to secure category 1 or category 2 quantities of radioactive material and the purposes and functions of the security measures employed;

(ii) the responsibility to report promptly to the licensee any condition that causes or may cause a violation of the requirements of the commission, the NRC, or any Agreement State;

(iii) the responsibility of the licensee to report promptly to the LLEA and licensee any actual or attempted theft, sabotage, or diversion of category 1 or category 2 quantities of radioactive material; and

(iv) the appropriate response to security alarms.

(B) In determining those individuals who shall be trained on the security program, the licensee shall consider each individual's assigned activities during authorized use and response to potential situations involving actual or attempted theft, diversion, or sabotage of category 1 or category 2 quantities of radioactive material. The extent of the training must be commensurate with the individual's potential involvement in the security of category 1 or category 2 quantities of radioactive material.

(C) Refresher training must be provided at a frequency not to exceed 12 months and when significant changes have been made to the security program. This training must include:

- (i) review of the training requirements of this paragraph and any changes made to the security program since the last training;
- (ii) reports on any relevant security issues, problems, and lessons learned;
- (iii) relevant results of commission inspections; and
- (iv) relevant results of the licensee's program review and testing and maintenance.

(D) The licensee shall maintain records of the initial and refresher training for three years from the date of the training. The training records must include dates of the training, topics covered, a list of licensee personnel in attendance, and related information.

(4) Protection of information.

(A) Licensees authorized to possess category 1 or category 2 quantities of radioactive material shall limit access to and unauthorized disclosure of their security plan, implementing procedures, and the list of individuals that have been approved for unescorted access.

(B) Efforts to limit access shall include the development, implementation, and maintenance of written policies and procedures for controlling access to, and for proper handling and protection against unauthorized disclosure of, the security plan and implementing procedures.

(C) Before granting an individual access to the security plan or implementing procedures, licensees shall:

- (i) evaluate an individual's need to know the security plan or implementing procedures; and

(ii) if the individual has not been authorized for unescorted access to category 1 or category 2 quantities of radioactive material, safeguards information, or safeguards information-modified handling, the licensee must complete a background investigation to determine the individual's trustworthiness and reliability. A trustworthiness and reliability determination shall be conducted by the reviewing official and shall include the background investigation elements contained in subsection (d)(1)(B) - (G) of this section.

(D) Licensees need not subject the following individuals to the background investigation elements for protection of information:

(i) the categories of individuals listed in subsection (f)(1) of this section; or

(ii) security service provider employees, provided written verification that the employee has been determined to be trustworthy and reliable, by the required background investigation in subsection (d)(1)(B) - (G) of this section, has been provided by the security service provider.

(E) The licensee shall document the basis for concluding that an individual is trustworthy and reliable and should be granted access to the security plan or implementing procedures.

(F) Licensees shall maintain a list of persons currently approved for access to the security plan or implementing procedures. When a licensee determines that a person no longer needs access to the security plan or implementing procedures or no longer meets the access authorization requirements for access to the information, the licensee shall remove the person from the approved list as soon as possible, but no-later-than seven working days, and take prompt measures to ensure that the individual is unable to obtain the security plan or implementing procedures.

(G) When not in use, the licensee shall store its security plan and implementing procedures in a manner to prevent unauthorized access. Information stored in non-removable electronic form must be password protected.

(H) The licensee shall retain as a record for three years after the document is no longer needed:

(i) a copy of the information protection procedures; and

(ii) the list of individuals approved for access to the security plan or implementing procedures.

(k) LLEA coordination.

(1) A licensee subject to subsections (i) and (j) of this section, this subsection, and subsections (l) - (q) of this section shall coordinate, to the extent practicable, with an LLEA for responding to threats to the licensee's facility, including any necessary armed response. The information provided to the LLEA must include:

(A) a description of the facilities and the category 1 and category 2 quantities of radioactive materials along with a description of the licensee's security measures that have been implemented to comply with subsections (i) and (j) of this section, this subsection, and subsections (l) - (q) of this section; and

(B) a notification that the licensee will request a timely armed response by the LLEA to any actual or attempted theft, sabotage, or diversion of category 1 or category 2 quantities of material.

(2) The licensee shall notify the executive director within three business days if:

(A) the LLEA has not responded to the request for coordination within 60 days of the coordination request; or

(B) the LLEA notifies the licensee that the LLEA does not plan to participate in coordination activities.

(3) The licensee shall document its efforts to coordinate with the LLEA. The documentation must be kept for three years.

(4) The licensee shall coordinate with the LLEA at least every 12 months, or when changes to the facility design or operation adversely affect the potential vulnerability of the licensee's material to theft, sabotage, or diversion.

(l) Security zones.

(1) Licensees shall ensure that all aggregated category 1 and category 2 quantities of radioactive material are used or stored within licensee established security zones. Security zones may be permanent or temporary.

(2) Temporary security zones must be established as necessary to meet the licensee's transitory or intermittent business activities, such as periods of maintenance, source delivery, and source replacement.

(3) Security zones must, at a minimum, allow unescorted access only to approved individuals through:

(A) isolation of category 1 and category 2 quantities of radioactive materials by the use of continuous physical barriers that allow access to the security zone only through established access control points. A physical barrier is a natural or man-made structure or formation sufficient for the isolation of the category 1 or category 2 quantities of radioactive material within a security zone; or

(B) direct control of the security zone by approved individuals at all times; or

(C) a combination of continuous physical barriers and direct control.

(4) For category 1 quantities of radioactive material during periods of maintenance, source receipt, preparation for shipment, installation, or source removal or exchange, the licensee shall, at a minimum, provide sufficient individuals approved for unescorted access to maintain continuous surveillance of sources in temporary security zones and in any security zone in which physical barriers or intrusion detection systems have been disabled to allow such activities.

(5) Individuals not approved for unescorted access to category 1 or category 2 quantities of radioactive material must be escorted by an approved individual when in a security zone.

(m) Monitoring, detection, and assessment.

(1) Monitoring and detection.

(A) Licensees shall establish and maintain the capability to continuously monitor and detect without delay all unauthorized entries into its security zones. Licensees shall provide the means to maintain continuous monitoring and detection capability in the event of a loss of the primary power source or provide for an alarm and response in the event of a loss of the capability to continuously monitor and detect unauthorized entries.

(B) Monitoring and detection must be performed by:

(i) a monitored intrusion detection system that is linked to an onsite or offsite central monitoring facility;

(ii) electronic devices for intrusion detection alarms that will alert nearby facility personnel;

(iii) a monitored video surveillance system;

(iv) direct visual surveillance by approved individuals located within the security zone; or

(v) direct visual surveillance by a licensee designated individual located outside the security zone.

(C) A licensee subject to subsections (i) - (l) of this section, this subsection, and subsections (n) - (q) of this section shall also have a means to detect unauthorized removal of the radioactive material from the security zone. This detection capability must provide:

(i) for category 1 quantities of radioactive material, immediate detection of any attempted unauthorized removal of the radioactive material from the security zone. Such immediate detection capability must be provided by:

(I) electronic sensors linked to an alarm;

(II) continuous monitored video surveillance; or

(III) direct visual surveillance.

(ii) For category 2 quantities of radioactive material, weekly verification through physical checks, tamper indicating devices, use, or other means to ensure that the radioactive material is present.

(2) Assessment. Licensees shall immediately assess each actual or attempted unauthorized entry into the security zone to determine whether the unauthorized access was an actual or attempted theft, sabotage, or diversion.

(3) Personnel communications and data transmission. For personnel and automated or electronic systems supporting the licensee's monitoring, detection, and assessment systems, licensees shall:

(A) maintain continuous capability for personnel communication and electronic data transmission and processing among site security systems; and

(B) provide an alternative communication capability for personnel, and an alternative data transmission and processing capability, in the event of a loss of the primary means of communication or data transmission and processing. Alternative communications and data transmission systems may not be subject to the same failure modes as the primary systems.

(4) Response. Licensees shall immediately respond to any actual or attempted unauthorized access to the security zones, or actual or attempted theft, sabotage, or diversion of category 1 or category 2 quantities of radioactive material at licensee facilities or temporary job sites. For any unauthorized access involving an actual or attempted theft, sabotage, or diversion of category 1 or category 2 quantities of radioactive material, the licensee's response shall include requesting, without delay, an armed response from the LLEA.

(n) Maintenance and testing.

(1) Each licensee subject to subsections (i) - (m) of this section, this subsection, and subsections (o) - (q) of this section shall implement a maintenance and testing program to ensure that intrusion alarms, associated communication systems, and other physical components of the systems used to secure or detect unauthorized access to radioactive material are maintained in operable condition and capable of performing their intended function when needed. The equipment relied on to meet the security requirements of this section must be inspected and tested for operability and performance at the manufacturer's suggested frequency. If there is no manufacturer's suggested frequency, the testing must be performed at least annually, not to exceed 12 months.

(2) The licensee shall maintain records on the maintenance and testing activities for three years.

(o) Requirements for mobile devices. Each licensee that possesses mobile devices containing category 1 or category 2 quantities of radioactive material must:

(1) have two independent physical controls that form tangible barriers to secure the material from unauthorized removal when the device is not under direct control and constant surveillance by the licensee; and

(2) for devices in or on a vehicle or trailer, unless the health and safety requirements for a site prohibit the disabling of the vehicle, the licensee shall utilize a method to disable the vehicle or trailer when not under direct control and constant surveillance by the licensee. Licensees shall not rely on the removal of an ignition key to meet this requirement.

(p) Security program review.

(1) Each licensee shall be responsible for the continuing effectiveness of the security program. Each licensee shall ensure that the security program is reviewed to confirm compliance with the requirements of subsections (i) - (o) of this section, this subsection, and subsection (q) of this section and that comprehensive actions are taken to correct any noncompliance that is identified.

The review must include the radioactive material security program content and implementation. Each licensee shall periodically (at least annually) review the security program content and implementation.

(2) The results of the review, along with any recommendations, must be documented. Each review report must identify conditions that are adverse to the proper performance of the security program, the cause of the condition(s), and, when appropriate, recommend corrective actions, and corrective actions taken. The licensee shall review the findings and take any additional corrective actions necessary to preclude repetition of the condition, including reassessment of the deficient areas where indicated.

(3) The licensee shall maintain the review documentation for three years.

(q) Reporting of events.

(1) The licensee shall immediately notify the LLEA after determining that an unauthorized entry resulted in an actual or attempted theft, sabotage, or diversion of a category 1 or category 2 quantity of radioactive material. As soon as possible after initiating a response, but not at the expense of causing delay or interfering with the LLEA response to the event, the licensee shall notify the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224. In no case shall the notification to the commission or the NRC be later than four hours after the discovery of any attempted or actual theft, sabotage, or diversion.

(2) The licensee shall assess any suspicious activity related to possible theft, sabotage, or diversion of category 1 or category 2 quantities of radioactive material and notify the LLEA as appropriate. As soon as possible but not later than four hours after notifying the LLEA, the licensee shall notify the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224.

(3) The initial telephonic notification required by paragraph (1) of this subsection must be followed, within a period of 30 days, by a written report submitted to the executive director. The report must include sufficient information for commission analysis and evaluation, including identification of any necessary corrective actions to prevent future instances.

(r) Additional requirements for transfer of category 1 and category 2 quantities of radioactive material. A licensee transferring a category 1 or category 2 quantity of radioactive material to a licensee of the commission, the NRC, or an Agreement State shall meet the license verification provisions listed in this subsection instead of those listed in §336.331(d) of this title (relating to Transfer of Radioactive Material):

(1) Any licensee transferring category 1 quantities of radioactive material to a licensee of the commission, the NRC, or an Agreement State, prior to conducting such transfer, shall verify with the NRC's license verification system or the license issuing authority that the transferee's license authorizes the receipt of the type, form, and quantity of radioactive material to be transferred and that the licensee is authorized to receive radioactive material at the location requested for delivery. If the verification is conducted by contacting the license issuing authority, the transferor shall document the verification. For transfers within the same organization, the licensee does not need to verify the transfer.

(2) Any licensee transferring category 2 quantities of radioactive material to a licensee of the commission, the NRC, or an Agreement State, prior to conducting such transfer, shall verify with the NRC's license verification system or the license issuing authority that the transferee's license authorizes the receipt of the type, form, and quantity of radioactive material to be transferred. If the verification is conducted by contacting the license issuing authority, the transferor shall document the verification. For transfers within the same organization, the licensee does not need to verify the transfer.

(3) In an emergency where the licensee cannot reach the license issuing authority and the license verification system is nonfunctional, the licensee may accept a written certification by the transferee that it is authorized by license to receive the type, form, and quantity of radioactive material to be transferred. The certification must include the license number, current revision number, issuing agency, expiration date, and for a category 1 shipment the authorized address. The licensee shall keep a copy of the certification. The certification must be confirmed by use of the NRC's license verification system or by contacting the license issuing authority by the end of the next business day.

(4) The transferor shall keep a copy of the verification documentation as a record for three years.

(s) Applicability of physical protection of category 1 and category 2 quantities of radioactive material during transit. The shipping licensee shall be responsible for meeting the requirements of subsection (r) of this section, this subsection, and subsections (t) - (w) of this section unless the receiving licensee has agreed in writing to arrange for the in-transit physical protection required under subsection (r) of this section, this subsection, and subsections (t) - (w) of this section.

(t) Preplanning and coordination of shipment of category 1 or category 2 quantities of radioactive material.

(1) Each licensee that plans to transport, or deliver to a carrier for transport, licensed material that is a category 1 quantity of radioactive material outside the confines of the licensee's facility or other place of use or storage shall:

(A) preplan and coordinate shipment arrival and departure times with the receiving licensee;

(B) preplan and coordinate shipment information with the governor or the governor's designee of any state through which the shipment will pass to:

(i) discuss the state's intention to provide law enforcement escorts; and

(ii) identify safe havens; and

(C) document the preplanning and coordination activities.

(2) Each licensee that plans to transport, or deliver to a carrier for transport, licensed material that is a category 2 quantity of radioactive material outside the confines of the licensee's facility or other place of use or storage shall coordinate the shipment no-later-than arrival time and the expected shipment arrival with the receiving licensee. The licensee shall document the coordination activities.

(3) Each licensee who receives a shipment of a category 2 quantity of radioactive material shall confirm receipt of the shipment with the originator. If the shipment has not arrived by the no-later-than arrival time, the receiving licensee shall notify the originator.

(4) Each licensee, who transports or plans to transport a shipment of a category 2 quantity of radioactive material, and determines that the shipment will arrive after the no-later-than arrival time provided pursuant to paragraph (2) of this subsection, shall promptly notify the receiving licensee of the new no-later-than arrival time.

(5) The licensee shall retain a copy of the documentation for preplanning and coordination and any revision thereof as a record for three years.

(u) Advance notification of shipment of category 1 quantities of radioactive material. As specified in paragraphs (1) and (2) of this subsection, each licensee shall provide advance notification to the NRC and the governor of a state, or the governor's designee, of the shipment of licensed material in a category 1 quantity, through or across the boundary of the state, before the transport or delivery to a carrier for transport of the licensed material outside the confines of the licensee's facility or other place of use or storage.

(1) Procedures for submitting advance notification.

(A) The notification must be made to the commission and to the office of each appropriate governor or governor's designee. The contact information, including telephone and mailing addresses, of governors and governors' designees, is available on the NRC's website at <https://scp.nrc.gov/special/designee.pdf>. A list of the contact information is also available upon request from the Director, Division of Material, State, Tribal, and Rulemaking Programs, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

(B) A notification delivered by mail must be postmarked at least seven days before transport of the shipment commences at the shipping facility.

(C) A notification delivered by any means other than mail must reach the commission at least four days before the transport of the shipment commences and must reach the office of the governor or the governor's designee at least four days before transport of a shipment within or through the state.

(2) Information to be furnished in advance notification of shipment. Each advance notification of shipment of category 1 quantities of radioactive material must contain the following information, if available at the time of notification:

(A) the name, address, and telephone number of the shipper, carrier, and receiver of the category 1 radioactive material;

(B) the license numbers of the shipper and receiver;

(C) a description of the radioactive material contained in the shipment, including the radionuclides and quantity;

(D) the point of origin of the shipment and the estimated time and date that shipment will commence;

(E) the estimated time and date that the shipment is expected to enter each state along the route;

(F) the estimated time and date of arrival of the shipment at the destination; and

(G) a point of contact, with a telephone number, for current shipment information.

(3) Revision notice.

(A) The licensee shall provide any information not previously available at the time of the initial notification, as soon as the information becomes available but not later than commencement of the shipment, to the governor of the state or the governor's designee and to the commission.

(B) A licensee shall promptly notify the governor of the state or the governor's designee of any changes to the information provided in accordance with paragraph (2) of this subsection and subparagraph (A) of this paragraph. The licensee shall also immediately notify the commission of any such changes.

(4) Cancellation notice. Each licensee who cancels a shipment for which advance notification has been sent shall send a cancellation notice to the governor of each state or to the governor's designee previously notified and to the commission. The licensee shall send the cancellation notice before the shipment would have commenced or as soon thereafter as possible. The licensee shall state in the notice that it is a cancellation and identify the advance notification that is being cancelled.

(5) Records. The licensee shall retain a copy of the advance notification and any revision and cancellation notices as a record for three years.

(6) Protection of information. State officials, State employees, and other individuals, whether or not licensees of the commission, NRC, or an Agreement State, who receive schedule information of the kind specified in paragraph (2) of this subsection shall protect that information against unauthorized disclosure as specified in subsection (j)(4) of this section.

(v) Requirements for physical protection of category 1 and category 2 quantities of radioactive material during shipment.

(1) Shipments by road.

(A) Each licensee who transports, or delivers to a carrier for transport, in a single shipment, a category 1 quantity of radioactive material shall:

(i) Ensure that movement control centers are established that maintain position information from a remote location. These control centers must monitor shipments 24 hours a day, seven days a week, and have the ability to communicate immediately, in an emergency, with the appropriate law enforcement agencies.

(ii) Ensure that redundant communications are established that allow the transport to contact the escort vehicle (when used) and movement control center at all times. Redundant communications may not be subject to the same interference factors as the primary communication.

(iii) Ensure that shipments are continuously and actively monitored by a telemetric position monitoring system or an alternative tracking system reporting to a movement control center. A movement control center must provide positive confirmation of the location, status, and control over the shipment. The movement control center must be prepared to promptly implement preplanned procedures in response to deviations from the authorized route or a notification of actual, attempted, or suspicious activities related to the theft, loss, or diversion of a shipment. These procedures will include, but not be limited to, the identification of and contact information for the appropriate LLEA along the shipment route.

(iv) Provide an individual to accompany the driver for those highway shipments with a driving time period greater than the maximum number of allowable hours of service in a 24-hour duty day as established by the Department of Transportation Federal Motor Carrier Safety Administration. The accompanying individual may be another driver.

(v) Develop written normal and contingency procedures to address:

(I) notifications to the communication center and law enforcement agencies;

(II) communication protocols. Communication protocols must include a strategy for the use of authentication codes and duress codes and provisions for refueling or other stops, detours, and locations where communication is expected to be temporarily lost;

(III) loss of communications; and

(IV) responses to an actual or attempted theft or diversion of a shipment.

(vi) Each licensee who makes arrangements for the shipment of category 1 quantities of radioactive material shall ensure that drivers, accompanying personnel, and movement control center personnel have access to the normal and contingency procedures.

(B) Each licensee that transports category 2 quantities of radioactive material shall maintain constant control and/or surveillance during transit and have the capability for immediate communication to summon appropriate response or assistance.

(C) Each licensee who delivers to a carrier for transport, in a single shipment, a category 2 quantity of radioactive material shall:

(i) use carriers that have established package tracking systems. An established package tracking system is a documented, proven, and reliable system routinely used to transport objects of value. In order for a package tracking system to maintain constant control and/or surveillance, the package tracking system must allow the shipper or transporter to identify when and where the package was last and when it should arrive at the next point of control;

(ii) use carriers that maintain constant control and/or surveillance during transit and have the capability for immediate communication to summon appropriate response or assistance; and

(iii) use carriers that have established tracking systems that require an authorized signature prior to releasing the package for delivery or return.

(2) Shipments by rail.

(A) Each licensee who transports, or delivers to a carrier for transport, in a single shipment, a category 1 quantity of radioactive material shall:

(i) Ensure that rail shipments are monitored by a telemetric position monitoring system or an alternative tracking system reporting to the licensee, third-party, or railroad communications center. The communications center shall provide positive confirmation of the location of the shipment and its status. The communications center shall implement preplanned procedures in response to deviations from the authorized route or to a notification of actual, attempted, or suspicious activities related to the theft or diversion of a shipment. These procedures will include, but not be limited to, the identification of and contact information for the appropriate LLEA along the shipment route.

(ii) Ensure that periodic reports to the communications center are made at preset intervals.

(B) Each licensee who transports, or delivers to a carrier for transport, in a single shipment, a category 2 quantity of radioactive material shall:

(i) use carriers that have established package tracking systems. An established package tracking system is a documented, proven, and reliable system routinely used to transport objects of value. In order for a package tracking system to maintain constant control and/or surveillance, the package tracking system must allow the shipper or transporter to identify when and where the package was last and when it should arrive at the next point of control;

(ii) use carriers that maintain constant control and/or surveillance during transit and have the capability for immediate communication to summon appropriate response or assistance; and

(iii) use carriers that have established tracking systems that require an authorized signature prior to releasing the package for delivery or return.

(3) Investigations. Each licensee who makes arrangements for the shipment of category 1 quantities of radioactive material shall immediately conduct an investigation upon the discovery that a category 1 shipment is lost or missing. Each licensee who makes arrangements for the shipment of category 2 quantities of radioactive material shall immediately conduct an investigation, in coordination with the receiving licensee, of any shipment that has not arrived by the designated no-later-than arrival time.

(w) Reporting of events.

(1) The shipping licensee shall notify the appropriate LLEA and the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224 within one hour of its determination that a shipment of category 1 quantities of radioactive material is lost or missing. The appropriate LLEA would be the law enforcement agency in the area of the shipment's last confirmed location. During the investigation required by subsection (v)(3) of this section, the shipping licensee will provide agreed upon updates to the executive director on the status of the investigation.

(2) The shipping licensee shall notify the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224 within four hours of its determination that a shipment of category 2 quantities of radioactive material is lost or missing. If, after 24 hours of its determination that the shipment is lost or missing, the radioactive material has not been located and secured, the licensee shall immediately notify the executive director.

(3) The shipping licensee shall notify the designated LLEA along the shipment route as soon as possible upon discovery of any actual or attempted theft or diversion of a shipment or suspicious activities related to the theft or diversion of a shipment of a category 1 quantity of radioactive material. As soon as possible after notifying the LLEA, the licensee shall notify the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224 upon discovery of any actual or attempted theft or diversion of a shipment or any suspicious activity related to the shipment of category 1 radioactive material.

(4) The shipping licensee shall notify the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224 as soon as possible

upon discovery of any actual or attempted theft or diversion of a shipment or any suspicious activity related to the shipment, of a category 2 quantity of radioactive material.

(5) The shipping licensee shall notify the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224 and the LLEA as soon as possible upon recovery of any lost or missing category 1 quantities of radioactive material.

(6) The shipping licensee shall notify the Office of Compliance and Enforcement 24-hour Emergency Response at 1-800-832-8224 as soon as possible upon recovery of any lost or missing category 2 quantities of radioactive material.

(7) The initial telephonic notification required by paragraphs (1) - (4) of this subsection must be followed within a period of 30 days by a written report submitted to the executive director. A written report is not required for notifications on suspicious activities required by paragraphs (3) and (4) of this subsection. The report must set forth the following information:

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

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

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

(D) actions that have been taken, or will be taken, to recover the material; and

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

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

(x) Form of records. Each record required by this section must be legible throughout the retention period specified in regulation by the licensing authority. The record may be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention

period. Records such as letters, drawings, and specifications, must include all pertinent information such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(y) Record retention. Licensees shall maintain the records that are required in this section for the period specified by the appropriate regulation. If a retention period is not otherwise specified, these records must be retained until the executive director terminates the facility's license. All records related to this section may be destroyed upon executive director termination of the facility license.

(z) Category 1 and category 2 radioactive materials. The terabecquerel (TBq) values are the regulatory standard. The curie (Ci) values specified are obtained by converting from the TBq value. The Ci values are provided for practical usefulness only.

Figure: 30 TAC §336.357(z)

Category 1 and Category 2 Threshold				
Radioactive Material	Category 1 (TBq)	Category 1 (Ci)	Category 2 (TBq)	Category 2 (Ci)
Americium-241	60	1,620	0.6	16.2
Americium-241/Be	60	1,620	0.6	16.2
Californium-252	20	540	0.2	5.40
Cobalt-60	30	810	0.3	8.10
Curium-244	50	1,350	0.5	13.5
Cesium-137	100	2,700	1	27.0
Gadolinium-153	1,000	27,000	10	270
Iridium-192	80	2,160	0.8	21.6
Plutonium-238	60	1,620	0.6	16.2
Plutonium-239/Be	60	1,620	0.6	16.2
Promethium-147	40,000	1,080,000	400	10,800
Radium-226	40	1,080	0.4	10.8
Selenium-75	200	5,400	2	54.0
Strontium-90	1,000	27,000	10	270

Thulium-170	20,000	540,000	200	5,400
Ytterbium-169	300	8,100	3	81.0

Note: Calculations Concerning Multiple Sources or Multiple Radionuclides

The "sum of fractions" methodology for evaluating combinations of multiple sources or multiple radionuclides is to be used in determining whether a location meets or exceeds the threshold and is thus subject to the requirements of this section.

I. If multiple sources of the same radionuclide and/or multiple radionuclides are aggregated at a location, the sum of the ratios of the total activity of each of the radionuclides must be determined to verify whether the activity at the location is less than the category 1 or category 2 thresholds of Table 1, as appropriate. If the calculated sum of the ratios, using the equation below, is greater than or equal to 1.0, then the applicable requirements of this section apply.

II. First determine the total activity for each radionuclide from Table 1. This is done by adding the activity of each individual source, material in any device, and any loose or bulk material that contains the radionuclide. Then use the equation below to calculate the sum of the ratios by inserting the total activity of the applicable radionuclides from Table 1 in the numerator of the equation and the corresponding threshold activity from Table 1 in the denominator of the equation. Calculations must be performed in metric values (i.e., TBq) and the numerator and denominator values must be in the same units.

R_1 = total activity for radionuclide 1

R_2 = total activity for radionuclide 2

R_N = total activity for radionuclide n

AR_1 = activity threshold for radionuclide 1

AR_2 = activity threshold for radionuclide 2

AR_N = activity threshold for radionuclide n

$$\sum_i^n \left[\frac{R_1}{AR_1} + \frac{R_2}{AR_2} + \frac{R_n}{AR_n} \right] \geq 1.0$$

§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
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	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.	

^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.

Adopted August 8, 2001

Effective August 30, 2001

§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., $\Sigma (\text{intake in } \mu\text{Ci of each radionuclide}/ALI_{ns}) < 1.0$). 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: 30 TAC §336.359(b)(6)

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

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)

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Actinium	Ac	89	Mercury	Hg	80
Aluminum	Al	13	Molybdenum	Mo	42

Americium	Am	95	Neodymium	Nd	60
Antimony	Sb	51	Neptunium	Np	93
Argon	Ar	18	Nickel	Ni	28
Arsenic	As	33	Niobium	Nb	41
Astatine	At	85	Nitrogen	N	7
Barium	Ba	56	Osmium	Os	76
Berkelium	Bk	97	Oxygen	O	8
Beryllium	Be	4	Palladium	Pd	46
Bismuth	Bi	83	Phosphorus	P	15
Bromine	Br	35	Platinum	Pt	78
Cadmium	Cd	48	Plutonium	Pu	94
Calcium	Ca	20	Polonium	Po	84
Californium	Cf	98	Potassium	K	19
Carbon	C	6	Praseodymium	Pr	59
Cerium	Ce	58	Promethium	Pm	61
Cesium	Cs	55	Protactinium	Pa	91
Chlorine	Cl	17	Radium	Ra	88
Chromium	Cr	24	Radon	Rn	86
Cobalt	Co	27	Rhodium	Rh	45
Copper	Cu	29	Rubidium	Rb	37
Curium	Cm	96	Ruthenium	Ru	44
Dysprosium	Dy	66	Samarium	Sm	62
Einsteinium	Es	99	Scandium	Sc	21
Erbium	Er	68	Selenium	Se	34
Europium	Eu	63	Silicon	Si	14
Fermium	Fm	100	Silver	Ag	47
Fluorine	F	9	Sodium	Na	11
Francium	Fr	87	Strontium	Sr	38
Gadolinium	Gd	64	Sulfur	S	16
Gallium	Ga	31	Tantalum	Ta	73
Germanium	Ge	32	Technetium	Tc	43
Gold	Au	79	Tellurium	Te	52
Hafnium	Hf	72	Terbium	Tb	65
Holmium	Ho	67	Thallium	Tl	81
Hydrogen	H	1	Thorium	Th	90
Indium	In	49	Thulium	Tm	69
Iodine	I	53	Tin	Sn	50
Iridium	Ir	77	Titanium	Ti	22
Iron	Fe	26	Tungsten	W	74
Krypton	Kr	36	Uranium	U	92
Lanthanum	La	57	Vanadium	V	23
Lead	Pb	82	Xenon	Xe	54
Lutetium	Lu	71	Ytterbium	Yb	70

Magnesium	Mg	12	Yttrium	Y	39
Manganese	Mn	25	Zinc	Zn	30
Mendelevium	Md	101	Zirconium	Zr	40

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§336.360. Appendix C. Quantities of Licensed Material Requiring Labeling.

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Hydrogen-3	1,000	Vanadium-47	1,000
Beryllium-7	1,000	Vanadium-48	100
Beryllium-10	1	Vanadium-49	1,000
Carbon-11	1,000	Chromium-48	1,000
Carbon-14	100	Chromium-49	1,000
Fluorine-18	1,000	Chromium-51	1,000
Sodium-22	10	Manganese-51	1,000
Sodium-24	100	Manganese-52m	1,000
Magnesium-28	100	Manganese-52	100
Aluminum-26	10	Manganese-53	1,000
Silicon-31	1,000	Manganese-54	100
Silicon-32	1	Manganese-56	1,000
Phosphorus-32	10	Iron-52	100
Phosphorus-33	100	Iron-55	100
Sulfur-35	100	Iron-59	10
Chlorine-36	10	Iron-60	1
Chlorine-38	1,000	Cobalt-55	100
Chlorine-39	1,000	Cobalt-56	10
Argon-39	1,000	Cobalt-57	100
Argon-41	1,000	Cobalt-58m	1,000

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Potassium-40	100	Cobalt-58	100
Potassium-42	1,000	Cobalt-60m	1,000
Potassium-43	1,000	Cobalt-60	1
Potassium-44	1,000	Cobalt-61	1,000
Potassium-45	1,000	Cobalt-62m	1,000
Calcium-41	100	Nickel-56	100
Calcium-45	100	Nickel-57	100
Calcium-47	100	Nickel-59	100
Scandium-43	1,000	Nickel-63	100
Scandium-44m	100	Nickel-65	1,000
Scandium-44	100	Nickel-66	10
Scandium-46	10	Copper-60	1,000
Scandium-47	100	Copper-61	1,000
Scandium-48	100	Copper-64	1,000
Scandium-49	1,000	Copper-67	1,000
Titanium-44	1	Zinc-62	100
Titanium-45	1,000	Zinc-63	1,000
Zinc-65	10	Bromine-74m	1,000
Zinc-69m	100	Bromine-74	1,000
Zinc-69	1,000	Bromine-75	1,000
Zinc-71m	1,000	Bromine-76	100
Zinc-72	100	Bromine-77	1,000
Gallium-65	1,000	Bromine-80m	1,000
Gallium-66	100	Bromine-80	1,000
Gallium-67	1,000	Bromine-82	100
Gallium-68	1,000	Bromine-83	1,000

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Gallium-70	1,000	Bromine-84	1,000
Gallium-72	100	Krypton-74	1,000
Gallium-73	1,000	Krypton-76	1,000
Germanium-66	1,000	Krypton-77	1,000
Germanium-67	1,000	Krypton-79	1,000
Germanium-68	10	Krypton-81	1,000
Germanium-69	1,000	Krypton-83m	1,000
Germanium-71	1,000	Krypton-85m	1,000
Germanium-75	1,000	Krypton-85	1,000
Germanium-77	1,000	Krypton-87	1,000
Germanium-78	1,000	Krypton-88	1,000
Arsenic-69	1,000	Rubidium-79	1,000
Arsenic-70	1,000	Rubidium-81m	1,000
Arsenic-71	100	Rubidium-81	1,000
Arsenic-72	100	Rubidium-82m	1,000
Arsenic-73	100	Rubidium-83	100
Arsenic-74	100	Rubidium-84	100
Arsenic-76	100	Rubidium-86	100
Arsenic-77	100	Rubidium-87	100
Arsenic-78	1,000	Rubidium-88	1,000
Selenium-70	1,000	Rubidium-89	1,000
Selenium-73m	1,000	Strontium-80	100
Selenium-73	100	Strontium-81	1,000
Selenium-75	100	Strontium-83	100
Selenium-79	100	Strontium-85m	1,000
Selenium-81m	1,000	Strontium-85	100

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Selenium-81	1,000	Strontium-87m	1,000
Selenium-83	1,000	Strontium-89	10
Strontium-90	0.1	Molybdenum-99	100
Strontium-91	100	Molybdenum-101	1,000
Strontium-92	100	Technetium-93m	1,000
Yttrium-86m	1,000	Technetium-93	1,000
Yttrium-86	100	Technetium-94m	1,000
Yttrium-87	100	Technetium-94	1,000
Yttrium-88	10	Technetium-96m	1,000
Yttrium-90m	1,000	Technetium-96	100
Yttrium-90	10	Technetium-97m	100
Yttrium-91m	1,000	Technetium-97	1,000
Yttrium-91	10	Technetium-98	10
Yttrium-92	100	Technetium-99m	1,000
Yttrium-93	100	Technetium-99	100
Yttrium-94	1,000	Technetium-101	1,000
Yttrium-95	1,000	Technetium-104	1,000
Zirconium-86	100	Ruthenium-94	1,000
Zirconium-88	10	Ruthenium-97	1,000
Zirconium-89	100	Ruthenium-103	100
Zirconium-93	1	Ruthenium-105	1,000
Zirconium-95	10	Ruthenium-106	1
Zirconium-97	100	Rhodium-99m	1,000
Niobium-88	1,000	Rhodium-99	100
Niobium-89m		Rhodium-100	100
(66 minutes)	1,000	Rhodium-101m	1,000

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Niobium-89		Rhodium-101	10
(122 minutes)	1,000	Rhodium-102m	10
Niobium-90	100	Rhodium-102	10
Niobium-93m	10	Rhodium-103m	1,000
Niobium-94	1	Rhodium-105	100
Niobium-95m	100	Rhodium-106m	1,000
Niobium-95	100	Rhodium-107	1,000
Niobium-96	100	Palladium-100	100
Niobium-97	1,000	Palladium-101	1,000
Niobium-98	1,000	Palladium-103	100
Molybdenum-90	100	Palladium-10	10
Molybdenum-93m	100	Palladium-109	100
Molybdenum-93	10	Silver-102	1,000
Silver-103	1,000	Tin-113	100
Silver-104m	1,000	Tin-117m	100
Silver-104	1,000	Tin-119m	100
Silver-105	100	Tin-121m	100
Silver-106m	100	Tin-121	1,000
Silver-106	1,000	Tin-123m	1,000
		Tin 123	10
Silver 110m	10	Tin-125	10
		Tin-126	10
Silver-112	100	Tin-127	1,000
Silver-115	1,000	Tin-128	1,000
Cadmium-104	1,000	Antimony-115	1,000
Cadmium-107	1,000	Antimony-116m	1,000

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Cadmium-109	1	Antimony-116	1,000
Cadmium-113m	0.1	Antimony-117	1,000
Cadmium-113	100	Antimony-118m	1,000
Cadmium-115m	10	Antimony-119	1,000
Cadmium-115	100	Antimony-120	
Cadmium-117m	1,000	(16 minutes)	1,000
Cadmium-117	1,000	Antimony-120	
Indium-109	1,000	(5.76 days)	100
Indium-110		Antimony-122	100
(69.1 minutes)	1,000	Antimony-124m	1,000
Indium-110		Antimony-124	10
(4.9 hours)	1,000	Antimony-125	100
Indium-111	100	Antimony-126m	1,000
Indium-112	1,000	Antimony-126	100
Indium-113m	1,000	Antimony-127	100
Indium-114m	10	Antimony-128	
Indium-115m	1,000	(10.4 minutes)	1,000
Indium-115	100	Antimony-128	
Indium-116m	1,000	(9.01 hours)	100
Indium-117m	1,000	Antimony-129	100
Indium-117	1,000	Antimony-130	1,000
Indium-119m	1,000	Antimony-131	1,000
Tin-110	100	Tellurium-116	1,000
Tin-111	1,000	Tellurium-121m	10
Tellurium-121	100	Xenon-131m	1,000
Tellurium-123m	10	Xenon-133m	1,000

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Tellurium-123	100	Xenon-133	1,000
Tellurium-125m	10	Xenon-135m	1,000
Tellurium-127m	10	Xenon-135	1,000
Tellurium-127	1,000	Xenon-138	1,000
Tellurium-129m	10	Cesium-125	1,000
Tellurium-129	1,000	Cesium-127	1,000
Tellurium-131m	10	Cesium-129	1,000
Tellurium-131	100	Cesium-130	1,000
Tellurium-132	10	Cesium-131	1,000
Tellurium-133m	100	Cesium-132	100
Tellurium-133	1,000	Cesium-134m	1,000
Tellurium-134	1,000	Cesium-134	10
Iodine-120m	1,000	Cesium-135m	1,000
Iodine-120	100	Cesium-135	100
Iodine-121	1,000	Cesium-136	10
Iodine-123	100	Cesium-137	10
Iodine-124	10	Cesium-138	1,000
Iodine-125	1	Barium-126	1,000
Iodine-126	1	Barium-128	100
Iodine-128	1,000	Barium-131m	1,000
Iodine-129	1	Barium-131	100
Iodine-130	10	Barium-133m	100
Iodine-131	1	Barium-133	100
Iodine-132m	100	Barium-135m	100
Iodine-132	100	Barium-139	1,000
Iodine-133	10	Barium-140	100

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Iodine-134	1,000	Barium-141	1,000
Iodine-135	100	Barium-142	1,000
Xenon-120	1,000	Lanthanum-131	1,000
Xenon-121	1,000	Lanthanum-132	100
Xenon-122	1,000	Lanthanum-135	1,000
Xenon-123	1,000	Lanthanum-137	10
Xenon-125	1,000	Lanthanum-138	100
Xenon-127	1,000	Lanthanum-140	100
Xenon-129m	1,000	Lanthanum-141	100
Lanthanum-142	1,000	Promethium-150	1,000
Lanthanum-143	1,000	Promethium-151	100
Cerium-134	100	Samarium-141m	1,000
Cerium-135	100	Samarium-141	1,000
Cerium-137m	100	Samarium-142	1,000
Cerium-137	1,000	Samarium-145	100
Cerium-139	100	Samarium-146	1
Cerium-141	100	Samarium-147	100
Cerium-143	100	Samarium-151	10
Cerium-144	1	Samarium-153	100
Praseodymium-136	1,000	Samarium-155	1,000
Praseodymium-137	1,000	Samarium-156	1,000
Praseodymium-138m	1,000	Europium-145	100
Praseodymium-139	1,000	Europium-146	100

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Praseodymium-142m	1,000	Europium-147	100
Praseodymium-142	100	Europium-148	10
Praseodymium-143	100	Europium-149	100
Praseodymium-144	1,000	Europium-150	
Praseodymium-145	100	(12.62 hours)	100
Praseodymium-147	1,000	Europium-150	
Neodymium-136	1,000	(34.2 years)	
Neodymium-138	100	Europium-152m	100
Neodymium-139m	1,000	Europium-152	1
Neodymium-139	1,000	Europium-154	1
Neodymium-141	1,000	Europium-155	10
Neodymium-147	100	Europium-156	100
Neodymium-149	1,000	Europium-157	100
Neodymium-151	1,000	Europium-158	1,000
Promethium-141	1,000	Gadolinium-145	1,000
Promethium-143	100	Gadolinium-146	10
Promethium-144	10	Gadolinium-147	100
Promethium-145	10	Gadolinium-148	0.001
Promethium-146	1	Gadolinium-149	100
Promethium-147	10	Gadolinium-151	10
Promethium-148m	10	Gadolinium-152	100
Promethium-148	10	Gadolinium-153	10

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Promethium-149	100	Gadolinium-159	100
Terbium-147	1,000	Thulium-162	1,000
Terbium-149	100	Thulium-166	100
Terbium-150	1,000	Thulium-167	100
Terbium-151	100	Thulium-170	10
Terbium-153	1,000	Thulium-171	10
Terbium-154	100	Thulium-172	100
Terbium-155	1,000	Thulium-173	100
Terbium-156m		Thulium-175	1,000
(5.0 hours)	1,000	Ytterbium-162	1,000
Terbium-156m		Ytterbium-166	100
(24.4 hours)	1,000	Ytterbium-167	1,000
Terbium-156	100	Ytterbium-169	100
Terbium-157	10	Ytterbium-175	100
Terbium-158	1	Ytterbium-177	1,000
Terbium-160	10	Ytterbium-178	1,000
Terbium-161	100	Lutetium-169	100
Dysprosium-155	1,000	Lutetium-170	100
Dysprosium-157	1,000	Lutetium-171	100
Dysprosium-159	100	Lutetium-172	100
Dysprosium-165	1,000	Lutetium-173	10
Dysprosium-166	100	Lutetium-174m	10
Holmium-155	1,000	Lutetium-174	10
Holmium-157	1,000	Lutetium-176m	1,000
Holmium-159	1,000	Lutetium-176	100
Holmium-161	1,000	Lutetium-177m	10

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Holmium-162m	1,000	Lutetium-177	100
Holmium-162	1,000	Lutetium-178m	1,000
Holmium-164m	1,000	Lutetium-178	1,000
Holmium-164	1,000	Lutetium-179	1,000
Holmium-166m	1	Hafnium-170	100
Holmium-166	100	Hafnium-172	1
Holmium-167	1,000	Hafnium-173	1,000
Erbium-161	1,000	Hafnium-175	100
Erbium-165	1,000	Hafnium-177m	1,000
Erbium-169	100	Hafnium-178m	0.1
Erbium-171	100	Hafnium-179m	10
Erbium-172	100	Hafnium-180m	1,000
Hafnium-181	10	Rhenium-184	100
Hafnium-182m	1,000	Rhenium-186m	10
Hafnium-182	0.1	Rhenium-186	100
Hafnium-183	1,000	Rhenium-187	1,000
Hafnium-184	100	Rhenium-188m	1,000
Tantalum-172	1,000	Rhenium-188	100
Tantalum-173	1,000	Rhenium-189	100
Tantalum-174	1,000	Osmium-180	1,000
Tantalum-175	1,000	Osmium-181	1,000
Tantalum-176	100	Osmium-182	100
Tantalum-177	1,000	Osmium-185	100
Tantalum-178	1,000	Osmium-189m	1,000
Tantalum-179	100	Osmium-191m	1,000
Tantalum-180m	1,000	Osmium-191	100

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Tantalum-180	100	Osmium-193	100
Tantalum-182m	1,000	Osmium-194	1
Tantalum-182	10	Iridium-182	1,000
Tantalum-183	100	Iridium-184	1,000
Tantalum-184	100	Iridium-185	1,000
Tantalum-185	1,000	Iridium-186	100
Tantalum-186	1,000	Iridium-187	1,000
Tungsten-176	1,000	Iridium-188	100
Tungsten-177	1,000	Iridium-189	100
Tungsten-178	1,000	Iridium-190m	1,000
Tungsten-179	1,000	Iridium-190	100
Tungsten-181	1,000	Iridium-192	
Tungsten-185	100	(73.8 days)	1
Tungsten-187	100	Iridium-192m	
Tungsten-188	10	(1.4 minutes)	10
Rhenium-177	1,000	Iridium-194m	10
Rhenium-178	1,000	Iridium-194	100
Rhenium-181	1,000	Iridium-195m	1,000
Rhenium-182		Iridium-195	1,000
(12.7 hours)	1,000	Platinum-186	1,000
Rhenium-182		Platinum-188	100
(64.0 hours)	100	Platinum-189	1,000
Rhenium-184m	10	Platinum-191	100
Platinum-193m	100	Lead-198	1,000
Platinum-193	1,000	Lead-199	1,000
Platinum-195m	100	Lead-200	100

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Platinum-197m	1,000	Lead-201	1,000
Platinum-197	100	Lead-202m	1,000
Platinum-199	1,000	Lead-202	10
Platinum-200	100	Lead-203	1,000
Gold-193	1,000	Lead-205	100
Gold-194	100	Lead-209	1,000
Gold-195	10	Lead-210	0.01
Gold-198m	100	Lead-211	100
Gold-198	100	Lead-212	1
Gold-199	100	Lead-214	100
Gold-200m	100	Bismuth-200	1,000
Gold-200	1,000	Bismuth-201	1,000
Gold-201	1,000	Bismuth-202	1,000
Mercury-193m	100	Bismuth-203	100
Mercury-193	1,000	Bismuth-205	100
Mercury-194	1	Bismuth-206	100
Mercury-195m	100	Bismuth-207	10
Mercury-195	1,000	Bismuth-210m	0.1
Mercury-197m	100	Bismuth-210	1
Mercury-197	1,000	Bismuth-212	10
Mercury-199m	1,000	Bismuth-213	10
Mercury-203	100	Bismuth-214	100
Thallium-194m	1,000	Polonium-203	1,000
Thallium-194	1,000	Polonium-205	1,000
Thallium-195	1,000	Polonium-207	1,000
Thallium-197	1,000	Polonium-210	0.1

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Thallium-198m	1,000	Astatine-207	100
Thallium-198	1,000	Astatine-211	10
Thallium-199	1,000	Radon-220	1
Thallium-200	1,000	Radon-222	1
Thallium-201	1,000	Francium-222	100
Thallium-202	100	Francium-223	100
Thallium-204	100	Radium-223	0.1
Lead-195m	1,000	Radium-224	0.1
Radium-225	0.1	Neptunium-232	100
Radium-226	0.1	Neptunium-233	1,000
Radium-227	1,000	Neptunium-234	100
Radium-228	0.1	Neptunium-235	100
Actinium-224	1	Neptunium-236	
Actinium-225	0.01	(1.15 x 10 ⁵ years)	0.001
Actinium-226	0.1	Neptunium-236	
Actinium-227	0.001	(22.5 hours)	1
Actinium-228	1	Neptunium-237	0.001
Thorium-226	10	Neptunium-238	10
Thorium-227	0.01	Neptunium-239	100
Thorium-228	0.001	Neptunium-240	1,000
Thorium-229	0.001	Plutonium-234	10
Thorium-230	0.001	Plutonium-235	1,000
Thorium-231	100	Plutonium-236	0.001
Thorium-232	100	Plutonium-237	100
Thorium-234	10	Plutonium-238	0.001

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Thorium-natural	100	Plutonium-239	0.001
Protactinium-227	10	Plutonium-240	0.001
Protactinium-228	1	Plutonium-241	0.01
Protactinium-230	0.1	Plutonium-242	0.001
Protactinium-231	0.001	Plutonium-243	1,000
Protactinium-232	1	Plutonium-244	0.001
Protactinium-233	100	Plutonium-245	100
Protactinium-234	100	Americium-237	1,000
Uranium-230	0.01	Americium-238	100
Uranium-231	100	Americium-239	1,000
Uranium-232	0.001	Americium-240	100
Uranium-233	0.001	Americium-241	0.001
Uranium-234	0.001	Americium-242m	0.001
Uranium-235	0.001	Americium-242	10
Uranium-236	0.001	Americium-243	0.001
Uranium-237	100	Americium-244m	100
Uranium-238	100	Americium-244	10
Uranium-239	1,000	Americium-245	1,000
Uranium-240	100	Americium-246m	1,000
Uranium-natural	100		
Americium-246	1,000	Californium-248	0.01
Curium-238	100	Californium-249	0.001
Curium-240	0.1	Californium-250	0.001
Curium-241	1	Californium-251	0.001
Curium-242	0.01	Californium-252	0.001
Curium-243	0.001	Californium-253	0.1

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
Curium-244	0.001	Californium-254	0.001
Curium-245	0.001	Einsteinium-250	100
Curium-246	0.001	Einsteinium-251	100
Curium-247	0.001	Einsteinium-253	0.1
Curium-248	0.001	Einsteinium-254m	1
Curium-249	1,000	Einsteinium-254	0.01
Berkelium-245	100	Fermium-252	1
Berkelium-246	100	Fermium-253	1
Berkelium-247	0.001	Fermium-254	10
Berkelium-249	0.1	Fermium-255	1
Berkelium-250	10	Fermium-257	0.01
Californium-244	100	Mendelevium-257	10
Californium-246	1	Mendelevium-258	0.01
Any alpha-emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.001		
Any radionuclide other than alpha-emitting radionuclides			

Quantities ¹ of Licensed Material Requiring Labeling			
Radionuclide	Quantity (μCi) ²	Radionuclide	Quantity (μCi) ²
not listed above, or			
mixtures of beta emitters			
of unknown composition			
	0.01		

Notes

1. The quantities listed in this appendix were derived by taking 1/10th of the most restrictive ALI listed in §336.359, Appendix B, Table I, Columns 1 and 2, 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), rounding to the nearest factor of 10, and arbitrarily constraining the values listed between 0.001 and 1,000 microcuries. Values of 100 microcuries have been assigned for radionuclides having a radioactive half-life in excess of 10^9 years (except rhenium, 1,000 microcuries) to take into account their low specific activities.

2. To convert microcuries to kilobecquerels, multiply the microcurie value by 37.

Note. For purposes of §336.326(e) of this title (relating to Posting Requirements), §336.329(a)(1) of this title (relating to Exemptions to Labeling Requirements), and §336.350(a) of this title (relating to Reports of Stolen, Lost, or Missing Licensed Radioactive Material) where there is involved a combination of radionuclides in known amounts, the limit for the combination shall be derived as follows: determine, for each radionuclide in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific radionuclide when not in combination. The sum of ratios for all radionuclides in the combination may not exceed 1.

Adopted May 14, 1997

Effective June 5, 1997

§336.362. Appendix E. Classification and Characteristics of Low-Level Radioactive Waste.

(a) Classification of radioactive waste for near-surface disposal.

(1) Considerations. Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazards persist long after precautions such as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(2) Classes of waste.

(A) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in subsection (b)(1) of this appendix. If Class A waste also meets the stability requirements set forth in subsection (b)(2) of this appendix, it is not necessary to segregate the waste for disposal.

(B) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in subsection (b) of this appendix.

(C) Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in subsection (b) of this appendix.

(D) Waste that is not generally acceptable for near-surface disposal is waste for which form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. Disposal of this waste is regulated by the United States Nuclear Regulatory Commission.

(3) Classification determined by long-lived radionuclides. If the radioactive waste contains only radionuclides listed in Table I, classification shall be determined as follows:

(A) If the concentration does not exceed 0.1 times the value in Table I, the waste is Class A.

(B) If the concentration exceeds 0.1 times the value in Table I but does not exceed the value in Table I, the waste is Class C.

(C) If the concentration exceeds the value in Table I, the waste is not generally acceptable for near-surface disposal.

(D) For wastes containing mixtures of radionuclides listed in Table I, the total concentration shall be determined by the sum of fractions rule described in paragraph (7) of this subsection.

Figure: 30 TAC §336.362(a)(3)(D)

Appendix E, Table I

Radionuclide	Concentration curies/cubic meter¹	Concentration nanocuries/ gram²
C-14	8	
C-14 in activated metal	80	
Ni-59 in activated metal	220	
Nb-94 in activated metal	0.2	
Tc-99	3	
I-129	0.08	
Alpha-emitting transuranic radionuclides with half-life greater than 5 years		100
Pu-241		3,500
Cm-242		20,000

Ra-226		100
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1. To convert the curies/cubic meter (Ci/m^3) value to gigabecquerels/cubic meter, multiply the Ci/m^3 value by 37.
 2. To convert the nanocuries/gram (nCi/g) value to becquerels/gram, multiply the nCi/g value by 37.

(4) Classification determined by short-lived radionuclides. If the radioactive waste does not contain any of the radionuclides listed in Table I, classification shall be determined based on the concentrations shown in Table II. However, as specified in paragraph (6) of this subsection, if radioactive waste does not contain any nuclides listed in either Table I or II, it is Class A.

(A) If the concentration does not exceed the value in Column 1, the waste is Class A.

(B) If the concentration exceeds the value in Column 1 but does not exceed the value in Column 2, the waste is Class B.

(C) If the concentration exceeds the value in Column 2 but does not exceed the value in Column 3, the waste is Class C.

(D) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

(E) For wastes containing mixtures of the radionuclides listed in Table II, the total concentration shall be determined by the sum of fractions rule described in paragraph (7) of this subsection.

Figure: 30 TAC §336.362(a)(4)(E)

Appendix E, Table II

Radionuclide	Concentration, curies/cubic meter¹ Column 1	Concentration, curies/cubic meter¹ Column 2	Concentration, curies/cubic meter¹ Column 3
Total of all radionuclides with less than 5-year half-life	700	2	2
H-3	40	2	2
Co-60	700	2	2
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7,000
Sr-90	0.04	150	7,000
Cs-137	1	44	4,600

1. To convert the curies/cubic meter (Ci/m³) value to gigabecquerels/cubic meter, multiply the Ci/m³ value by 37.

2. There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other radionuclides in Table II determine the waste to be Class C independent of these radionuclides.

(5) Classification determined by both long- and short-lived radionuclides. If the radioactive waste contains a mixture of radionuclides, some of which are listed in Table I and some of which are listed in Table II, classification shall be determined as follows:

(A) If the concentration of a radionuclide listed in Table I does not exceed 0.1 times the value listed in Table I, the class shall be that determined by the concentration of radionuclides listed in Table II.

(B) If the concentration of a radionuclide listed in Table I exceeds 0.1 times the value listed in Table I but does not exceed the value in Table I, the waste shall be Class C, provided the concentration of radionuclides listed in Table II does not exceed the value shown in Column 3 of Table II.

(6) Classification of wastes with radionuclides other than those listed in Tables I and II. If the waste does not contain any radionuclides listed in either Table I or II, it is Class A.

(7) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. For example, if a waste contains strontium-90 in a concentration of 50 curies/cubic meter (Ci/m³) (1.85 terabecquerels/m³) and cesium-137 in a concentration of 22 Ci/m³ (814 gigabecquerels/m³), since the concentrations both exceed the values in Column 1, Table II, they must be compared to the Column 2 values. For the strontium-90 fraction, $50/150 = 0.33$, and for the cesium-137 fraction, $22/44 = 0.5$; the sum of the fractions = 0.83. Since the sum is less than 1.0, the waste is Class B.

(8) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods, such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram.

(b) Radioactive waste characteristics.

(1) The following are minimum requirements for all classes of waste and are intended to facilitate handling and to provide protection of health and safety of personnel at the disposal site.

(A) Waste shall be packaged in conformance with the conditions of the license issued for the disposal site. Where the license conditions for the disposal site are more restrictive than the provisions of this appendix, the license conditions shall govern.

(B) Waste shall not be packaged for disposal in cardboard or fiberboard boxes.

(C) Liquid waste shall be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(D) Solid waste containing liquid shall contain as little free-standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume.

(E) Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures or of explosive reaction with water.

(F) Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with paragraph (1)(H) of this subsection.

(G) Waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.

(H) Waste in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20 degrees Celsius. Total activity shall not exceed 100 curies (3.7 terabecquerels) per container.

(I) Waste containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce to the maximum extent practicable the potential hazard from the nonradiological materials.

(2) The following requirements are intended to provide stability of the waste. Stability is intended to ensure that the waste does not degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

(A) Waste shall have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

(B) Notwithstanding the provisions in paragraphs (1)(C) and (D) of this subsection, liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form.

(C) Void spaces within the waste and between the waste and its package shall be reduced to the extent practicable.

(c) Labeling. Each package of waste shall be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with subsection (a) of this appendix.

Adopted May 14, 1997

Effective June 5, 1997

§336.363. Appendix F. Requirements for Receipt of Low-Level Radioactive Waste for Disposal at Licensed Land Disposal Facilities and Uniform Manifests.

(a) Manifest requirements for shipments received at licensed land disposal facilities.

(1) Manifest forms required.

(A) The operator of a licensed low-level radioactive waste land disposal facility shall not receive for disposal any waste which does not have a completed manifest which reflects the information requested on applicable United States Nuclear Regulatory Commission (NRC) Forms 540 (Uniform Low-Level Radioactive Waste Manifest (Shipping Paper)) and 541 (Uniform Low-Level Radioactive Waste Manifest (Container and Waste Description)) and, if necessary, on an applicable NRC Form 542 (Uniform Low-Level Radioactive Waste Manifest (Manifest Index and Regional Compact Tabulation)), as those forms and requirements are prescribed in 10 Code of Federal Regulations (CFR) §61.80, as amended (relating to Licensing Requirements for Land Disposal of Radioactive Waste) and 10 CFR §20.2006, as amended (relating to Standards for Protection Against Radiation). The NRC Forms 540 and 540A must be completed and must physically accompany the waste shipment received at the licensed land disposal facility. Upon agreement between the shipper and the licensed land disposal facility, NRC Forms 541 and 541A and 542 and 542A may be completed, transmitted, and stored in electronic media with the capability for producing legible, accurate, and complete records on the respective forms.

(B) Copies of manifests required by this appendix may be legible carbon copies, photocopies, or computer printouts that reproduce the data in the format of the uniform manifest.

(C) This appendix includes information requirements of the United States Department of Transportation (DOT), as codified in 49 CFR Part 172. Specific information on hazardous, medical, or other waste that is required to meet EPA rules, as codified in 40 CFR Parts 259, 261, or elsewhere, is not addressed in this appendix and must be provided on the required EPA forms. However, the required EPA forms must accompany the Uniform Low-Level Radioactive Waste Manifest required by this appendix.

(2) Definitions. Terms used in this appendix have the definitions set forth as follows:

(A) Computer-readable medium - Means that the regulatory agency's computer can transfer the information from the medium into its memory.

(B) NRC Forms 540, 540A, 541, 541A, 542, and 542A - Official NRC forms referenced in this appendix, as those forms and requirements are prescribed in 10 CFR §61.80, as amended and 10 CFR §20.2006, as amended. Forms received by the licensed land disposal facility need not be the originals of these forms provided that any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information. Upon agreement between the shipper and the licensed land disposal facility, NRC Forms 541 (and 541A) and 542 (and 542A) may be completed, transmitted, and stored in electronic media. The electronic media must have the capability for producing legible, accurate, and complete records in the format of the uniform manifest.

(C) Shipper - For purposes of the rules in this appendix, the waste generator, waste collector, or waste processor who offers low-level radioactive waste for transportation and consigns the waste to a licensed land disposal facility operator.

(D) Shipping paper - NRC Form 540 and, if required, NRC Form 540A, as those forms and requirements are prescribed in 10 CFR §61.80, as amended, which include the information required by DOT in 49 CFR Part 172.

(E) Uniform Low-Level Radioactive Waste Manifest or uniform manifest - The combination of NRC Forms 540, 541, and, if necessary, 542, and their respective continuation sheets (Forms 540A, 541A, and 542A) as needed, or equivalent, as those forms and requirements are prescribed in 10 CFR §61.80, as amended.

(3) Information requirements. The uniform manifest for waste received for disposal at a licensed land disposal facility shall include all information required by instructions accompanying the forms and by 10 CFR §61.80, as amended. This information shall include, as appropriate, general information, shipment information, disposal container and waste information, uncontainerized waste information, multi-generator disposal container information, and certifications.

(b) Control and tracking.

(1) The licensed land disposal facility operator shall acknowledge receipt of the waste within one week of receipt by returning, as a minimum, a signed copy of NRC Form 540 to the shipper, as this form and requirements are prescribed in 10 CFR §61.80, as amended and 10 CFR §20.2006 as amended through March 27, 1995 (60 FR 15663). The shipper to be notified is that who last possessed the waste and transferred the waste to the operator. If a discrepancy exists between materials listed on the uniform manifest and materials received, copies or electronic transfer of the affected forms must be returned indicating the discrepancy.

(2) The land disposal facility operator shall maintain copies of all completed manifests and electronically store the information required by §336.740(i) of this title (relating to Maintenance of Records and Reports) until the commission terminates the license.

(3) The land disposal facility operator shall notify the shipper, the Texas Department of Health, and the executive director when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been canceled.

Adopted December 17, 2003

Effective January 8, 2004

§336.364. Appendix G. Acceptable Surface Contamination Levels.

Acceptable Surface Contamination Levels

Radionuclide ¹	Average ^{2,3,6}	Maximum ^{2,4,6}	Removable ^{2,3,5,6}
U-natural, U-235, U-238, and associated decay products except Ra-226, Th-230, Ac-227, and Pa-231	5,000 dpm alpha/ 100 cm ²	15,000 dpm alpha/ 100 cm ²	1,000 dpm alpha/ 100 cm ²
Transuranics, Ra-223, Ra-224, Ra-226, Ra-228	1,000 dpm/	3,000 dpm/	200 dpm/

Th-natural, Th-228, Th-230, Th-232, U-232, Pa-231, Ac-227, Sr-90, I-125, I-126, I-129, I-131, and I-133	100 cm ²	100 cm ²	100 cm ²
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 dpm beta- gamma/ 100 cm ²	15,000 dpm beta- gamma/ 100 cm ²	1,000 dpm beta- gamma/100 cm ²

1. Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should be applied independently.
2. As used in this appendix, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
3. Average contamination level shall not be measured over more than 1 square meter. For objects of less surface area, the average shall be derived for each object.
4. The maximum contamination level applies to an area of not more than 100 square centimeters (cm²).
5. The amount of removable radioactive material per 100 cm² of surface area shall be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels shall be reduced proportionally and the entire surface shall be wiped.
6. The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters shall not exceed 0.2 millirad/hour at 1 cm and 1.0 millirad/hour at 1 cm, respectively, measured through not more than 7 milligrams/cm² of total absorber.

Adopted May 14, 1997

Effective June 5, 1997

§336.365. Appendix H. Radionuclide Concentration and Annual Activity Limits for Disposal in a Type I Municipal Solid Waste Facility or a Hazardous Waste Facility.

Radionuclide Concentration and Annual Activity Limits
for Disposal in a Type I Municipal Solid Waste
Facility or a Hazardous Waste Facility
(For use in §336.225 of this title (relating
to Disposal of Specific Wastes))

Disposal Radionuclide	Concentration Limit (curies/m ³)	Annual Generator Limit (curies/yr)
Fluorine-18	3×10^{-1}	8
Sodium-24	9×10^{-4}	2×10^{-2}
Silicon-31	$1 \times 10^{+2}$	$3 \times 10^{+3}$
Phosphorus-32	2	50
Phosphorus-33	10	$3 \times 10^{+2}$
Sulfur-35	9	$2 \times 10^{+2}$
Argon-41	3×10^{-1}	8
Potassium-42	2×10^{-2}	5×10^{-1}
Calcium-45	4	$1 \times 10^{+2}$
Calcium-47	2×10^{-2}	5×10^{-1}
Scandium-46	2×10^{-3}	5×10^{-2}
Chromium-51	6×10^{-1}	20
Iron-59	5×10^{-3}	1×10^{-1}
Cobalt-57	6×10^{-2}	2
Cobalt-58	1×10^{-2}	3×10^{-1}
Zinc-65	7×10^{-3}	2×10^{-1}
Gallium-67	3×10^{-1}	8
Selenium-75	5×10^{-2}	1
Bromine-82	2×10^{-3}	5×10^{-2}
Rubidium-86	4×10^{-2}	1
Strontium-85	2×10^{-2}	5×10^{-1}
Strontium-89	8	$2 \times 10^{+2}$
Yttrium-90	4	$1 \times 10^{+2}$
Yttrium-91	4×10^{-1}	10

Disposal Radionuclide	Concentration Limit (curies/m ³)	Annual Generator Limit (curies/yr)
Zirconium-95	8 x 10 ⁻³	2 x 10 ⁻¹
Niobium-95	8 x 10 ⁻³	2 x 10 ⁻¹
Molybdenum-99	5 x 10 ⁻²	1
Technetium-99m	1	30
Rhodium-106	1	30
Silver-110m	2 x 10 ⁻³	5 x 10 ⁻²
Cadmium-115m	2 x 10 ⁻¹	5
Indium-111	9 x 10 ⁻²	2
Indium-113m	9	2 x 10 ⁺²
Tin-113	6 x 10 ⁻²	2
Tin-119	20	5 x 10 ⁺²
Antimony-124	2 x 10 ⁻³	5 x 10 ⁻²
Iodine-123	4 x 10 ⁻¹	10
Iodine-125	7 x 10 ⁻¹	20
Iodine-131	4 x 10 ⁻²	1
Iodine-133	2 x 10 ⁻²	5 x 10 ⁻¹
Tellurium-129	2 x 10 ⁻¹	5
Xenon-127	8 x 10 ⁻²	2
Xenon-133	1	30
Barium-140	2 x 10 ⁻³	5 x 10 ⁻²
Lanthanum-140	2 x 10 ⁻³	5 x 10 ⁻²
Cerium-141	4 x 10 ⁻¹	10
Cerium-144	1 x 10 ⁻³	3 x 10 ⁻²
Praseodymium-143	6	2 x 10 ⁺²
Neodymium-147	7 x 10 ⁻²	2
Ytterbium-169	6 x 10 ⁻²	2
Iridium-192	1 x 10 ⁻²	3 x 10 ⁻¹
Gold-198	3 x 10 ⁻²	8 x 10 ⁻¹
Mercury-197	8 x 10 ⁻¹	20
Thallium-201	4 x 10 ⁻¹	10
Mercury-203	1 x 10 ⁻¹	3

Notes

In the case of a waste that contains a mixture of radionuclides, the limiting values for purposes of this appendix shall be determined as follows:

For each radionuclide in the mixture, calculate the ratio between the quantity present in the mixture and the limit established in this appendix for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture may not exceed 1.

Examples: If the concentrations of radionuclides a, b, and c in the waste are represented by C_a , C_b , and C_c and the applicable concentration limits are CL_a , CL_b , and CL_c , respectively, then the concentrations shall be limited so that the following relationship exists:

$$(C_a/CL_a) + (C_b/CL_b) + (C_c/CL_c) \leq 1$$

If the total curies for radionuclides a, b, and c are represented by A_a , A_b , and A_c and the annual curie limits are AL_a , AL_b , and AL_c , respectively, then the generator is limited to the following:

$$(A_a/AL_a) + (A_b/AL_b) + (A_c/AL_c) \leq 1$$

Adopted May 14, 1997

Effective June 5, 1997

§336.367. Appendix J. Cumulative Occupational Exposure History.

CUMULATIVE OCCUPATIONAL EXPOSURE HISTORY										
1. NAME (LAST, FIRST, MIDDLE INITIAL)				2. IDENTIFICATION NUMBER		3. ID TYPE		4. SEX MALE <input type="checkbox"/> FEMALE <input type="checkbox"/>		5. DATE OF BIRTH
6. MONITORING PERIOD			7. LICENSEE NAME			8. LICENSE NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE		12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE		18. TODE	
6. MONITORING PERIOD			7. LICENSEE NAME			8. LICENSE NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE		12. LDE	13. SDE, WB	14. SDE,	15. CEDE	16. CDE	17. TEDE		18. TODE	
6. MONITORING PERIOD			7. LICENSEE NAME			8. LICENSE NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE		12. LDE	13. SDE, WB	14. SDE,	15. CEDE	16. CDE	17. TEDE		18. TODE	
6. MONITORING PERIOD			7. LICENSEE NAME			8. LICENSE NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE		12. LDE	13. SDE, WB	14. SDE,	15. CEDE	16. CDE	17. TEDE		18. TODE	
6. MONITORING PERIOD			7. LICENSEE NAME			8. LICENSE NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE		12. LDE	13. SDE, WB	14. SDE,	15. CEDE	16. CDE	17. TEDE		18. TODE	
6. MONITORING PERIOD			7. LICENSEE NAME			8. LICENSE NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE		12. LDE	13. SDE, WB	14. SDE,	15. CEDE	16. CDE	17. TEDE		18. TODE	
19. SIGNATURE OF MONITORED INDIVIDUAL			20. DATE SIGNED		21. CERTIFYING ORGANIZATION		22. SIGNATURE OF DESIGNEE			23. DATE SIGNED

INSTRUCTIONS AND ADDITIONAL INFORMATION PERTINENT TO THE
 COMPLETION OF CUMULATIVE OCCUPATIONAL EXPOSURE HISTORY
 (All doses shall be stated in rem)

<p>1. Type or print the full name of the monitored individual in the order of last name (include "Jr," "Sr," "III," etc.), first name, middle initial (if applicable).</p> <p>2. Enter the individual's identification number, including punctuation. This number should be the 9-digit social security number if at all possible. If the individual has no social security number, enter the number from another official identification such as a passport or work permit.</p> <p>3. Enter the code for the type of identification used as shown below:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">CODE</th> <th style="text-align: left; border-bottom: 1px solid black;">ID TYPE</th> </tr> </thead> <tbody> <tr> <td>SSN</td> <td>U.S. Social Security Number</td> </tr> <tr> <td>PPN</td> <td>Passport Number</td> </tr> <tr> <td>CSI</td> <td>Canadian Social Insurance Number</td> </tr> <tr> <td>WPN</td> <td>Work Permit Number</td> </tr> <tr> <td>IND</td> <td>INDEX Identification Number</td> </tr> <tr> <td>OTH</td> <td>Other</td> </tr> </tbody> </table> <p>4. Check the box that denotes the sex of the individual being monitored.</p> <p>5. Enter the date of birth of the individual being monitored in the format MM/DD/YY.</p> <p>6. Enter the monitoring period for which this report is filed. The format should be MM/DD/YY - MM/DD/YY.</p>	CODE	ID TYPE	SSN	U.S. Social Security Number	PPN	Passport Number	CSI	Canadian Social Insurance Number	WPN	Work Permit Number	IND	INDEX Identification Number	OTH	Other	<p>9. Place an "X" in "Record", "Estimate", or "No Record". Choose "Record" if the dose data listed represent a final determination of the dose received to the best of the licensee's knowledge. Choose "Estimate" only if the listed dose data are preliminary and will be superseded by a final determination resulting in a subsequent report. An example of such a case would be when dose data are based on self-reading dosimeter results, and the licensee intends to assign the record dose on the basis of TLD results that are not yet available.</p> <p>10. Place an "X" in either "Routine" or "PSE". Choose "Routine" if the data represent the results of monitoring for routine exposures. Choose "PSE" if the listed dose data represent the results of monitoring of planned special exposures received during the monitoring period. If more than one PSE was received in a single year, the licensee should sum all of the PSEs and report the total.</p> <p>11. Enter the deep-dose equivalent (DDE) to the whole body.</p> <p>12. Enter the eye dose equivalent (LDE) recorded for the lens of the eye.</p>	<p>15. Enter the committed effective dose equivalent (CEDE).</p> <p>16. Enter the committed dose equivalent (CDE) recorded for the maximally-exposed organ.</p> <p>17. Enter the total effective dose equivalent (TEDE). The TEDE is the sum of items 11 and 15.</p> <p>18. Enter the total organ dose equivalent (TODE) for the maximally-exposed organ. The TODE is the sum of items 11 and 16.</p> <p>19. Signature of the monitored individual. The signature of the monitored individual on this form indicates that the information contained on the form is complete and correct to the best of his or her knowledge.</p> <p>20. Enter the date this form was signed by the monitored individual.</p> <p>21. (OPTIONAL) Enter the name of the licensee or facility not licensed by the commission providing monitoring for exposure to radiation (such as a DOE facility) or the employer if the individual is not employed by the licensee and the employer chooses to maintain exposure records for its employees.</p>
CODE	ID TYPE															
SSN	U.S. Social Security Number															
PPN	Passport Number															
CSI	Canadian Social Insurance Number															
WPN	Work Permit Number															
IND	INDEX Identification Number															
OTH	Other															

<p>7. Enter the name of the licensee or facility not licensed by the commission that provided monitoring.</p> <p>8. Enter the commission license number or numbers.</p>	<p>13. Enter the shallow-dose equivalent recorded for the skin of the whole body (SDE,WB).</p> <p>14. Enter the shallow-dose equivalent recorded for the skin of the extremity receiving the maximum dose (SDE,ME).</p>	<p>22. [OPTIONAL] Signature of the person designated to represent the licensee or employer entered in item 21. The licensee or employer who chooses to countersign the form should have on file documentation of all the information on this form being signed.</p> <p>23. [OPTIONAL] Enter the date this form was signed by the designated representative.</p>
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Adopted May 14, 1997

Effective June 5, 1997

§336.368. Appendix K. Occupational Exposure Record for a Monitoring Period.

OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD						
1. NAME (LAST, FIRST, MIDDLE INITIAL)		2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE		5. DATE OF BIRTH
6. MONITORING PERIOD		7. LICENSEE NAME	8. LICENSE NUMBER(S)		9A. RECORD	9B. ROUTINE
					ESTIMATE	PSE
INTAKES				DOSES (in rem)		
10A. RADIONUCLIDE	10B. CLASS	10C. MODE	10D. INTAKE IN Ci			
				DEEP-DOSE EQUIVALENT (DDE)		11.
				EYE DOSE EQUIVALENT TO THE LENS OF THE EYE (LDE)		12.
				SHALLOW-DOSE EQUIVALENT, WHOLE BODY (SDE, WB)		13.
				SHALLOW-DOSE EQUIVALENT, MAX EXTREMITY (SDE, ME)		14.
				COMMITTED EFFECTIVE DOSE EQUIVALENT (CEDE)		15.
				COMMITTED DOSE EQUIVALENT, MAXIMALLY-EXPOSED ORGAN (CDE)		16.
				TOTAL EFFECTIVE DOSE (BLOCKS 11+15) (TEDE)		17.
				TOTAL ORGAN DOSE EQUIVALENT, MAX ORGAN (BLOCKS 11+16)		18.
				19. COMMENTS		

20. SIGNATURE -- LICENSEE	21. DATE PREPARED
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**INSTRUCTIONS AND ADDITIONAL INFORMATION PERTINENT TO THE
COMPLETION OF OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD
(All doses shall be stated in rem)**

<p>1. Type or print the full name of the monitored individual in the order of last name (include "Jr," "Sr," "III," etc.), first name, middle initial (if applicable).</p> <p>2. Enter the individual's identification number, including punctuation. This number shall be the 9-digit social security number if at all possible. If the individual has no social security number, enter the number from another official identification such as a passport or work permit.</p> <p>3. Enter the code for the type of identification used as shown below:</p> <table border="0"> <tr> <td><u>CODE</u></td> <td><u>ID TYPE</u></td> </tr> <tr> <td>SSN</td> <td>U.S. Social Security Number</td> </tr> <tr> <td>PPN</td> <td>Passport Number</td> </tr> <tr> <td>CSI</td> <td>Canadian Social Insurance Number</td> </tr> <tr> <td>WPN</td> <td>Work Permit Number</td> </tr> <tr> <td>IND</td> <td>INDEX Identification Number</td> </tr> <tr> <td>OTH</td> <td>Other</td> </tr> </table> <p>4. Check the box that denotes the sex of the individual being monitored.</p> <p>5. Enter the date of birth of the individual being monitored in the format MM/DD/YY.</p> <p>6. Enter the monitoring period for which this report is filed. The format should be MM/DD/YY - MM/DD/YY.</p>	<u>CODE</u>	<u>ID TYPE</u>	SSN	U.S. Social Security Number	PPN	Passport Number	CSI	Canadian Social Insurance Number	WPN	Work Permit Number	IND	INDEX Identification Number	OTH	Other	<p>listed dose data are preliminary and will be superseded by a final determination resulting in a subsequent report. An example of such a case would be when dose data are based on self-reading dosimeter results and the licensee intends to assign the record dose on the basis of TLD results that are not yet available.</p> <p>9B. Place an "X" in either "Routine" or "PSE". Choose "Routine" if the data represent the results of monitoring for routine exposures. Choose "PSE" if the listed dose data represent the results of monitoring of planned special exposures received during the monitoring period. If more than one PSE was received in a single year, the licensee should sum all of the PSEs and report the total.</p> <p>10A. Enter the symbol for each radionuclide that resulted in an internal exposure recorded for the individual, using the format "Xx-###x," for example, Cs-137 or Tc-99m.</p> <p>10B. Enter the lung clearance class as listed in §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) (D, W, Y, V, or O for other) for all intakes by inhalation.</p>	<p>11. Enter the deep-dose equivalent (DDE) to the whole body.</p> <p>12. Enter the eye dose equivalent (LDE) recorded for the lens of the eye.</p> <p>13. Enter the shallow-dose equivalent recorded for the skin of the whole body (SDE,WB).</p> <p>14. Enter the shallow-dose equivalent recorded for the skin of the extremity receiving the maximum dose (SDE,ME).</p> <p>15. Enter the committed effective dose equivalent (CEDE) or "NR" for "Not Required" or "NC" for "Not Calculated".</p> <p>16. Enter the committed dose equivalent (CDE) recorded for the maximally-exposed organ or "NR" for "Not Required" or "NC" for "Not Calculated".</p> <p>17. Enter the total effective dose equivalent (TEDE). The TEDE is the sum of items 11 and 15.</p> <p>18. Enter the total organ dose equivalent (TODE) for the maximally-exposed organ. The TODE is the sum of items 11 and 16.</p> <p>19. Comments. In the space provided, enter additional information that may be</p>
<u>CODE</u>	<u>ID TYPE</u>															
SSN	U.S. Social Security Number															
PPN	Passport Number															
CSI	Canadian Social Insurance Number															
WPN	Work Permit Number															
IND	INDEX Identification Number															
OTH	Other															

<p>7. Enter the name of the licensee.</p> <p>8. Enter the commission license number or numbers.</p> <p>9A. Place an "X" in "Record" or "Estimate". Choose "Record" if the dose data listed represent a final determination of the dose received to the best of the licensee's knowledge. Choose "Estimate" only if the</p>	<p>10C. Enter the mode of intake. For inhalation, enter "H." For absorption through the skin, enter "B." For oral ingestion, enter "G." For injection, enter "J."</p> <p>10D. Enter the intake of each radionuclide in Ci.</p>	<p>needed to determine compliance with limits. An example is to enter the note that the SDE,ME was the result of exposure from a discrete hot particle. Another example is to indicate that an overexposure report has been sent to the commission in reference to the exposure report.</p> <p>20. Signature of the person designated to represent the licensee.</p> <p>21. Enter the date this form was prepared.</p>
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Adopted May 14, 1997

Effective June 5, 1997