From:	Cynthia Sanders
To:	Schneider, Kathleen
Subject:	RATs ID 1991-4, Notification of Incidents Submission Review Request
Date:	Wednesday, October 24, 2012 12:48:49 PM
Attachments:	2008_391-3-17.03.pdf RATs ID 1991-4, Notification of Incidents Final Rule Submittal Letter - GEORGIA.docx

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Kathy and I resending this to you because I enter your email wrong and it was return as undeliverable.

Ms. Henderson,

It was brought to the state of Georgia attention that the NRC does not have documentation of a review of the Georgia Radioactive Materials Rules and Regulations which were adopted for Notification and Incidents. I am submitting a copy of the most recent amendment for Rule 391-3-17-.03(15)(b) for your review. Please see the attached final regulation submission letter and a copy of Rule 391-3-17-.03, Standard for Protection Against Radiation. Amended, with and effective date of November 6, 2008.

If you have any questions, please feel free to contact me at 404-362-2675.

Sincerely,

Cynthia S. Long
Environmental Health/Protection Manager
Georgia Department of Natural Resources
Radioactive Materials Program

Georgia Department of Natural Resources

4220 International Parkway, Suite 100, Atlanta, Georgia 30354
Environmental Protection Division
Judson H. Turner, Director
(404) 362-2675

October 24, 2012

Pamela Henderson, Deputy Director
Division Materials Safety and State Agreements
Office of Federal and State Materials and
Environmental Management Programs
U.S. Nuclear Regulatory Commission
T8-E24
Washington, D.C. 20555-0001

Dear Ms. Henderson:

Enclosed is a copy of the final revisions to the Georgia Radiological Health Rules [Chapter 391-3-17, Georgia Rules and Regulations for Radioactive Materials with effective date of November 8, 2008]. The final regulation corresponds to the following equivalent amendment to NRC's regulations.

	Rats ID	Title	State Section
•	1991-4	Notification of Incidents	Rule 391-3-17-.03(15)(b) Standards for Protection Against Radiation. Amended

We believe that adoption of these revisions satisfies the compatibility and health and safety categories established in the Office of Federal and State Materials and Environmental Management Programs (FSME) Procedure SA-200.

If you have any questions, please feel free to contact me at (404) 362-2675 or by email at csanders@dnr.state.ga.us .

Sincerely,

Cynthia S. Long
Environmental Health/Protection Manager
Radioactive Material Program

Enclosures:
As stated

391-3-17-.03 STANDARDS FOR PROTECTION AGAINST RADIATION. AMENDED.

(1) General Provisions

(a) Purpose.

This Rule, 391-3-17-.03, establishes standards for protection against ionizing radiation resulting from activities conducted pursuant to licenses issued by the Department. The requirements in this Rule are designed to control the receipt, possession, use, transfer, and disposal of sources of radiation by any licensee so that the total dose to an individual, including doses resulting from all sources of radiation other than background radiation, does not exceed the standards for protection against radiation prescribed in this Rule. However, nothing in this Rule shall be construed as limiting actions that may be necessary to protect health and safety.

(b) Scope.

This Rule applies to persons licensed by the Department on or after January 1, 1994, to receive, possess, use, transfer, or dispose of sources of radiation. The limits in this Rule 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.

(2) Definitions

The definitions set forth for certain terms under 391-3-17-.01 are applicable to those terms as used in this Rule, unless the term is otherwise defined herein. As used in this Rule:

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

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

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

(d) "Annual limit on intake" (ALI) means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent of five rem (0.05 Sv) or a committed dose equivalent of 50 rem (0.5 Sv) to any individual organ or tissue. ALI values for intake by ingestion and by inhalation of selected radionuclides are given in Table I, Columns 1 and 2, of Appendix B to 10 CFR 20.

(e) "Chelating agent" means amine polycarboxylic acids, hydroxycarboxylic acids, gluconic acid, and polycarboxylic acids.

(f) "Chemical description" means a description of the principal chemical characteristics of a low-level radioactive waste.

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

(h) "Computer-readable medium" means that the Department's computer can transfer the information from the medium into its memory.

(i) "Consignee" means the designated receiver of the shipment of low-level radioactive waste.

(j) "Constraint (dose constraint)" means a value above which specified licensee actions are required.

(k) "Critical Group" means the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.

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

(m) "Decommission" means to remove a facility or site safely from service and reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of the license.

(n) "Decontamination facility" means a facility operating under a Department, U.S. Nuclear Regulatory Commission, Agreement State or Licensing State license whose principal purpose is decontamination of equipment or materials to accomplish recycle, reuse, or other waste management objectives, and, for purposes of this part, is not considered to be a consignee for LLW shipments.

(o) "Demand respirator" means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

(p) "Derived air concentration" (DAC) means the concentration of a given radionuclide in air which, if breathed by the reference man for a working year of 2,000 hours under conditions of light work (inhalation rate of 1.2 cubic meters of air per hour), results in an intake of one ALI. DAC values are given in Table I, Column 3 of Appendix B to 10 CFR 20.

(q) "Derived air concentration-hour" (DAC-hour) means the product of the concentration of radioactive material in air, expressed as a fraction or multiple of the derived air concentration for each radionuclide, and the time of exposure to that radionuclide, in hours. A licensee may take 2,000 DAC-hours to represent one ALI, equivalent to a committed effective dose equivalent of five rem (0.05 Sv).

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

(s) "Disposal container" means a container principally used to confine low-level radioactive waste during disposal operations at a land disposal facility (also see "high integrity container"). Note that for some shipments, the disposal container may be the transport package.

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

(u) "Dosimetry processor" means a person that processes and evaluates individual monitoring equipment devices in order to determine the radiation dose delivered to the monitoring devices.

(v) "EPA identification number" means the number received by a transporter following application to the Administrator of EPA as required by 40 CFR part 263.

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

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

(y) "Fit test" means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

(z) "Generator" means a licensee operating under a Department, U.S. Nuclear Regulatory Commission or Agreement State license who (1) is a waste generator as defined in (2)(ff), or (2) is the licensee to whom waste can be attributed within the context of the Low-Level Radioactive Waste Policy Amendments Act of 1985 (e.g., waste generated as a result of decontamination or recycle activities).

(aa) "Helmet" means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

(bb) "High integrity container (HIC)" means a container commonly designed to meet the structural stability requirements of Rule 391-3-17-.03(12)(g), and to meet Department of Transportation requirements for a Type A package.

(cc) "Hood" means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

(dd) "Land disposal facility" means the land, buildings and structures, and equipment that are intended to be used for the disposal of radioactive waste. For purposes of this Rule, a "geologic repository" as defined in 10 CFR Part 60 is not considered a "land disposal facility."

(ee) "Lens dose equivalent" (LDE) has the same meaning as that given in Rule 391-3-17-.01(2)(yy).

(ff) "Loose-fitting facepiece" means a respiratory inlet covering that is designed to form a partial seal with the face.

(gg) "Nationally tracked source" means a sealed source containing a quantity equal to or greater than Category 1 or Category 2 levels of any radioactive material listed in Table 3 of 391-3-17-.03(15). In this context a sealed source is defined as radioactive material that is sealed in a capsule or closely bonded, in a solid form and which is not exempt from regulatory control. It does not mean material encapsulated solely for disposal, or nuclear material contained in any fuel assembly, subassembly, fuel rod, or fuel pellet. Category 1 nationally tracked sources are those containing radioactive material at a quantity equal to or greater than the Category 1 threshold. Category 2 nationally tracked sources are those containing radioactive material at a quantity equal to or greater than the Category 2 threshold but less than the Category 1 threshold.

(hh) "Negative pressure respirator" (tight fitting) means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

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

(jj) "Positive pressure respirator" means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

(kk) "Physical description" means the items called for on NRC Form 541 or equivalent form to describe a low-level radioactive waste.

(ll) "Planned special exposure" means an infrequent exposure to radiation separate from and in addition to the annual occupational dose limits.

(mm) "Powered air-purifying respirator" (PAPR) means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

(nn) "Pressure demand respirator" means a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

(oo) "Qualitative fit test" (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

(pp) "Quantitative fit test" (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

(qq) "Reference man" means a hypothetical aggregation of human physical and physiological characteristics determined by international consensus. These characteristics may be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base.

(rr) "Residual radioactivity" means radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radiation. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the site, even if those burials were made in accordance with the provisions of Rule .03 of this Chapter.

(ss) "Residual waste" means low-level radioactive waste resulting from processing or decontamination activities that cannot be easily separated into distinct batches attributable to specific waste generators. This waste is attributable to the processor or decontamination facility, as applicable.

(tt) "Respiratory protective device" means an apparatus, such as a respirator, used to reduce an individual's intake of airborne radioactive materials.

(uu) "Self-contained breathing apparatus" (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

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

(ww) "Shipper" means the licensed entity (i.e., the waste generator, waste collector, or waste processor) who offers low-level radioactive waste for transportation, typically consigning this type of waste to a licensed waste collector, waste processor, or land disposal facility operator.

(xx) "Shipping paper" means NRC Form 540 and, if required, NRC Form 540A or equivalent forms which include the information required by DOT in 49 CFR Part 172.

(yy) "Source material" has the same meaning as that given in Rule 391-3-17-.01(2)(uuuu).

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

(aaa) "Supplied-air respirator" (SAR) or airline respirator means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

(bbb) "Tight-fitting facepiece" means a respiratory inlet covering that forms a complete seal with the face.

(ccc) "Uniform Low-Level Radioactive Waste Manifest" or "Uniform Manifest" means the combination of NRC Forms 540, 541, and if necessary, 542, and their respective continuation sheets as needed, or equivalent forms.

(ddd) "User seal check" (fit check) means an action conducted by the respirator user to determine if the respirator is properly seated to the face. Examples include negative pressure check, positive pressure check, irritant smoke check, or isoamyl acetate check.

(eee) "Very high radiation area" means an area, accessible to individuals, in which radiation levels from radioactive materials external to the body could result in an individual receiving an absorbed dose in excess of 500 rads (5 Gray) in one hour at one meter from a source of radiation or from any surface that the radiation penetrates.[1]

(fff) "Waste collector" means an entity, operating under a Department, U.S. Nuclear Regulatory Commission, Agreement State, or Licensing State license, whose principal purpose is to collect and consolidate waste generated by others, and to transfer this waste, without processing or repackaging the collected waste, to another licensed waste collector, licensed waste processor, or licensed land disposal facility.

(ggg) "Waste description" means the physical, chemical and radiological description of a low-level radioactive waste as called for on NRC Form 541 or equivalent form.

[1] For very high doses received at high dose rates, units of absorbed dose, Gray and rad, are appropriate, rather than units of dose equivalent, Sievert and rem.

(hhh) "Waste generator" means an entity, operating under a Department, U.S. Nuclear Regulatory Commission, Agreement State, or Licensing State license, who (1) possesses any material or component that contains radioactivity or is radioactively contaminated for which the licensee foresees no further use, and (2) transfers this material or component to a licensed land disposal facility or to a licensed waste collector or processor for handling or treatment prior to disposal. A licensee performing processing or decontamination services may be a "waste generator" if the transfer of low-level radioactive waste from its facility is defined as "residual waste."

(iii) "Waste processor" means an entity, operating under a Department, U.S. Nuclear Regulatory Commission, Agreement State, or Licensing State license, whose principal purpose is to process, repackage, or otherwise treat low-level radioactive material or waste generated by others prior to eventual transfer of waste to a licensed low-level radioactive waste land disposal facility.

(jjj) "Waste type" means a waste within a disposal container having a unique physical description (i.e., a specific waste descriptor code or description; or a waste sorbed on or solidified in a specifically defined media).

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

ORGAN DOSE WEIGHTING FACTORS

Organ or Tissue	w_T
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30[a]
Whole Body	1.00[b]

[a] 0.30 results from 0.06 for each of five "remainder" organs, excluding the skin and the lens of the eye, that receive the highest doses.

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

(3) Implementation

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

(b) If a license condition exempts a licensee from a provision of Rule 391-3-17-.03 in effect on or before January 1, 1994, it also exempts the licensee from the corresponding provision of this Rule.

(c) If a license condition cites provisions of Rule 391-3-17-.03 in effect prior to January 1, 1994, which do not correspond to any provisions of this Rule, the license condition remains in force until there is an amendment or renewal of the license that modifies or removes this condition.

(4) Radiation Protection Programs

(a) Each licensee shall develop, document, and implement a Radiation Protection Program sufficient to ensure compliance with the provisions of this Rule. See (14)(b) of this Rule for record-keeping requirements relating to these Programs.

(b) The licensee shall use, to the extent practical, 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 least annually, review the Radiation Protection Program content and implementation.

(d) To implement the ALARA requirements of .03(4)(b), and notwithstanding the requirements in .03(5)(i) of this rule, a constraint on air emissions of radioactive material to the environment, excluding Radon-222 and its daughters, shall be established by licensees such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of ten (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 exceedance as provided in .03(15)(c) and promptly take appropriate corrective action to ensure against recurrence.

(5) Occupational Dose Limits and Dose Limits for Individual Members of the Public

(a) Occupational Dose Limits for Adults.

1. The licensee shall control the occupational dose to individual adults, except for planned special exposures pursuant to (5)(f) of this Rule, in accordance with the following dose limits:

(i) An annual limit, which is the more limiting of:

(I) The total effective dose equivalent being equal to five (5) rem (0.05 Sv); or

(II) The sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rem (0.50 Sv).

(ii) 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:

(I) A lens dose equivalent of 15 rem (0.15 Sv); and

(II) A shallow dose equivalent of 50 rem (0.50 Sv) to the skin of the whole body or to the skin of any extremity.

2. Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime, listed in (5)(f)5.(i) and (ii) of this Rule.

3. The assigned deep dose equivalent shall be for the portion of the body receiving the highest exposure. The assigned shallow dose equivalent shall be the dose averaged over the contiguous ten (10) square centimeters of skin receiving the highest exposure.

4. 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.

5. Derived air concentration (DAC) and annual limit on intake (ALI) values are specified in Table I of Appendix B to 10 CFR 20 and may be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits. See (14)(g) of this Rule for maintaining records of these exposures.

6. Notwithstanding the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to ten milligrams in a week in consideration of chemical toxicity. See footnote 3 of Appendix B 10 CFR 20.

7. The licensee shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person during the current year. See (5)(e) of this Rule.

(b) Compliance with Requirements for Summation of External and Internal Doses.

1. General Requirements. If the licensee is required to monitor pursuant to both (8)(b)1. and 2. of this Rule, the licensee shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee is required to monitor only pursuant to (8)(b)1. of this Rule or only pursuant to (8)(b)2. of this Rule, then summation is not required to demonstrate compliance with the dose limits. The licensee must demonstrate compliance with the requirements for summation of external and internal doses pursuant to (5)(b)2., 3., and 4. of this Rule. 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.

2. Intake by Inhalation. 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 unity:

(i) The sum of the fractions of the inhalation ALI for each radionuclide;

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

(iii) 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 factors, w_T, and the committed dose equivalent, $H_{T,50}$, per unit intake is greater than ten percent of the maximum weighted value of H_{50} (i.e., $w_T H_{T,50}$), per unit intake for any organ or tissue.

3. Intake by Oral Ingestion. If the occupationally-exposed individual receives an intake of radionuclides by oral ingestion greater than ten percent of the applicable oral ALI, the licensee shall account for this intake and include it in demonstrating compliance with the limits.

4. Intake through Wounds or Absorption through Skin. 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 evaluated or accounted for pursuant to (5)(b)4. of this Rule.

(c) Determination of External Dose from Airborne Radioactive Material.

1. 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 Appendix B, footnotes 1 and 2, of 10 CFR 20.

2. 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.

(d) Determination of Internal Exposure.

1. For purposes of assessing the dose used to determine compliance with occupational dose equivalent limits, the licensee shall, when required under (8)(b) of this Rule, take suitable and timely measurements of:

(i) Concentrations of radioactive materials in air in work areas during operations;

(ii) Quantities of radionuclides in the body;

(iii) Quantities of radionuclides excreted from the body; or

(iv) Combinations of these measurements.

2. Unless respiratory protective equipment is used, as provided in (10)(d) of this Rule, 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.

3. 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:

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

(ii) Upon prior approval of the Department, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material, for example, aerosol size distribution or density; and

(iii) 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 Appendix B of 10 CFR 20.

4. If the licensee chooses to assess intakes of Class Y material using the measurements given in (5)(d)1.(ii) or (iii) of this Rule, the licensee may delay the recording and reporting of the assessments for periods up to seven months, unless otherwise required by (15)(b) or (15)(c) of this Rule. This delay permits the licensee to make additional measurements basic to the assessments.

5. 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:

(i) The sum of the ratios of the concentration to the appropriate DAC value (i.e. D, W, or Y) from Appendix B of 10 CFR 20, for each radionuclide in the mixture; or

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

6. 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.

7. When a mixture of radionuclides in the air exists, a licensee may disregard certain radionuclides in the mixture if:

(i) The licensee uses the total activity of the mixture in demonstrating compliance with the dose limits in (5)(a) of this Rule and in complying with the monitoring requirements in (8)(b)2. of this Rule;

(ii) The concentration of any radionuclide disregarded is less than ten percent of its DAC; and

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

8. When determining the committed effective dose equivalent, the following information may be considered:

(i) In order 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 five rem (0.05Sv) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent;

(ii) When the ALI (and the associated DAC) is determined by the non-stochastic organ dose limit of 50 rem (0.50 Sv), the intake of radionuclides that would result in a committed effective dose equivalent of five rem (0.05 Sv), (i.e., the stochastic ALI) is listed in parentheses in Table I of Appendix B of 10 CFR 20. In this case, the licensee may, as a simplifying assumption, use the stochastic ALIs to determine the committed effective dose equivalent. However, if the licensee uses the stochastic ALIs, the licensee shall also demonstrate that the limit in (5)(a)1.(i)(II) of this Rule is not exceeded.

(e) Determination of Prior Occupational Dose.

1. For each individual who is likely to receive, in a year, an occupational dose requiring monitoring pursuant to (8)(b) of this Rule, the licensee shall:

   (i) Determine the occupational radiation dose received during the current year; and

   (ii) Attempt to obtain the records of lifetime cumulative occupational radiation dose.

2. Prior to permitting an individual to participate in a planned special exposure, the licensee shall determine:

   (i) The internal and external doses from all previous planned special exposures; and

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

3. In complying with the requirements of (5)(e)1. of this Rule, a licensee may:

   (i) 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 may have received during the current year;

   (ii) Accept, as the record of lifetime cumulative radiation dose, an up-to-date Department Form "Occupational Radiation 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

   (iii) Obtain 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, facsimile, or letter. The licensee shall request a written

verification of the dose data if the authenticity of the transmitted report cannot be established.

4. The licensee shall record the exposure history, as required by (5)(e)1. of this Rule, on Department Form "Occupational Radiation Exposure History" or other clear and legible record, and 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, the licensee shall use the dose shown in the report in preparing the Department Form "Occupational Radiation Exposure History" or equivalent form. For any period in which the licensee does not obtain a report, the licensee shall place a notation on the "Occupational Radiation Exposure History" or equivalent form indicating the periods of time for which data are not available.

5. Licensees are not required to partition historical dose between external dose equivalents and internal committed dose equivalents of radionuclides assessed under the Regulations in effect before January 1, 1994. Further, occupational exposure histories obtained and recorded on Department Form "Occupational Radiation Exposure History" or equivalent before January 1, 1994, might not have included effective dose equivalent but may be used in the absence of specific information on the intake of radionuclides by the individual.

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

   (i) In establishing administrative controls under (5)(a)7. of this Rule, for the current year, that the allowable dose limit for the individual is reduced by 1.25 rem (12.5 mSv) for each quarter for which records were unavailable and the individual was engaged in activities that could have resulted in occupational radiation exposure; and

   (ii) That the individual is not available for planned special exposures.

7. The licensee shall retain the records on Department Form "Occupational Radiation Exposure History" or equivalent until the Department terminates each pertinent license requiring this record. The licensee shall retain records used in preparing Department

Form "Occupational Radiation Exposure History" or equivalent for three years after the record is made.

(f) 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 (5)(a) of this Rule 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 higher exposure estimated to result from the planned special exposure are unavailable or impractical (i.e., industrial radiography source retrieval for an area that cannot be evacuated).

2. The management official of 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:

   (i) Informed of the purpose of the planned operation;

   (ii) 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

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

4. Prior to permitting an individual to participate in a planned special exposure, the licensee ascertains prior doses as required by (5)(e)2. of this Rule during the lifetime for each individual involved.

5. Subject to (5)(a)2. of this Rule, 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:

   (i) The numerical values of any of the dose limits in (5)(a)1. of this Rule in any year; and

   (ii) Five times the annual dose limits in (5)(a)1. of this Rule during the individual's lifetime.

6. The licensee maintains records of the conduct of a planned special

exposure in accordance with (14)(f) of this Rule and submits a written report in accordance with (15)(d) of this Rule.

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 after the date of the planned special exposure. The dose from planned special exposures shall not be considered in controlling the future occupational dose of the individual pursuant to (5)(a)1. of this Rule but shall be included in evaluations required by (5)(f)1. and (5)(f)5. of this Rule.

(g) Occupational Dose Limits for Minors. The annual occupational dose limits for minors are ten percent of the annual occupational dose limits specified for adult workers in (5)(a) of this Rule.

(h) Dose to an Embryo/Fetus.

1. The licensee shall ensure that the dose equivalent to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv). For record-keeping requirements, see (14)(g) of this Rule.

2. The licensee shall make efforts to avoid substantial variation[2] above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in (5)(h)1. of this Rule.

3. The dose equivalent to an embryo/fetus shall be taken as the sum of:

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

   (ii) The dose equivalent to the embryo/fetus from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

4. If by the time the woman declares pregnancy to the licensee the dose equivalent to the embryo/fetus is found to have exceeded 0.50 rem (5.0 mSv), or is within 0.05 rem (0.5 mSv) of this dose equivalent, the licensee shall be deemed to be in compliance with (5)(h)1. of this Rule if the additional dose equivalent to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the

[2] The National Council on Radiation Protection and Measurements recommended in NCRP Report No. 91 (June 1, 1987) that no more than 0.05 rem (0.5 mSv) to the embryo/fetus be received in any one month.

remainder of the pregnancy.

5. If the declared pregnant woman has not notified the licensee of the estimated date of conception, the licensee shall ensure that the dose equivalent to the embryo/fetus as specified in (5)(h)3. of this Rule due to occupational exposure of the declared pregnant woman does not exceed 0.05 rem (0.5 mSv) per month during the remainder of the pregnancy. If, after initially declaring her pregnancy, a declared pregnant woman advises the licensee of the estimated date of conception, 10% of the dose limits specified in (5)(a) and (d) of this Rule shall apply.

(i) Radiation Dose Limits for Individual Members of the Public.

1. Each licensee shall conduct operations so that:

(i) Except as provided in (5)(i)1.(iii) the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year, exclusive of the dose contributions from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with Rule .05(37), from voluntary participation in medical research programs, and from the licensee's disposal of radioactive material into sanitary sewerage in accordance with (13)(c) of this Rule; and

(ii) The dose in any unrestricted area from external sources, exclusive of the dose contributions from individuals administered radioactive material and released in accordance with Rule .05(37), does not exceed 0.002 rem (0.02 mSv) in any one hour.

(iii) The total effective dose equivalent to individual members of the public from infrequent exposure to radiation from radiation machines does not exceed 0.5 rem (5 mSv).

2. A licensee or license applicant may apply for prior Department authorization to operate up to an annual dose limit for an individual member of the public of 0.5 rem (5 mSv). The licensee or license applicant shall include the following information in this application:

(i) Demonstration of the need for and the expected duration of operations in excess of the limit in (5)(i)1. of this Rule;

(ii) The licensee's program to assess and control dose within the 0.5 rem (5 mSv) annual limit; and

(iii) The procedure to be followed to maintain the dose as low as is reasonably achievable (ALARA).

3. In addition to the requirements of this Rule, a licensee subject to the provisions of the U.S. Environmental Protection Agency's (EPA) generally applicable environmental radiation standards in 40 CFR Part 190 shall comply with those standards.

4. The Department 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.

(j) Compliance with Dose Limits for Individual Members of the Public.

1. 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 (5)(i) of this Rule.

2. A licensee shall show compliance with the annual dose limit in (5)(i) of this Rule by:

(i) 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

(ii) Demonstrating that:

(I) The annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in Table II of Appendix B of 10 CFR 20.

(II) If an individual were continually present in an unrestricted area, the dose from external sources would not exceed 0.002 rem (0.02 mSv) in one hour and 0.05 rem (0.50 mSv) in one year.

3. Upon approval from the Department, the licensee may adjust the

effluent concentration values in Appendix B, Table II of 10 CFR 20, 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).

(6) Testing for Leakage or Contamination of Sealed Sources

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

1. Each sealed source, other than hydrogen-3, with a half-life greater than 30 days and in any form other than gas, shall be tested for leakage or contamination as follows:

(i) Prior to initial use;

(ii) Unless otherwise authorized by the Department, at intervals not to exceed six months, except that each source designed for the purpose of emitting alpha particles shall be tested at intervals not to exceed three months;

(iii) At any other time there is reason to suspect that a sealed source might have been damaged or might be leaking, it shall be tested for leakage before further use; and

(iv) In the absence of a certificate from a transferor indicating that a test for leakage has been made within six months prior to the transfer, the sealed source shall not be put into use until tested and the results received.

2. Tests for leakage for all sealed sources, except those manufactured to contain radium, shall be capable of detecting the presence of 0.005 μCi (185 Bq) of radioactive material on a test sample. Test samples shall be taken from the sealed source or from the surfaces of the container in which the sealed source is stored or mounted on which one might expect contamination to accumulate. For sealed sources contained in a device, test samples are obtained when the source is in the "off" position.

3. Tests for leakage for sources manufactured to contain radium shall be capable of detecting an absolute leakage rate of 0.001 μCi (37 Bq) of radon-222 in a 24-hour period when the collection efficiency for radon-222 and its daughters has been determined with respect to collection method, volume, and time.

4. Test samples shall also be taken from the interior surfaces of the

container in which sealed sources of radium are stored. This test shall be capable of detecting the presence of 0.005 μCi (185 Bq) of a radium daughter that has a half-life greater than four days.

5. Notwithstanding the periodic test for leakage required, any sealed source is exempt from such tests for leakage when the sealed source contains 100 μCi (3.7 MBq) or less of beta- or gamma-emitting material or ten μCi (370 kBq) or less of alpha-emitting material.

(b) Tests for leakage or contamination shall be performed by persons specifically authorized by the Department, an Agreement State, a Licensing State, or the U.S. Nuclear Regulatory Commission to perform such services.

(c) The following shall be considered evidence that the sealed source is leaking:

1. The presence of 0.005 μCi (185 Bq) or more of removable contamination on any test sample. If the test of a sealed source, other than radium, reveals the presence of 0.005 μCi (185 Bq) or more of removable contamination, the licensee shall immediately withdraw the sealed source from use, take action to prevent the spread of contamination, and cause the sealed source to be decontaminated and repaired or to be disposed of in accordance with this Rule.

2. Leakage of 0.001 μCi (37 Bq) of radon-222 per 24 hours for sealed sources manufactured to contain radium. If the test of a sealed source manufactured to contain radium reveals the presence of removable contamination resulting from the decay of 0.005 μCi (185 Bq) or more of radium-226, the licensee shall immediately withdraw the sealed source from use, take action to prevent the spread of contamination, and cause the sealed source to be decontaminated and repaired or to be disposed of in accordance with this Rule.

(d) Records of test results for sealed sources shall be made pursuant to (14)(d).

(e) Reports of test results for leaking or contaminated sealed sources shall be made pursuant to (15)(g) of this Rule.

(7) Radiological Requirements for License Termination

(a) General provisions and scope.

1. The requirements in this section apply to the decommissioning of facilities licensed under Rule .02(8)(g), (Licensing of Radioactive Materials. Amended);

2. The requirements in this section do not apply to sites which:

   (i) Have been decommissioned prior to April 18, 2002 in accordance with requirements identified in .03(7) and Rule .02 of this Chapter; or

   (ii) Have previously submitted and received Department approval on a decommissioning plan by April 18, 2002.

3. After a site has been decommissioned and the license terminated in accordance with the requirements in this section, the Department will require additional cleanup only if, based on new information, it determines that the requirements of this section were not met and residual radioactivity remaining at the site could result in significant threat to public health and safety.

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

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

(c) Alternate requirements for license termination.

1. The Department may terminate a license using alternate requirements greater than the dose requirements of .03(7)(b) if the licensee:

   (i) Provides assurance that public health and safety would continue to be protected, and that it is unlikely that the dose from all man-made sources combined, other than medical, would be more than the 100 mrem/year (1 mSv/year) limit of

.03(5)(i), by submitting an analysis of possible sources of exposure;

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

(iii) Has submitted a decommissioning plan to the Department indicating the licensee's intent to decommission in accordance with requirements of Rule .02(18)(d), and specifying that the licensee proposes to decommission by use of alternate requirements. The licensee shall document in the decommissioning plan how the advice of individuals and institutions in the community who may be affected by the decommissioning has been sought and addressed, as appropriate, following analysis of that advice. In seeking such advice, the licensee shall provide for:

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

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

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

2. The use of alternate requirements to terminate a license requires the approval of the Department after consideration of the Department’s recommendations that will address any comments provided by the U.S. Environmental Protection Agency (EPA) and any public comments submitted in accordance with (7)(d) of this rule.

(d) Public notification and public participation. Upon the receipt of a decommissioning plan from the licensee, or a proposal by the licensee for release of a site in accordance with (7)(c) of this Rule, or whenever the Department deems such notice to be in the public interest, the Department will:

1. Notify and solicit comments from:

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

(ii) The EPA for cases where the licensee proposes to release a site in accordance with (7)(c).

2. Publish a notice in the local newspaper(s), letters to State or local organizations, or other appropriate forum, that is readily accessible to individuals in the vicinity of the site, and solicit comments from affected parties.

(e) Minimization of contamination. Applicants for licenses, other than renewals, after April 18, 2002, shall describe in the application how facility design and procedures for operation will minimize, to the extent practical, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practical, the generation of radioactive waste.

(8) Surveys and Monitoring

(a) General.

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

(i) May be necessary for the licensee to demonstrate compliance with this Rule; and

(ii) Are reasonable under the circumstances to evaluate:

(I) The magnitude and extent of radiation levels;

(II) Concentrations or quantities of radioactive material; and

(III) The potential radiological hazards.

2. The licensee shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated periodically, at least annually, for the radiation measured except when a more frequent interval is specified in other applicable parts of these Rules or a license condition.

3. 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 (5)(a) of this Rule, with other applicable provisions of this Chapter, or with conditions specified in a license shall be processed and evaluated by a qualified dosimetry processor. A dosimetry processor is qualified if it:

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

   (ii) Is 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.

4. The licensee shall ensure that adequate precautions are taken to prevent a deceptive exposure of an individual monitoring device.

(b) Conditions Requiring Individual Monitoring of External and Internal Occupational Dose. Each licensee shall monitor exposures to sources of radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this Rule. As a minimum:

1. Each licensee shall monitor occupational exposure to radiation and shall supply and require the use of individual monitoring devices by:

   (i) Adults likely to receive, in one year from sources external to the body, a dose in excess of ten percent of the limits in (5)(a)1. of this Rule;

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

   (iii) 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 (1 mSv);[3] and

[3]All of the occupational doses in .03(5)(a) continue to be applicable to the declared pregnant worker as long as the embryo/fetus dose limit is not exceeded.

(iv) Individuals entering a high or very high radiation area.

2. Each licensee shall monitor, to determine compliance with (5)(d) of this Rule, the occupational intake of radioactive material by, and assess the committed effective dose equivalent to:

(i) Adults likely to receive, in one year, an intake in excess of ten percent (10%) of the applicable ALI in Table I, Columns 1 and 2, of Appendix B of 10 CFR 20; and

(ii) Minors likely to receive, in one year, a committed effective dose equivalent in excess of 0.05 rem (0.50 mSv).

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

(9) Control Of Exposure From External Sources In Restricted Areas

(a) Control of Access to High Radiation Areas.

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

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

(ii) 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

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

2. In place of the controls required by (9)(a)1. of this Rule, the licensee may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

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

4. The licensee shall establish the controls required by (9)(a)1. and (9)(a)3. of this Rule in a way that does not prevent individuals from leaving a high radiation area.

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

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

   (ii) The dose rate at one meter from the external surface of any package does not exceed 0.01 rem (0.1 mSv) per hour.

6. The licensee is not required to control entrance or access to rooms or other areas in hospitals solely because of the presence of patients containing radioactive material, provided that there are personnel in attendance who will take the necessary precautions to prevent the exposure of individuals to radiation or radioactive material in excess of the established limits in this Rule and to ensure operation within the ALARA provisions of the licensee's Radiation Protection Program.

7. The licensee is not required to control entrance or access to rooms or other areas containing sources of radiation capable of producing a high radiation area as described in Rule 391-3-17-.01(2)(qq) if the licensee has met all the specific requirements for access and control specified in other applicable Rules, such as 391-3-17-.04 for industrial radiography.

(b) Control of Access to Very High Radiation Areas.

1. In addition to the requirements in (9)(a) of this Rule, the licensee shall institute additional 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 Gy) or more in one hour at one meter from a source of radiation or any surface through which the radiation penetrates. This requirement does not apply to rooms or areas in which diagnostic x-ray systems are the only source of radiation, or to non-self-shielded irradiators.

2. The licensee is not required to control entrance or access to rooms or other areas containing sources of radiation capable of producing

a very high radiation area as defined in this Rule if the licensee has met all the specific requirements for access and control specified in other applicable Rules, such as 391-3-17-.04 for industrial radiography.

(10) Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas

(a) Use of Process or Other Engineering Controls. The licensee shall use, to the extent practicable, process or other engineering controls (e.g., containment, decontamination, or ventilation) to control the concentrations of radioactive material in air.

(b) Use of Other Controls. 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 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.

(c) 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.

(d) Use of Individual Respiratory Protection Equipment.

1. If the licensee uses respiratory protection equipment to limit intakes pursuant to (10)(b) of this Rule:

(i) Except as provided in (10)(d)1.(ii) of this Rule, the licensee shall use only respiratory protection equipment that is tested and certified by or had certification extended by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH/MSHA).

(ii) The licensee may use equipment that has not been tested or certified by the National Institute for Occupational Safety and

Health and the Mine Safety and Health Administration or had certification extended by NIOSH/MSHA or for which there is no schedule for testing or certification, provided the licensee has submitted to the Department and the Department has approved an application for authorized use of that equipment, including a demonstration by testing, or a demonstration on the basis of reliable test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use.

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

(I) Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;

(II) Surveys and bioassays, as appropriate, to evaluate actual intakes;

(III) Testing of respirators for operability (user seal check for face sealing devices and functional check for others) immediately prior to each use;

(IV) Written procedures regarding: respirator selection; fit testing; breathing air quality; inventory control; storage, issuance, maintenance, repair, and quality assurance of respiratory protection equipment, including testing for operability immediately prior to each use; supervision and training of personnel; monitoring, including air sampling and bioassays; and record-keeping; and

(V) Determination by a physician prior to initial fitting of face sealing respirators; before the first use of non-face sealing respirators; and either every 12 months thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment.

(VI) Fit testing, with fit factor " ten times the APF for negative pressure devices", and a fit factor " 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.

(iv) 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 such relief.

(v) 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.

(vi) 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. 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.

(vii) 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 (29 CFR 1910.134(i)(1)(ii)(A) through (E). Grade D quality air criteria include:

(I) Oxygen content (v/v) of 19.5-23.5%;

(II) Hydrocarbon (condensed) content of five (5) milligrams per cubic meter of air or less;

(III) Carbon monoxide (CO) content of ten (10) ppm or less;

(IV) Carbon dioxide content of 1,000 ppm or less; and

(V) Lack of noticeable odor.

(viii) The licensee shall ensure that no objects, materials or substances, such as facial hair, or any conditions that interfere with the face to 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.

(ix) 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. 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.

(e) Further Restrictions on the Use of Respiratory Protection Equipment. The Department may impose restrictions in addition to those in (10)(b) and (10)(c) of this Rule and Appendix A to 10 CFR 20, in order 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 total effective dose equivalent ALARA; and

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

(f) Application for use of higher assigned protection factors. The licensee shall obtain authorization from the Department before using assigned protection factors in excess of those specified in Appendix A to 10 CFR Part 20. The Department 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.

(11) Storage and Control of Licensed Material

(a) Security and Control of Licensed Radioactive Material. The licensee shall secure licensed materials from unauthorized removal or access.

(b) Control of material sources of radiation not in storage. The licensee shall maintain constant surveillance and use devices or administrative procedures to prevent unauthorized use of licensed radioactive material that is in an unrestricted area and that is not in storage or in a patient.

(12) Precautionary Procedures

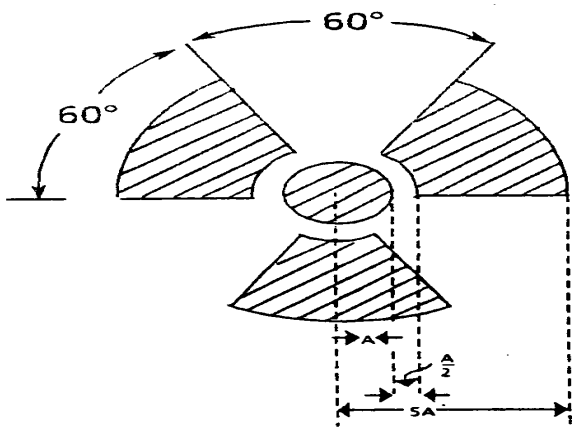
(a) Caution Signs.

1. Standard Radiation Symbol. Unless otherwise authorized by the Department, the symbol prescribed by (12)(a) of this Rule uses the colors magenta (or purple or black) on yellow background. The symbol prescribed is the three-bladed design as follows:

(i) Cross-hatched area is to be magenta, purple, or black; and

(ii) The background is to be yellow.

2. Exception to Color Requirements for Standard Radiation Symbol. Notwithstanding the requirements of (12)(a)1. of this Rule, licensees are authorized to label sources, source holders, or device components containing sources of radiation that are subjected to high temperatures with conspicuously etched or stamped radiation caution symbols without a color requirement.



3. In addition to the contents of signs and labels prescribed in this Rule, 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.

(b) Posting Requirements.

1. 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."

2. 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." The licensee may satisfy this requirement by posting the sign at the boundary of the high radiation area.

3. 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."

4. 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."

5. Posting of Areas or Rooms in which Licensed 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 ten times the quantity of such material specified in Appendix C of 10 CFR Part 20 with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)".

(c) Exceptions to Posting Requirements.

1. A licensee is not required to post caution signs in areas or rooms containing sources of radiation for periods of less than eight hours, if all of the following conditions are met:

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

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

2. Rooms or other areas in hospitals that are occupied by patients are not required to be posted with caution signs pursuant to (12)(b) of this Rule provided that the patient could be released from licensee control pursuant to Rule 391-3-17-.05.

3. A room or area is not required to be posted with a caution sign pursuant to (12)(b) of this Rule because of the presence of a sealed source provided that the radiation level at 30 centimeters from the surface of the source container or housing does not exceed 0.005 rem (0.05 mSv) per hour.

(d) Labeling Containers and Radiation Machines.

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

2. Each licensee shall, prior to removal or disposal of empty

uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive materials.

(e) Exemptions to Labeling Requirements. A licensee is not required to label:

1. Containers holding licensed material in quantities less than the quantities listed in Appendix C of 10 CFR 20;

2. Containers holding licensed material in concentrations less than those specified in Table III of Appendix B of 10 CFR 20;

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 Rule;

4. Containers when they are in transport and packaged and labeled in accordance with the regulations of the U.S. Department of Transportation[4];

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 chemical process equipment, piping, and tanks.

(f) Procedures for Receiving and Opening Packages.

1. Each licensee who is authorized to receive a package containing quantities of radioactive material in excess of a Type A quantity, as defined in Rule 391-3-17-.06(3)(u), shall make arrangements to receive:

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

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

[4] Labeled with a Radioactive White I, Yellow II, or Yellow III label as specified in U.S. Department of Transportation (DOT) regulations, 49 CFR 172.403-172.440.

2. Each licensee shall:

   (i) Monitor the external surfaces of a labeled[5] package for radioactive contamination unless the package contains only radioactive material in the form of gas or in "special form" as defined in Rule 391-3-17-.01(2)(wwww);

   (ii) Monitor the external surfaces of a labeled package for radiation levels unless the package contains quantities of radioactive material that are less than or equal to the Type A quantity, as defined in Rule 391-3-17-.06 (3)(u), and the radioactive material is in the form of a gas or in special form as defined in Rule 391-3-17-.01(2)(wwww); and

   (iii) Monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if the package has evidence of potential contamination, such as packages that are crushed, wet, or damaged.

3. The licensee shall perform the monitoring required by (12)(f)2. of this Rule as soon as practicable after receipt of the package, but not later than three hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours, or not later than three hours from the beginning of the next working day if it is received after working hours.

4. The licensee shall immediately notify the final delivery carrier and the Department by telephone, telegram, mailgram, or facsimile, when:

   (i) Removable radioactive surface contamination exceeds the limits of Rule 391-3-17-.06(15)(h); or

   (ii) External radiation levels exceed the limits of Rule 391-3-17-.06(15)(i).

5. Each licensee shall:

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

[5] Labeling of packages containing radioactive materials is required by the U.S. Department of Transportation (DOT) if the amount and type of radioactive material exceeds the limits for an excepted quantity or article as defined and limited by U.S. Department of Transportation (DOT) regulations 49 CFR 173.403(m) and (w) and 173.421-.424.

(ii) Ensure that the procedures are followed and that special instructions for the type of package being opened are followed.

6. Licensees transferring special form sources in vehicles owned or operated by the licensee to and from a work site are exempt from the contamination monitoring requirements of (12)(f)2. of this Rule, but are not exempt from the monitoring requirement in (12)(f)2. of this Rule for measuring radiation levels to ensure that the source is still properly lodged in its shield.

(13) Waste Disposal

(a) General Requirements.

1. A licensee shall dispose of licensed material only:

(i) By transfer to an authorized recipient as provided in (13)(i) of this Rule and in Rule 391-3-17-.02(19), or to the U.S. Department of Energy;

(ii) By decay in storage;

(iii) By release in effluents within the limits in (5)(i) of this Rule; or

(iv) As authorized pursuant to (13)(b), (13)(c), (13)(d), or (13)(e) of this Rule.

2. A person shall be specifically licensed by the Department, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State to receive waste containing licensed material from other persons for:

(i) Treatment prior to disposal;

(ii) Treatment or disposal by incineration;

(iii) Decay in storage;

(iv) Disposal at a land disposal facility licensed pursuant to 10 CFR Part 61, or equivalent regulations of an Agreement State; or

(v) Storage until transferred to a disposal facility authorized to receive the waste.

(b) Method for Obtaining Approval of Proposed Disposal Procedures. A licensee or applicant for a license may apply to the Department for approval of proposed procedures not otherwise authorized in this Chapter to dispose of licensed material generated in the licensee's operations. Each application shall include:

1. A description of the waste containing licensed material to be disposed of, including the physical and chemical properties that have an impact on risk evaluation, and the proposed manner and conditions of waste disposal;

2. An analysis and evaluation of pertinent information on the nature of the environment;

3. The nature and location of other potentially affected facilities; and

4. Analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in this Rule.

(c) Disposal by Release into Sanitary Sewerage.

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

(i) The material is readily soluble, or is readily dispersible biological material, in water;

(ii) The quantity of licensed radioactive material that the licensee releases into the sewer in one month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in Table III of Appendix B of 10 CFR 20;

(iii) If more than one radionuclide is released, the following conditions must also be satisfied:

(I) The licensee shall determine the fraction of the limit in Table III of Appendix B of 10 CFR 20, represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee into the sewer by the concentration of that radionuclide listed in Table III of Appendix B of 10 CFR 20; and

(II) The sum of the fractions for each radionuclide

required by (13)(c)1.(iii)(I) of this Rule does not exceed unity; and

(iv) The total quantity of licensed radioactive material that the licensee releases into the sanitary sewerage system in a year does not exceed five Ci (185 GBq) of hydrogen-3, one Ci (37 GBq) of carbon-14, and one Ci (37 GBq) of all other radioactive materials combined.

2. Excreta from individuals undergoing medical diagnosis or therapy with radioactive material are not subject to the limitations contained in (13)(c)1. of this Rule.

(d) Treatment or Disposal by Incineration. A licensee may treat or dispose of licensed material by incineration only in the forms and concentrations specified in (13)(e) of this Rule or as specifically approved by the Department pursuant to (13)(b) of this Rule.

(e) Disposal of Specific Wastes.

1. A licensee may dispose of the following licensed material as if it were not radioactive:

(i) 0.05 μCi (1.85 kBq) or less of hydrogen-3, carbon-14, or iodine-125 per gram of medium used for liquid scintillation counting; and

(ii) 0.05 μCi (1.85 kBq) or less of hydrogen-3, carbon-14, or iodine-125 per gram of animal tissue, averaged over the weight of the entire animal.

2. A licensee shall not dispose of tissue under (13)(e)1.(ii) of this Rule in a manner that would permit its use either as food for humans or as animal feed.

3. The licensee shall maintain records in accordance with (14)(i) of this Rule.

(f) 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 hazard will persist long after such precautions 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.

(i) 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 (13)(g)1. of this Rule. If Class A waste also meets the stability requirements set forth in (13)(g)2. of this Rule, it is not necessary to segregate the waste for disposal.

(ii) 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 (13)(g) of this Rule.

(iii) 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 (13)(g) of this Rule.

3. Classification determined by long-lived radionuclides. If the waste contains only radionuclides listed in Table 1, classification shall be determined as follows:

(i) If the concentration does not exceed 0.1 times the value in Table 1, the waste is Class A.

(ii) If the concentration exceeds 0.1 times the value in Table 1, the waste is Class C.

(iii) If the concentration exceeds the value in Table 1, the waste is not generally acceptable for near-surface disposal.

(iv) For wastes containing mixtures of radionuclides listed in

Table 1, the total concentration shall be determined by the sum of fractions rule described in (13)(f)7. of this Rule.

Table 1

Radionuclide	Concentration (Curies/cubic meter)
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 five years	100 [(a)]
Pu-241	3,500 [(a)]
Cm-242	20,000 [(a)]
Ra-226	100 [(a)]

[(a)] Units are in nanocuries per gram.

4. Classification determined by short-lived radionuclides. If the waste does not contain any of the radionuclides listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. If a nuclide is not listed Table 2, it does not need to be considered in determining the waste class.

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

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

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

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

   (v) For wastes containing mixtures of the radionuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule described in (13)(f)7. of this Rule.

Table 2

Radionuclide	Concentration (Curies/ cubic meter) Column 1	Column 2	Column 3
Total of all radionuclides with less than five year half-life	700	(b)	(b)
H-3	40	(b)	(b)
Co-60	700	(b)	(b)
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

(b) 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 2 determine the waste to be Class C independent of these radionuclides.

5. Classification determined by both long- and short-lived radionuclides. If the waste contains a mixture of radionuclides, some of which are listed in Table 1 and some of which are listed in Table 2, classification shall be determined as follows:

   (i) If the concentration of a radionuclide listed in Table 1 is less than 0.1 times the value listed in Table 1, the class shall be that determined by the concentration of radionuclides listed in Table 2.

   (ii) If the concentration of a radionuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1, the waste shall be Class C, provided the concentration of radionuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.

6. Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If the waste does not contain any radionuclides listed in either Table 1 or 2, 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. Example: A waste contains Sr-90

in a concentration of 50 Ci/m^3 and Cs-137 in a concentration of 22 Ci/m^3. Since the concentrations both exceed the values in Column 1, Table 2, they must be compared to Column 2 values. For Sr-90 fraction, 50/150 = 0.33; for Cs-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 the 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.

(g) Radioactive Waste Characteristics.

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

(i) Wastes shall be packaged in conformance with the conditions of the license issued to the site operator to which the waste will be shipped. Where the conditions of the site license are more restrictive than the provisions of this Chapter, the site license conditions shall govern.

(ii) Wastes shall not be packaged for disposal in cardboard or fiberboard boxes.

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

(iv) Solid wastes containing liquid shall contain as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed one percent of the volume.

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

(vi) Wastes 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 wastes packaged in accordance with (13)(g)1.(viii) of this Rule.

(vii) Pyrophoric materials contained in wastes shall be treated, prepared, and packaged to be nonflammable.

(viii) Wastes in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20°C. Total activity shall not exceed 100 Curies (3.7 TBq) per container.

(ix) Wastes containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological 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.

(i) 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 the 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.

(ii) Notwithstanding the provisions in (13)(g)1.(iii) and (iv) of this Rule, liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little freestanding and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed one percent of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5 percent of the volume of the waste for waste processed to a stable form.

(iii) Void spaces within the waste and between the waste and its

package shall be reduced to the extent practicable.

(h) 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 (13)(f) of this Rule.

(i) Transfer for Disposal and Manifest.

1. A waste generator, collector, or processor who transports, or offers for transportation, low-level radioactive waste intended for ultimate disposal at a licensed low-level radioactive waste land disposal facility must prepare a Manifest reflecting information requested on applicable NRC Forms 540 or equivalent forms (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 or equivalent form (Uniform Low-Level Radioactive Waste Manifest (Manifest Index and Regional Compact Tabulation)). NRC Forms 540 and 540A or equivalent forms must be completed and must physically accompany the pertinent low-level radioactive waste shipment. Upon agreement between shipper and consignee, NRC Forms 541 and 541A and 542 and 542A or equivalent forms may be completed, transmitted, and stored in electronic media with the capability for producing legible, accurate, and complete records on the respective forms. Licensees are not required by the Department to comply with the manifesting requirements of this Chapter when they ship:

(i) LLW for processing and expect its return (i.e., for storage under their license) prior to disposal at a licensed land disposal facility;

(ii) LLW that is being returned to the licensee who is the "waste generator" or "generator," as defined in this Rule; or

(iii) Radioactively contaminated material to a "waste processor" that becomes the processor’s residual waste.

For guidance in completing these forms, refer to the instructions that accompany the forms. Copies of manifests required by this Rule may be legible carbon copies, photocopies, or computer printouts that reproduce the data in the format of the uniform manifest. NRC Forms 541 and 541A and 542 and 542A or equivalent forms and the accompanying instructions, in hard copy, may be obtained from Radioactive Materials Program, 4220 International Parkway, Suite 100, Atlanta, Georgia 30354, or

current address.

This Rule includes information requirements of the Department of Transportation, as codified in 49 CFR Part 172. Information on hazardous, medical, or other waste, required to meet EPA regulations, as codified in 40 CFR Parts 259, 261 or elsewhere, is not addressed in this Rule, 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 Rule.

2. General Information. The shipper of the low-level radioactive waste, shall provide the following information on the uniform manifest:

   (i) The name, facility address, and telephone number of the licensee shipping the waste;

   (ii) An explicit declaration indicting whether the shipper is acting as a waste generator, collector, processor, or a combination of these identifiers for purposes of the manifested shipment; and

   (iii) The name, address, and telephone number, or the name and EPA identification number for the carrier transporting the waste.

3. Shipment Information. The shipper of the radioactive waste shall provide the following information regarding the waste shipment on the uniform manifest:

   (i) The date of the waste shipment;

   (ii) The total number of packages/disposal containers;

   (iii) The total disposal volume and disposal weight in the shipment;

   (iv) The total radionuclide activity in the shipment;

   (v) The activity of each of the radionuclides H-3, C-14, Tc-99, and I-129 contained in the shipment; and

   (vi) The total masses of U-233, U-235, and plutonium in the form of special nuclear material, and the total mass of uranium and thorium in the form of source material.

4. Disposal Container and Waste Information. The shipper of the radioactive waste shall provide the following information on the uniform manifest regarding the waste and each disposal container of waste in the shipment:

(i) An alphabetic or numeric identification that uniquely identifies each disposal container in the shipment;

(ii) A physical description of the disposal container, including the manufacturer and model of any high integrity container;

(iii) The volume displaced by the disposal container;

(iv) The gross weight of the disposal container, including the waste;

(v) For waste consigned to a disposal facility, the maximum radiation level at the surface of each disposal container;

(vi) A physical and chemical description of the waste;

(vii) The total weight percentage of chelating agent for any waste containing more than 0.1 percent chelating agent by weight, plus the identify of the principal chelating agent;

(viii) The approximate volume of waste within a container;

(ix) The sorbing or solidification media, if any, and the identity of the solidification media vendor and brand name;

(x) The identities and activities of individual radionuclides contained in each container, the masses of U-233, U-235, and plutonium in the form of special nuclear material, and the masses of uranium and thorium in the form of source material. For discrete waste types (i.e., activated materials, contaminated equipment, mechanical filters, sealed source/devices, and wastes in solidification/stabilization media), the identities and activities of individual radionuclides associated with a disposal container shall be reported;

(xi) The total radioactivity within each container; and

(xii) For wastes consigned to a disposal facility, the classification of the waste pursuant to (12)(f). Waste not meeting the

structural stability requirements of (12)(g)2. must be identified.

5. Uncontainerized Waste Information. The shipper of the radioactive waste shall provide the following information on the uniform manifest regarding a waste shipment delivered without a disposal container:

   (i) The approximate volume and weight of the waste;

   (ii) A physical and chemical description of the waste;

   (iii) The total weight percentage of chelating agent if the chelating agent exceeds 0.1 percent by weight, plus the identity of the principal chelating agent;

   (iv) For waste consigned to a disposal facility, the classification of the waste pursuant to (13)(f) of this Rule. Waste not meeting the structural stability requirements of (13)(g)2. of this Rule must be identified;

   (v) The identities and activities of individual radionuclides contained in the waste, the masses of U-233, U-235, and plutonium in the form of special nuclear material, and the masses of uranium and thorium in the form of source material; and

   (vi) For wastes consigned to a disposal facility, the maximum radiation levels at the surface of the waste.

6. Multi-Generator Disposal Container Information. This section applies to disposal containers enclosing mixtures of waste originating from different generators. (Note: The origin of the LLW resulting from a processor's activities may be attributable to one or more "generators" (including "waste generators") as defined in this Chapter). It also applies to mixtures of wastes shipped in an uncontainerized form, for which portions of the mixture within the shipment originate from different generators.

   (i) For homogeneous mixtures of waste, such as incinerator ash, provide the waste description applicable to the mixture and the volume of the waste attributed to each generator.

   (ii) For heterogeneous mixtures of waste, such as the combined products from a large compactor, identify each generator contributing waste to the disposal container, and, for

discrete waste types (i.e., activated materials, contaminated equipment, mechanical filters, sealed source/devices, and wastes in solidification/stabilization media), the identities and activities of individual radionuclides contained on these waste types within the disposal container. For each generator, provide the following:

(I) The volume of waste within the disposal container;

(II) A physical and chemical description of the waste, including the solidification agent, if any;

(III) The total weight percentage of chelating agents for any disposal container containing more than 0.1 percent chelating agent by weight, plus the identity of the principal chelating agent;

(IV) The sorbing or solidification media, if any, and the identity of the solidification media vendor and brand name if the media is claimed to meet stability requirements of (13)(g)2. of this Rule; and

(V) Radionuclide identities and activities contained in the waste, the masses of U-233, U-235, and plutonium in the form of special nuclear material, and the masses of uranium and thorium in the form of source material if contained in the waste.

7. An authorized representative of the waste generator, processor, or collector shall certify by signing and dating the shipment manifest that the transported materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the Department. A collector in signing the certification is certifying that nothing has been done to the collected waste which would invalidate the waste generator's certification.

8. Control and Tracking. Any licensee who transfers radioactive waste to a land disposal facility or a licensed waste collector shall comply with all of the following requirements. Any licensee who transfers waste to a licensed waste processor for waste treatment or repackaging shall comply with the requirements of (13)(i)8.(iv) through (ix). A licensee shall:

(i) Prepare all wastes so that the waste is classified according

to (13)(f) and meets waste characteristics requirements in (13)(g);

(ii) Label each disposal container (or transport package if potential radiation hazards preclude labeling of the individual disposal container) of waste to identify whether it is Class A waste, Class B waste, Class C waste, or greater than Class C waste, in accordance with (13)(f);

(iii) Conduct a quality assurance program to assure compliance with (13)(f) and (13)(g) (the program must include management evaluation of audits);

(iv) Prepare the NRC Forms 540 and 540A or Equivalent Forms, "Uniform Low-Level Radioactive Waste Manifest" as required by this Section;

(v) Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either:

(I) Receipt of the manifest precedes the LLW shipment, or

(II) The manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee, or

(III) Both (I) and (II) is also acceptable.

(vi) Include NRC Form 540 (and NRC 540A, if required) or Equivalent Forms with the shipment regardless of the option in (13)(i)8.(v);

(vii) Receive acknowledgment of the receipt of the shipment in the form of a signed copy of NRC Form 540 or Equivalent Form;

(viii) Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgment of receipt as the record of transfer of licensed material as required by Rule 391-3-17-.02; and

(ix) For any shipments or any part of a shipment for which acknowledgment of receipt has not been received within the times set forth in this section, conduct an investigation in

accordance with (13)(i)12.

9. Any waste collector licensee who handles only prepackaged waste shall:

(i) Acknowledge receipt of the waste from the shipper within one week of receipt by returning a signed copy of NRC Form 540 or Equivalent Form.

(ii) Prepare a new manifest to reflect consolidated shipments that meet the requirements of this section. The waste collector shall ensure that, for each container of waste in the shipment, the manifest identifies the generator of that container of waste;

(iii) Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either:

(I) Receipt of the manifest precedes the LLW shipment, or

(II) The manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee, or

(III) Both (I) and (II) is also acceptable;

(iv) Include NRC Form 540 (and NRC From 540A, if required) or Equivalent Forms, with the shipment regardless of the option chosen in (13)(i)9.(iii);

(v) Receive acknowledgment of the receipt of the shipment in the form of a signed copy of NRC Form 540 or Equivalent Form;

(vi) Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgment of receipt;

(vii) For any shipments or any part of a shipment for which acknowledgment of receipt has not been received within the times set forth in this section, conduct an investigation in accordance with (13)(i)12.; and

(viii) Notify the shipper and the Department 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.

10. Any licensed waste processor who treats or repackages waste shall:

(i) Acknowledge receipt of the waste from the shipper within one week of receipt by returning a signed copy of NRC Form 540 or Equivalent Form;

(ii) Prepare a new manifest that meets the requirements of this section. Preparation of the new manifest reflects that the processor is responsible for meeting these requirements. For each container of waste in the shipment, the manifest shall identify the waste generators, the preprocessed waste volume, and other information as required in (13)(i)6.;

(iii) Prepare all wastes so that the waste is classified according to (13)(f) and meets the waste characteristics requirements in (13)(g);

(iv) Label each package of waste to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with (13)(f) and (13)(h);

(v) Conduct a quality assurance program to assure compliance with (13)(f) and (13)(g) (the program shall include management evaluation of audits);

(vi) Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either:

(I) Receipt of the manifest precedes the LLW shipment, or

(II) The manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee, or

(III) Both (I) and (II) is also acceptable;

(vii) Include NRC Form 540 (and NRC Form 540A if required) or Equivalent Forms, with the shipment regardless of the option chosen in (13)(i)10.(vi);

(viii) Receive acknowledgment of the receipt of the shipment in the form of a signed copy of NRC Form 540 or Equivalent Form;

(ix) Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgment of receipt as the record of transfer of licensed material as required by Rule 391-3-17-.02;

(x) For any shipment or any part of a shipment for which acknowledgment of receipt has not been received within the times set forth in this section, conduct an investigation in accordance with (13)(i)12.; and

(xi) Notify the shipper and the Department when any shipment, or any 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.

11. The land disposal facility operator shall:

(i) Acknowledge receipt of the waste within one week of receipt by returning, as a minimum, a signed copy of NRC Form 540 or Equivalent Form to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the operator. If any discrepancy exists between materials listed on the Uniform Low-Level Radioactive Waste Manifest and materials received, copies or electronic transfer of the affected forms must be returned indicating that discrepancy.

(ii) Maintain copies of all completed manifests and electronically store the information until the Department terminates the license; and

(iii) Notify the shipper and the Department 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.

12. Any shipments or part of a shipment for which acknowledgment is not received within the times set forth in this section must:

(i) Be investigated by the shipper if the shipper has not received notification or receipt within 20 days after transfer;

and

(ii) Be traced and reported. The investigation shall include tracing the shipment and filing a report with the Department. Each licensee who conducts a trace investigation shall file a written report with the Department within two weeks of completion of the investigation.

(j) Compliance with Environmental and Health Protection Regulations. Nothing in this Rule relieves the licensee from complying with other applicable Federal, State, and local regulations governing other toxic or hazardous properties of materials that may be disposed of pursuant to this Rule.

(14) Records

(a) General Provisions.

1. Each licensee shall use the units of Curie, rad, rem, and dpm , including multiples and subdivisions and shall clearly indicate the units of all quantities on records required by this Rule.

2. In the records required by this rule, the licensee may record quantities in SI units in parentheses following each of the units specified in (14)(a)1. However, all quantities must be recorded as stated in (14)(a)1.

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

(b) Records of Radiation Protection Programs.

1. Each licensee shall maintain records of the Radiation Protection Program required pursuant to (4) of this Rule, including:

(i) The provisions of the Program; and

(ii) Audits and other reviews of Program content and implementation.

2. The licensee shall retain the records required by (14 3)(b)1.(i) of this Rule until the Department terminates each pertinent license requiring the record. The licensee shall retain each of the records

required by (14)(b)1.(ii) of this Rule for three years after the record is made.

(c) Records of Surveys.

1. Each licensee shall maintain records showing the results of surveys and calibrations required by (8)(a) and (12)(f)2. of this Rule. The licensee shall retain each of these records for three years after the record is made.

2. The licensee shall retain each of the following records until the Department terminates each pertinent license requiring the record:

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

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

(iii) Records showing the results of air sampling, surveys, and bioassays required pursuant to (10)(d)1.(iii)(I) and (II) of this Rule; and

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

3. Upon termination of the license, the licensee shall permanently store records on Department Form "Occupational Radiation Exposure History" or equivalent or shall make provision with the Department for their transfer to the Department.

(d) Records of Tests for Leakage or Contamination of Sealed Sources. Records of tests for leakage or contamination of sealed sources required by (6) of this Rule shall be kept in units of microcuries or becquerels and maintained for inspection by the Department for three years after the record is made.

(e) Records of Prior Occupational Dose.

1. The licensee shall retain the records of prior occupational dose and of exposure history as specified in (5)(e) of this Rule on Department Form "Occupational Radiation Exposure History" or

equivalent until the Department terminates each pertinent license requiring this record. The licensee shall retain records used in preparing Department Form "Occupational Radiation Exposure History" for three years after the record is made.

2. Upon termination of the license, the licensee shall permanently store records on Department Form "Occupational Radiation Exposure History" or equivalent or shall make provision with the Department for their transfer to the Department.

(f) Records of Planned Special Exposures.

1. For each use of the provisions of (5)(e) of this Rule for planned special exposures, the licensee shall maintain records that describe:

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

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

(iii) What actions were necessary;

(iv) Why the actions were necessary;

(v) What precautions were taken to assure that doses were maintained ALARA;

(vi) What individual and collective doses were expected to result; and

(vii) The doses actually received in the planned special exposure.

2. The licensee shall retain the records until the Department terminates each pertinent license requiring these records.

3. Upon termination of the license, the licensee shall permanently store records on Department Form "Occupational Radiation Exposure History" or equivalent or shall make provision with the Department for their transfer to the Department.

(g) Records of Individual Monitoring Results.

1. Record-keeping Requirement. Each licensee shall maintain records of doses received by all individuals for whom monitoring was required pursuant to (8)(b) of this Rule 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:

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

   (ii) The estimated intake of radionuclides (see (5)(b) of this Rule);

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

   (iv) The specific information used to calculate the committed effective dose equivalent pursuant to (5)(d)3. of this Rule;

   (v) The total effective dose equivalent when required by (5)(b) of this Rule; and

   (vi) The total of the deep dose equivalent and the committed dose to the organ receiving the highest total dose.

2. Record-keeping Frequency. The licensee shall make entries of the records specified in (14)(g)1. of this Rule at intervals not to exceed one year.

3. Record-keeping Format. The licensee shall maintain the records specified in (14)(g)1. of this Rule on Department Form "Occupational Radiation Exposure History" in accordance with the instructions or in clear and legible records containing all the information required by the Department Form.

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

5. The licensee shall retain each required form or record until the Department terminates each pertinent license requiring the record.

6. Upon termination of the license, the licensee shall permanently store records on Department Form "Occupational Radiation Exposure History" or equivalent or shall make provisions with the Department for their transfer to the Department.

7. Privacy Protection. The records required pursuant to (14)(g) should be protected from public disclosure because of their personal privacy nature.

(h) Records of Dose to Individual Members of the Public.

1. Each licensee shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public. See (5)(i) of this Rule.

2. The licensee shall retain the records required by (14)(h)1. of this Rule until the Department terminates each pertinent license requiring the record.

(i) Records of Waste Disposal.

1. Each licensee shall maintain records of the disposal of licensed materials made pursuant to (13)(b), (13)(c), (13)(d), and (13)(e) of this Rule and of disposal of licensed materials by burial in soil, including burials authorized before July 12, 1982.[6]

2. The licensee shall retain the records required by (14)(i) of this Rule until the Department terminates each pertinent license requiring the record.

(j) Records of Testing Entry Control Devices for Very High Radiation Areas.

1. Each licensee shall maintain records of tests made on entry control devices for very high radiation areas. These records must include the date, time, and results of each such test of function.

2. The licensee shall retain the records required by (14)(j)1. of this Rule for three years after the record is made.

(k) Form of Records. Each record required by this Rule 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

[6] A previous Rule, .03(5)(d), permitted burial of small quantities of licensed materials in soil before July 12, 1982, without specific Department authorization.

capable of producing a clear copy throughout the required retention period; or the record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(15) Reports

(a) Reports of Stolen, Lost, or Missing Licensed Sources of Radiation.

1. Telephone. Each licensee shall report to the Department by telephone as follows:

(i) Immediately after its occurrence becomes known to the licensee, stolen, lost, or missing licensed radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in Appendix C of 10 CFR 20, under such circumstances that it appears to the licensee that an exposure could result to individuals in unrestricted areas; or

(ii) Within 30 days after its occurrence becomes known to the licensee, lost, stolen or missing licensed radioactive material in an aggregate quantity greater than ten times the quantity specified in Appendix C of 10 CFR 20 that is still missing.

2. Written. Each licensee who is required to make a report pursuant to (15)(a)1. of this Rule shall, within 30 days after making the telephone report, make a written report to the Department setting forth the following information:

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

(ii) A description of the circumstances under which the loss or theft occurred;

(iii) A statement of disposition, or probable disposition, of the licensed material or source of radiation involved;

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

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

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

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

4. The licensee shall prepare any report filed with the Department pursuant to (15)(a) of this Rule so that names of individuals who may have received exposure to radiation are stated in a separate and detachable portion of the report.

(b) Notification of Incidents.

1. Immediate notification. Each licensee shall:

(i) Notify the Department 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 licensed material that could exceed regulatory limits (events may include fires, explosions, toxic gas releases, etc.).

(ii) Notwithstanding any other requirements for notification, immediately report, to the Department, any event involving radioactive material or sources of radiation possessed by the licensee that may have caused or threatens to cause any of the following conditions:

(I) An individual to receive:

I. A total effective dose equivalent of 25 rem (0.25 Sv) or more; or

II. An lens dose equivalent of 75 rem (0.75 Sv) or more; or

III. A shallow-dose equivalent to the skin or extremities of 250 rad (2.5 Gy) or more; or

(II) The release of radioactive material, inside or outside 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 (the provisions of this paragraph do not apply to locations where personnel are not normally stationed during routine operations, such as hot cells or process enclosures).

2. Twenty-four hour report. Each licensee shall notify the Department within 24 hours after the discovery of any of the following events involving licensed material:

(i) An unplanned contamination event that:

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

(II) Involves a quantity of material greater than five times the lowest annual limit on intake specified in Appendix B of 10 CFR Part 20 for the material; and

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

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

(I) The equipment is required by regulation 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;

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

(III) No redundant equipment is available and operable to perform the required safety function.

(iii) 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;

(iv) An unplanned fire or explosion damaging any licensed material or any device, container, or equipment containing licensed material when:

(I) The quantity of material involved is greater than five times the lowest annual limit on intake specified in Appendix B of 10 CFR Part 20 for the material; and

(II) The damage affects the integrity of the licensed material or its container.

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

(i) Licensees shall make required by (15)(b)(1.) and (2.) by telephone to the Department. To the extent that the information is available at the time of notification, the information provided in these must include:

(I) The caller's name and call back telephone number;

(II) A description of the event, including date and time;

(III) The exact location of the event;

(IV) The isotopes, quantities, and chemical and physical form of the licensed material involved; and

(V) Any personnel radiation exposure data available.

(ii) Written report. Each licensee who makes a report required by (15)(b)(1) and (2) shall submit a written follow-up report within 30 days of the initial report. Written reports prepared pursuant to other regulations may be submitted to fulfill this requirement if the reports contain all of the necessary information and the appropriate distribution is made. These written reports must be sent to the Radioactive Materials Program, 4220 International Parkway, Suite 100, Atlanta, Georgia 30354 or current mailing address. The written report must include the following:

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

malfunctioned;

(II) The exact location of the event;

(III) The isotopes, quantities, and chemical and physical form of the licensed material involved;

(IV) Date and time of the event;

(V) Corrective actions taken or planned and the results of any evaluations or assessments; and

(VI) The extent of exposure of individuals to radiation or to radioactive materials.

4. The licensee shall prepare each report filed with the Department pursuant to (15)(b) of this Rule so that names of individuals who have received exposure to sources of radiation are stated in a separate and detachable portion of the report.

5. Licensees shall make the required by (15)(b)1. and 2. of this Rule by telephone to the Department, and shall confirm the initial contact by telegram, mailgram, or facsimile to the Department.

6. The provisions of (15)(b) of this Rule do not apply to doses that result from planned special exposures, provided such doses are within the limits for planned special exposures and are reported pursuant to (15)(d) of this Rule.

(c) Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits.

1. Reportable Events. In addition to the notification required by (15)(b) of this Rule, each licensee shall submit a written report to the Department within 30 days after learning of any of the following occurrences:

(i) Incidents for which notification is required by (15)(b) of this Rule;

(ii) Doses in excess of any of the following:

(I) The occupational dose limits for adults in (5)(a) of this Rule;

(II) The occupational dose limits for a minor in (5)(g) of

this Rule;

(III) The limits for an embryo/fetus of a declared pregnant woman in (5)(h) of this Rule;

(IV) The limits for an individual member of the public in (5)(i) of this Rule;

(V) Any applicable limit in the license; or

(VI) The ALARA constraints for air emissions established under .03(4)(d).

(iii) Levels of radiation or concentrations of radioactive material in:

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

(II) An unrestricted area in excess of ten times the applicable limit set forth in this Rule or in the license, whether or not the exposure of any individual in excess of the limits in (5)(i) of this Rule is involved; or

(iv) For licensees subject to the provisions of U.S. Environmental Protection Agency's generally applicable environmental radiation standards in 40 CFR 190, levels of radiation or releases of radioactive material in excess of those standards, or of license conditions related to those standards[7].

2. Contents of Reports.

(i) Each report required by (15)(c)1. of this Rule shall describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

(I) Estimates of each individual's dose;

(II) The levels of radiation and concentrations of radioactive material involved;

(III) The cause of the elevated exposures, dose rates, or

[7] For purposes of these Regulations, the U.S. Environmental Protection Agency Standards apply only to source material mills and nuclear power plants.

concentrations; and

(IV) 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.

(ii) Each report filed pursuant to (14)(c)1. of this Rule shall include for each occupationally exposed individual: the name, Social Security account number, and date of birth. With respect to the limit for the embryo/fetus in (5)(h) of this Rule, the identification should be that of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable portion of the report.

3. All licensees who make pursuant to (15)(c)1. of this Rule shall submit the report in writing to the Department.

(d) Reports of Planned Special Exposures. The licensee shall submit a written report to the Department within 30 days following any planned special exposure conducted in accordance with (5)(f) of this Rule, informing the Department that a planned special exposure was conducted and indicating the date that the planned special exposure occurred and the information required by (14)(g) of this Rule.

(e) Reports to Individuals of Exceeding Dose Limits. When a licensee is required, pursuant to the provisions of (15)(c), (15)(d), or (15)(f), to report to the Department 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 Department to the individual. This report must be transmitted at a time no later than the transmittal to the Department.

(f) Notifications and Reports to Individuals.

1. Requirements for notification and to individuals of exposure to radiation or radioactive material are specified in Rule 391-3-17-.07(4).

2. When a licensee is required pursuant to (15)(c) of this Rule to report to the Department any exposure of an individual to radiation or radioactive material, the licensee shall also notify the individual. Such notice shall be transmitted at a time not later than the transmittal to the Department, and shall comply with the provisions

of Rule 391-3-17-.07(4)(a).

(g) Reports of Leaking or Contaminated Sealed Sources. If the test for leakage or contamination required pursuant to Rule .03(6) indicates that the sealed source is leaking or contaminated, a report of the test shall be filed within five days with the Department describing the equipment involved, the test results, and the corrective action taken.

(h) Reports and Requirements for Well-logging Operations Using Sealed Sources.

1. A licensee may perform well-logging operations with a sealed source only after the licensee executes a written agreement with the well owner or operator that, within thirty days after a well-logging source has been classified as irretrievable, the following requirements will be implemented:

(i) Each irretrievable well-logging source must be immobilized and sealed in place with a cement plug;

(ii) A whipstock or other deflection device must be set at some point in the well above the cement plug, unless the cement plug and source are not accessible to any subsequent drilling operations;

(iii) A permanent identification plaque, constructed of long lasting material such as stainless steel, brass, bronze, or monel, must be mounted at the surface of the well, unless the mounting of the plaque is not practical. The plaque must contain:

(I) The word "CAUTION";

(II) A radiation symbol (the color requirement need not be met);

(III) The date the source was abandoned;

(IV) The name of the well owner or well operator;

(V) The well name and well identification number(s) or other designation;

(VI) An identification of the sealed source(s) by radionuclide and quantity of activity;

(VII) The depth of the source and depth to the top of the plug; and

(VIII) An appropriate warning.

2. When a well-logging source becomes irretrievable, the licensee shall: Notify, by telephone, the Georgia Department of Natural Resources giving the circumstances of the loss that resulted in the inability to retrieve the source; and

(i) Request approval to implement abandonment procedures, or

(ii) That the licensee implemented abandonment before receiving Department approval because the licensee believed there was an immediate threat to public health and safety.

3. The licensee shall, within 30 days after a well-logging source has been classified as irretrievable, make a report in writing to the Georgia Department of Natural Resources, Radioactive Materials Program, 4220 International Parkway, Suite 100, Atlanta, Georgia 30354 or current address. The licensee shall send a copy of the report to each appropriate State agency that has authority over the particular well-drilling operation. The report must contain the following information:

(i) Date of occurrence;

(ii) A description of the irretrievable well-logging source involved including radionuclide, quantity and chemical and physical form;

(iii) Surface location and identification of well;

(iv) Results of efforts to immobilize and seal the source in place;

(v) Depth of source;

(vi) Depth of the top of the cement plug;

(vii) Depth of the well;

(viii) Any other information (e.g., warning statement) contained on the permanent identification plaque;

(ix) The immediate threat to public health and safety justification for implementing abandonment if prior Department approval was not obtained in accordance with Rule .03(15)(h)2.(iii);

(x) Any other information, such as a warning statement, contained on the permanent identification plaque; and

(xi) State and Federal agencies receiving copies of this report.

(i) Serialization of Nationally Tracked Sources.

1. Each licensee who manufactures a nationally tracked source after February 6, 2007 shall assign a unique serial number to each nationally tracked source. Serial numbers must be composed only of alpha-numeric characters.

(j) Reports of Transactions Involving Nationally Tracked Sources.

1. Each licensee who manufactures, transfers, receives, disassembles, or disposes or a nationally tracked source shall complete and submit a National Source Tracking Transaction Report as specified below for each type of transaction.

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

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

(ii) The name of the individual preparing the report;

(iii) The manufacturer, model, and serial number of the source;

(iv) The radioactive material in the source;

(v) The initial source strength in becquerels (curies) at the time of manufacture; and

(vi) The manufacture date of the source.

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

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

(ii) The name of the individual preparing the report;

(iii) The name and license number of the recipient facility and shipping address;

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

(v) The radioactive material in the source;

(vi) The initial or current source strength in becquerels (curies);

(vii) The date for which the source strength is reported;

(viii) The shipping date;

(ix) The estimated arrival date; and

(x) 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.

4. Each licensee that receives a nationally tracked source shall complete and submit a National Source Tracking Transaction Report. The report must include the following information:

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

(ii) The name of the individual preparing the report;

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

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

(v) The radioactive material in the source;

(vi) The initial or current source strength in becquerels (curies);

(vii) The date for which the source strength is reported;

(viii) The date of receipt; and

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

5. Each licensee that disassembles a nationally tracked source shall complete and submit a National Source Tracking Transaction Report. The report must include the following information:

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

(ii) The name of the individual preparing the report;

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

(iv) The radioactive material in the source;

(v) The initial or current source strength in becquerels (curies);

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

(vii) The disassemble date of the source.

6. Each licensee who disposes a nationally tracked source shall complete and submit a National Source Tracking Transaction Report. The report must include the following information:

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

(ii) The name of the individual preparing the report;

(iii) The waste manifest number;

(iv) The container identification with the nationally tracked source;

(v) The date of disposal; and

(vi) The method of disposal.

7. The reports discussed in (15)(j)2-6 above must be submitted by the close of the next business day after the transaction. A single report may be submitted for multiple sources and transactions. The reports must be submitted to the National Source Tracking System by using:

   (i) The on-line National Source Tracking System;

   (ii) Electronically using a computer-readable format;

   (iii) By facsimile;

   (iv) By mail to the address on the National Sources Tracking Transaction Report Form (NRC Form 748); or

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

8. Each licensee shall correct any error in previously filed reports or file a new report for any missed transaction within five (5) 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 must be conducted during the month of January in each year. The reconciliation process must include resolving any discrepancies between the National Source Tracking System and the actual inventory by filing the reports identified in (15)(j)2-6 of this section. By January 31 of each year, each licensee must submit to the National Source Tracking System confirmation that the data in the National Source Tracking System is correct.

9. Each licensee that possesses Category 1 nationally tracked sources shall report its initial inventory of Category 1 nationally tracked sources to the National Source Tracking System by January 31, 2009. Each licensee that possesses Category 2 nationally tracked sources shall report its initial inventory of Category 2 nationally tracked sources to the National Source Tracking System by January 31, 2009. Nationally Tracked Source Thresholds are presented in Table 3 of 391-3-17-.03(15). The information may be submitted by using any of the methods identified in (15)(j)7. The initial inventory report must include the

following information:

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

(ii) The name of the individual preparing the report;

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

(iv) The radioactive material in the source;

(v) The initial or current source strength in becquerels (curies); and

(vi) The date for which the source strength is reported.

Table 3: Nationally Tracked Source Thresholds

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
Americium-241/Beryllium	60	1,600	0.6	16
Californium-252	20	540	0.2	5.4
Cobalt-60	30	810	0.3	8.1
Curium-244	50	1,400	0.5	14
Cesium-137	100	2,700	1	27
Gadolinium-153	1,000	27,000	10	270
Iridium-192	80	2,200	0.8	22
Plutonium-238	60	1,600	0.6	16
Plutonium-238/Beryllium	60	1,600	0.6	16
Polonium-210	60	1,600	0.6	16
Promethium-147	40,000	1,100,000	400	11,000
Radium-226	40	1,100	0.4	11
Selenium-75	200	5,400	2	54
Strontium-90	1,000	27,000	10	270
Thorium-228	20	540	0.2	5.4
Thorium-229	20	540	0.2	5.4
Thulium-170	20,000	540,000	200	5,400
Ytterbium-169	300	8,100	3	81

The Terabecquerel (TBq) values are the regulatory standard. The Curie (Ci) values specified are obtained by converting from the TBq value. The Curie values are provided for practical usefulness only and are rounded after conversion.

(16) Exemptions and Additional Requirements

(a) Vacating Premises. Each specific licensee shall, no less than 30 days before vacating or relinquishing possession or control of premises which may have been contaminated with radioactive material as a result of his activities, notify the Department in writing of his intent to vacate. When deemed necessary by the Department, the licensee shall decontaminate the premises in such a manner as the Department may specify.

(b) Orders. The Department may, by order, impose upon any licensee such requirements, issued in furtherance of this rule, as it deems appropriate or necessary to protect health or minimize danger to life or property.

Authority O.C.G.A. 31-13-1 et seq.; Ga. L. 1964, pp. 499, 507, 566-575, as amended (Georgia Radiation Control Act)