PART III

STANDARDS FOR PROTECTION AGAINST RADIATION

RHA 3.1 PURPOSE AND SCOPE

The regulations in this part apply to persons licensed by the Department to receive, possess, use, transfer, or dispose of radioactive material. The limits in this part do not apply to doses due to background radiation, to exposure of patients to radiation for the purpose of medical diagnosis or therapy, to exposure from individuals administered radioactive material and released under RHA 4.32, or to exposure from voluntary participation in medical research programs.

RHA 3.2 DEFINITIONS as used in this part:

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

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

3.2.3 "Adult" means an individual 18 or more years of age.

3.2.4 "Airborne radioactivity area" means a room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations--

i) In excess of the derived air concentrations (DACs) specified in Appendix B, RHA 3.53, or...

ii) To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours.

3.2.5 "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.

3.2.6 "ALARA" (acronym for "as low as is reasonably achievable") means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.

3.2.7 "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 5 rems (0.05 Sv) or a committed dose equivalent of 50 rems (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 1, Columns 1 and 2, of Appendix B, RHA 3.53).

3.2.8 "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.

3.2.9 "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.

3.2.10 "Background radiation" means radiation from cosmic sources; naturally occurring radioactive materials, including radon (except as a decay product of source or special nuclear material) and global fallout as it exists in the environment from the testing of nuclear explosive devices. "Background radiation" does not include radiation from source, byproduct, or special nuclear materials regulated by the Department.

3.2.11 "Bioassay" (radiobioassay) means the determination of kinds, quantities or concentrations, and, in some cases, the locations of radioactive material in the human body, whether by direct measurement (in vivo counting) or by analysis and evaluation of materials excreted or removed from the human body.

3.2.12 "Chelating agent" means amine polycarboxylic acids, hydrocarboxylic, gluconic acid, and polycarboxylic acids.

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

3.2.14 "Class" (or lung class or inhalation 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 applies to a range of clearance half-times: for Class D (Days) of less than 10 days, for Class W (Weeks) from 10 to 100 days, and for Class Y (Years) of greater than 100 days.

3.2.15 "Collective dose" is the sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

3.2.16 "Committed dose equivalent" (H) means the dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

3.2.17 "Committed effective dose equivalent" ($H_{E,50}$) is the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues ($H_{E,50} = 3W_T H_{T,50}$).

3.2.18 "Computer-readable medium" means a medium selected from the available technologies, as authorized by the Department, that can be used to transfer the information to the Department's computer.

3.2.19 "Consignee" means the designated receiver of the shipment of low-level radioactive waste.

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

3.2.21 "Controlled area" means an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason.

3.2.22 "Critical Group" means the group of individuals reasonably expected to receive the greatest exposure to residual radiation for any applicable set of circumstances.

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

3.2.24 "Decommission" means to remove a facility or site safely from service and reduce residual radioactivity to level that permits 1) release of the property for unrestricted use and termination of the license; or 2) release of the property under restricted conditions and termination of the license.

3.2.25 "Decontamination facility" means a facility operating under a 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.

3.2.26 "Deep-dose equivalent" (H_d), which applies to external whole-body exposure, is the dose equivalent at a tissue depth of 1 cm (1000 mg/cm^2).

3.2.27 "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.

3.2.28 "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 1.2 cubic meters of air per hour), results in an intake of one ALI. DAC values are given in Table 1, Column 3, of Appendix B, RHA 3.53.

3.2.29 "Derived air concentration-hour" (DAC-hour) is 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 5 rems (0.05 Sv).

3.2.30 "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.

3.2.31 "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).

3.2.32 "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.

3.2.33 "Dose or radiation dose" is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined in other paragraphs of this section.

3.2.34 "Dose equivalent" (H_T) means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and sievert (Sv).

3.2.35 "Effective dose equivalent" (H_E) is the sum of the products of the dose equivalent to the organ or tissue (H_T) and the weighting factors (W_T) applicable to each of the body organs or tissues that are irradiated ($H_E = 3W_T H_T$).

3.2.36 "Embryo/fetus" means the developing human organism from conception until the time of birth.

3.2.37 "Entrance or access point" means any location through which an individual could gain access to radiation areas or to radioactive materials. This includes entry or exit portals of sufficient size to permit human entry, irrespective of their intended use.

3.2.38 "EPA identification number" means the number received by a transporter following application to the administrator of EPA as required by 40 CFR Part 263.

3.2.39 "Exposure" means being exposed to ionizing radiation or to radioactive material.

3.2.40 "External dose" means that portion of the dose equivalent received from radiation sources outside the body.

3.2.41 "Extremity" means hand, elbow, arm below the elbow, foot, knee, and leg below the knee.

3.2.42 "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.

3.2.43 "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.

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

3.2.45 "Generally applicable environmental radiation standards" means standards issued by the Environmental Protection Agency (EPA) under the authority of the Atomic Energy Act of 1954, as amended, that impose limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.

3.2.46 "Generator" means a licensee operating under a Commission or Agreement State license who (1) is a radioactive waste generator as defined in this part, 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).

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

3.2.48 "High Integrity Container (HIC)" means a container commonly designed to meet the structural stability requirements of Appendix E, RHA 3.56.2.2, and to meet Department of Transportation requirements for a Type A package.

3.2.49 “High radiation area” means an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 mSv) in 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates.

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

3.2.51 "Individual monitoring" means:

(1) The assessment of dose equivalent by the use of devices designed to be worn by an individual;

(2) The assessment of committed effective dose equivalent by bioassay (see Bioassay) or by determination of the time-weighted air concentrations to which an individual has been exposed, i.e., DAC-hours; or

(3) The assessment of dose equivalent by the use of survey data.

3.2.52 “Individual monitoring devices (individual monitoring equipment)” means devices designed to be worn by a single individual for the assessment of dose equivalent such as film badges, thermoluminescence dosimeters (TLDs), pocket ionization chambers, and personal (“lapel”) air sampling devices.

3.2.53 "Internal dose" means that portion of the dose equivalent received from radioactive material taken into the body.

3.2.54 "Land disposal facility" means the land buildings and structures, and equipment which are intended to be used for the disposal of radioactive wastes.

3.2.55 “Lens dose equivalent (LDE)” applies to the external exposure of the lens of the eye and is taken as the dose equivalent at a tissue depth of 0.3 centimeter (300 mg/cm^2).

3.2.56 "Licensed material" means source material, special nuclear material, or byproduct material received, possessed, used, transferred or disposed of under a general or specific license issued by the Department.

3.2.57 "Limits (dose limits)" means the permissible upper bounds of radiation doses.

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

3.2.59 "Lost or missing licensed material" means licensed material whose location is unknown. It includes material that has been shipped but has not reached its destination and whose location cannot be readily traced in the transportation system.

3.2.60 "Member of the public" means any individual except when that individual is receiving an occupational dose.

3.2.61 "Minor" means an individual less than 18 years of age.

3.2.62 "Monitoring" (radiation monitoring, radiation protection monitoring) means the measurement of radiation levels, concentrations, surface area concentrations or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses.

3.2.63 “Nationally tracked source” means a sealed source containing a quantity equal to or greater than Category 1 or 2 levels of any radioactive material listed in Appendix G to Part 3 of these Regulations. 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.

3.2.64 "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.

3.2.65 "Nonstochastic effect" means health effects, 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 (also called a deterministic effect).

3.2.66 "NRC Forms 540, 540A, 541, 541A, 542, and 542A" are official NRC forms referenced in this regulation. Licensees need not use originals of these NRC Forms as long as any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information. Upon agreement between the shipper and consignee, NRC Forms 541 (and 541A) and NRC Forms 542 (and 542A) may be completed, transmitted, and stored in electronic media. The electronic media must have the capability for producing legible, accurate, and complete records in the format of the uniform manifest.

3.2.67 "Occupational dose" means the dose received by an individual in the course of employment in which the individual’s assigned duties involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released under RHA 4.32, or from voluntary participation in medical research programs, or as a member of the public.

3.2.68 "Package" means the assembly of components necessary to ensure compliance with the packaging requirements of DOT regulations, together with its radioactive contents, as presented for transport.

3.2.69 "Physical description" means the items called for on NRC Form 541 to describe a low-level radioactive waste.

3.2.70 "Planned special exposure" means an infrequent exposure to radiation, separate from and in addition to the annual dose limits.

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

3.2.72 "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.

3.2.73 "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.

3.2.74 "Public dose" means the dose received by a member of the public from exposure to radiation or to radioactive material released by a licensee, or to any other source of radiation under the control of the licensee. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual had received, from exposure to individuals administered radioactive material and released under RHA 4.32, or from voluntary participation in medical research programs.

3.2.75 "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.

3.2.76 "Quality Factor" (Q) means the modifying factor (listed in tables 1 and 2 of RHA 3.3) that is used to derive dose equivalent from absorbed dose.

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

3.2.78 "Reference man" means a hypothetical aggregation of human physical and physiological characteristics arrived at 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.

3.2.79 "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 this Regulation.

3.2.80 "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.

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

3.2.82 "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.

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

3.2.84 "Shallow-dose equivalent" (H^s), which applies to the external exposure of the skin of the whole body or the skin of an extremity, is taken as the dose equivalent at a tissue depth of 0.007 centimeter (7 mg/cm^2).

3.2.85 "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.

3.2.86 "Shipping paper" means NRC Form 540 and if required, NRC Form 540A which includes the information required by DOT in 49 CFR Part 172.

3.2.87 "Source material" means (1) uranium or thorium, or any combination thereof, in any physical or chemical form, or (2) ores which contain by weight one-twentieth of one percent (0.05 percent) or more of (a) uranium, (b) thorium, or (c) any combination thereof. Source material does not include special nuclear material (SNM).

3.2.88 "Special nuclear material" means (1) plutonium, uranium-233, uranium-enriched in the isotope-233 or the isotope-235, or (2) any material artificially enriched by any of the foregoing. This definition does not include source material.

3.2.89 "Stochastic effects" means health effects that occur 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.

3.2.90 "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.

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

3.2.92 "Total Effective Dose Equivalent" (TEDE) means the sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

3.2.93 "Type A quantity" means a quantity of radioactive material, the aggregate radioactivity of which does not exceed A_1 for special form radioactive material or A_2 for normal form radioactive material, where A_1 and A_2 are given in Appendix A 10CFR Part 71 or may be determined by procedures described in Appendix A 10CFR Part 71.

3.2.94 "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.

3.2.95 "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.

3.2.96 "Very high radiation area" means an area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in 1 hour at 1 meter from a radiation source or from any surface that the radiation penetrates.

[Note: At very high doses received at high dose rates, units of absorbed dose (e.g., rads and grays) are appropriate, rather than units of dose equivalent (e.g., rems and sieverts).]

3.2.97 "Waste collector" means an entity, operating under a license issued by the Department, the U.S. Nuclear Regulatory Commission, or another Agreement State, 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.

3.2.98 "Waste description" means the physical, chemical and radiological description of a low-level radioactive waste as called for on NRC Form 541.

3.2.99 "Waste generator" means an entity, operating under a license issued by the Department, the U.S. Nuclear Regulatory Commission, or another Agreement State, who possesses any material or component that contains radioactivity or is radioactively contaminated for which the licensee foresees no further use, and 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."

3.2.100 "Waste processor" means an entity, operating under a license issued by the Department, the U.S. Nuclear Regulatory Commission, or another Agreement State, 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.

3.2.101 "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 solidified in a specifically defined media).

3.2.102 "Weighting factor, W_T," for an organ or tissue (T) is 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	[1]0.30
Whole Body	[2]1.00

[1] 0.30 results from 0.06 for each of 5 "remainder" organs (excluding the skin and the lens of the eye) that receive the highest doses.

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

3.2.103 "Working level" (WL) is any combination of short-lived radon daughters (for radon-222: polonium-218, lead-214, bismuth-214, and polonium-214; and for radon-220: polonium-216, lead-212, bismuth-212, and polonium-212) in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha particle energy.

3.2.104 "Working level month" (WLM) means an exposure to 1 working level for 170 hours (2,000 working hours per year/12 months per year = approximately 170 hours per month).

3.2.105 "Year" means the period of time beginning in January used to determine compliance with the provisions of this part. The licensee may change the starting date of the year used to determine compliance by the licensee provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.

RHA 3.3 UNITS OF RADIATION DOSE

3.3.1 Definitions. As used in this part, the units of radiation dose are:

3.3.1.1 Gray (Gy) is the SI unit of absorbed dose. One gray is equal to an absorbed dose of 1 Joule/kilogram (100 rads).

3.3.1.2 Rad is the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram or 0.01 joule/kilogram (0.01 gray).

3.3.1.3 Rem is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (1 rem = 0.01 sievert).

3.3.1.4 Sievert is the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv = 100 rems).

3.3.2 As used in this part, the quality factors for converting absorbed dose to dose equivalent are shown in Table 1.

TABLE 1: QUALITY FACTORS AND ABSORBED DOSE EQUIVALENCIES

TYPE OF RADIATION	Quality Factor (Q)	Absorbed dose equal to a unit dose equivalent[a]
X-Ray, gamma, or beta radiation	1	1
Alpha particles, multiple-charged particles, fission fragments and heavy particles of unknown charge	20	0.05
Neutrons of unknown energy.....	10	0.1
High-energy protons.....	10	0.1

[a] Absorbed dose in rad equal to 1 rem or the absorbed dose in gray equal to 1 sievert.

3.3.3 If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in rems per hour or sieverts per hour, as provided in paragraph 3.3.2 of this section, 1 rem

(0.01 Sv) of neutron radiation of unknown energies may, for purposes of the regulations in this part, be assumed to result from a total fluence of 25 million neutrons per square centimeter incident upon the body. If sufficient information exists to estimate the approximate energy distribution of the neutrons, the licensee may use the fluence rate per unit dose equivalent or the appropriate Q value from Table 2 to convert a measured tissue dose in rads to dose equivalent in rems.

TABLE 2: MEAN QUALITY FACTORS, Q, AND FLUENCE PER UNIT DOSE EQUIVALENT FOR MONOENERGETIC NEUTRONS

Neutron Energy (MeV)	Quality Factor[a] (Q)	Fluence per Unit Dose Equivalent[b] (neutrons cm^{-2} rem^{-1})
(thermal).. $2.5x10^{-8}$	2	980×10^6
1×10^{-7}	2	980×10^6
1×10^{-6}	2	810×10^6
1×10^{-5}	2	810×10^6
1×10^{-4}	2	840×10^6
1×10^{-3}	2	980×10^6
1×10^{-2}	2.5	1010×10^6
1×10^{-1}	7.5	170×10^6
5×10^{-1}	11	39×10^6
1	11	27×10^6
2.5	9	29×10^6
5	8	23×10^6
7	7	24×10^6
10	6.5	24×10^6
14	7.5	17×10^6
20	8	16×10^6
40	7	14×10^6
60	5.5	16×10^6
1×10^2	4	20×10^6
2×10^2	3.5	19×10^6
3×10^2	3.5	16×10^6
4×10^2	3.5	14×10^6

[a] Value of quality factor (Q) at the point where the dose equivalent is maximum in a 30-cm diameter cylinder tissue-equivalent phantom.

[b] Monoenergetic neutrons incident normally on a 30-cm diameter cylinder tissue-equivalent phantom.

RHA 3.4 RADIATION PROTECTION PROGRAMS

3.4.1 Each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this part. (See RHA 3.35 for recordkeeping requirements relating to these programs.)

3.4.2 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).

3.4.3 The licensee shall periodically (at least annually) review the radiation protection program content and implementation.

3.4.4 To implement the ALARA requirements of RHA 3.4.2, and notwithstanding the requirements in RHA 3.13, a constraint on air emissions of radioactive material to the environment, excluding Radon-222 and its daughters, shall be established by licensees, such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 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 RHA 3.46 and promptly take appropriate corrective action to ensure against recurrence.

RHA 3.5 OCCUPATIONAL DOSE LIMITS FOR ADULTS

3.5.1 The licensee shall control the occupational dose to individual adults, except for planned special exposures under RHA 3.10 to the following dose limits.

3.5.1.1 An annual limit, which is the more limiting of--

3.5.1.1.1 The total effective dose equivalent being equal to 5 rems (0.05 Sv); or

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

3.5.1.2 The annual limits to the lens of the eye, to the skin of the whole body, and to the skin of the extremities, which are:

3.5.1.2.1 A lens dose equivalent of 15 rems (0.15 Sv), and

3.5.1.2.2 A shallow-dose equivalent of 50 rems (0.50 Sv) to the skin of the whole body or to the skin of any extremity.

3.5.2 Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, must be subtracted from the limits for planned special exposures that the individual may receive during the current year (see 3.10.5.1) and during the individual's lifetime (see 3.10.5.2).

3.5.3 When the external exposure is determined by measurement with an external personal monitoring device, the deep-dose equivalent must be used in place of the effective dose equivalent, unless the effective dose equivalent is determined by a dosimetry method approved by the Department. The assigned deep-dose equivalent must be for the part of the body receiving the highest exposure. The assigned shallow-dose equivalent must be the dose averaged over the contiguous 10 square centimeters of skin receiving the highest exposure. The deep-dose equivalent, lens dose equivalent and shallow-dose equivalent may be assessed from surveys or other radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure, or the results of individual monitoring are unavailable.

3.5.4 Derived air concentration (DAC) and annual limit on intake (ALI) values are presented in Table 1 of Appendix B, RHA 3.53 and may be used to determine the individual's dose (see RHA 3.39) and to demonstrate compliance with the occupational dose limits.

3.5.5 In addition to the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to 10 milligrams in a week in consideration of chemical toxicity (see footnote 3 of Appendix B, RHA 3.53).

3.5.6 The licensee shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person (see 3.37.5).

RHA 3.6 COMPLIANCE WITH REQUIREMENTS FOR SUMMATION OF EXTERNAL AND INTERNAL DOSES

3.6.1 If the licensee is required to monitor under both 3.17.1 and 3.17.2, the licensee shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee is required to monitor only under 3.17.1 or only under 3.17.2, then summation is not required to demonstrate compliance with the dose limits. The licensee may demonstrate compliance with the requirements for summation of external and internal doses by meeting one of the conditions specified in paragraph 3.6.1.1 of this section and the conditions in paragraphs 3.6.1.2 and 3.6.1.3 of this section.

(Note: 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.)

3.6.1.1 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:

3.6.1.1.1 The sum of the fractions of the inhalation ALI for each radionuclide, or

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

3.6.1.1.3 The sum of the calculated committed effective dose equivalents to all significantly irradiated[1] organs or tissues (T) calculated from bioassay data using appropriate biological models and expressed as a fraction of the annual limit.

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

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

RHA 3.7 DETERMINATION OF EXTERNAL DOSE FROM AIRBORNE RADIOACTIVE MATERIAL

[1] 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_{50}, per unit intake is greater than 10 percent of the maximum weighted value of H_{50} (i.e., $W_T H_{50,T}$) per unit intake for any organ or tissue.

3.7.1 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, RHA 3.53 footnotes 1 and 2).

NOTE: Airborne radioactivity measurements and DAC values should 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 should be based upon measurements using instruments or individual monitoring devices.

RHA 3.8 DETERMINATION OF INTERNAL EXPOSURE

3.8.1 For purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee shall, when required under RHA 3.17, take suitable and timely measurements of--

3.8.1.1 Concentrations of radioactive materials in air in work areas;

3.8.1.2 Quantities of radionuclides in the body; or

3.8.1.3 Quantities of radionuclides excreted from the body; or

3.8.1.4 Combinations of these measurements.

3.8.2 Unless respiratory protective equipment is used, as provided in 3.19.3, 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.

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

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

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

3.8.3.3 Separately assess the contribution of fractional intakes of Class D, W, or Y compounds of a given radionuclide (see Appendix B, RHA 3.53) to the committed effective dose equivalent.

3.8.4 If the licensee chooses to assess intakes of Class Y material using the measurements given in 3.8.1.2 or 3.8.1.3, the licensee may delay the recording and reporting of the assessments for periods up to 7 months, unless otherwise required by RHA 3.45 or RHA 3.46, in order to permit the licensee to make additional measurements basic to the assessments.

3.8.5 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 must be either--

3.8.5.1 The sum of the ratios of the concentration to the appropriate DAC value (e.g., D, W, Y) from Appendix B, RHA 3.53 for each radionuclide in the mixture; or

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

3.8.6 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 must be the most restrictive DAC of any radionuclide in the mixture.

3.8.7 When a mixture of radionuclides in air exists, licensees may disregard certain radionuclides in the mixture if--

3.8.7.1 The licensee uses the total activity of the mixture in demonstrating compliance with the dose limits in RHA 3.5 and in complying with the monitoring requirements in 3.17.2, and

3.8.7.2 The concentration of any radionuclide disregarded is less than 10 percent of its DAC, and

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

3.8.8 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 5 rems (0.05 Sv) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

3.8.9 When the ALI (and the associated DAC) is determined by the nonstochastic organ dose limit of 50 rems (0.5 Sv), the intake of radionuclides that would result in a committed effective dose equivalent of 5 rems (0.05 Sv) (the stochastic ALI) is listed in parentheses in Table 1 of Appendix B, RHA 3.53. In this case, the licensee may, as a simplifying assumption, use the stochastic ALIs to determine committed effective dose equivalent. However, if the licensee uses the stochastic ALIs, the licensee must also demonstrate that the limit in 3.5.1.1.2 is met.

RHA 3.9 [RESERVED]

RHA 3.10 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 RHA 3.5 provided that each of the following conditions is satisfied--

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

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

3.10.3 Before a planned special exposure, the licensee ensures that the individuals involved are--

3.10.3.1 Informed of the purpose of the planned operation;

3.10.3.2 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

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

3.10.4 Prior to permitting an individual to participate in a planned special exposure, the licensee ascertains prior doses as required by RHA 3.37.2 during the lifetime of the individual for each individual involved.

3.10.5 Subject to RHA 3.5.2, the licensee does 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--

3.10.5.1 The numerical values of any of the dose limits in RHA 3.5.1 in any year; and

3.10.5.2 Five times the annual dose limits in RHA 3.5.1 during the individual's lifetime.

3.10.6 The licensee maintains records of the conduct of a planned special exposure in accordance with RHA 3.38 and submits a written report in accordance with RHA 3.47.

3.10.7 The licensee records the best estimate of the dose resulting from the planned special exposure in the individual's record and informs the individual, in writing, of the dose within 30 days from the date of the planned special exposure. The dose from planned special exposures is not to be considered in controlling future occupational dose of the individual under RHA 3.5.1 but is to be included in evaluations required by RHA 3.10.4 and 3.10.5.

RHA 3.11 OCCUPATIONAL DOSE LIMITS FOR MINORS

The annual occupational dose limits for minors are 10 percent of the annual dose limits specified for adult workers in RHA 3.5.

RHA 3.12 DOSE TO AN EMBRYO/FETUS

3.12.1 The licensee shall ensure that the dose equivalent to the embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv). (For recordkeeping requirements, see RHA 3.39)

3.12.2 The licensee shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in paragraph 3.12.1 of this section.

3.12.3 The dose equivalent to the embryo/fetus shall be taken as the sum of--

3.12.3.1 The deep-dose equivalent to the declared pregnant woman; and

3.12.3.2 The dose equivalent to the embryo/fetus resulting from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

3.12.4 If the dose equivalent to the embryo/fetus is found to have exceeded 0.5 rem (5 mSv), or is within 0.05 rem (0.5 mSv) of this dose, by the time the woman declares the pregnancy to the licensee, the licensee shall be deemed to be in compliance with paragraph 3.12.1 of this section if the additional dose equivalent to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the remainder of the pregnancy.

RHA 3.13 DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC

3.13.1 Each licensee shall conduct operations so that--

3.13.1.1 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 contribution from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released, under RHA 4.32, from voluntary participation in medical research programs, and from the licensee's disposal of radioactive material into sanitary sewerage in accordance with RHA 3.29, and

3.13.1.2 The dose in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with RHA 4.32, does not exceed 0.002 rem (0.02 mSv) in any one hour.

3.13.2 If the licensee permits members of the public to have access to controlled areas, the limits for members of the public continue to apply to those individuals.

3.13.3 Notwithstanding paragraph 3.13.1.1 of this section, a licensee may permit visitors to an individual who cannot be released, under RHA 4.32, to receive a radiation dose greater than 0.1 rem (1 mSv) if--

3.13.3.1 The radiation dose received does not exceed 0.5 rem (5 mSv); and

3.13.3.2 The authorized user, as defined in Part IV of these regulations, has determined before the visit that it is appropriate.

3.13.4 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:

3.13.4.1 Demonstration of the need for and the expected duration of operations in excess of the limit in paragraph 3.13.1 of this section;

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

3.13.4.3 The procedures to be followed to maintain the dose as low as is reasonably achievable.

3.13.5 In addition to the requirements of this part, a licensee subject to the provisions of EPA's generally applicable environmental radiation standards in 40 CFR Part 190 shall comply with those standards.

3.13.6 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.

RHA 3.14 COMPLIANCE WITH DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC

3.14.1 The licensee shall make or cause to be made, as appropriate, surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits for individual members of the public in RHA 3.13.

3.14.2 A licensee shall show compliance with the annual dose limit in RHA 3.13 by--

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

3.14.2.2 Demonstrating that--

3.14.2.2.1 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 2 of Appendix B, RHA 3.53 and

3.14.2.2.2 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 an hour and 0.05 rem (0.5 mSv) in a year.

3.14.3 Upon approval from the Department, the licensee may adjust the effluent concentration values in Appendix B, RHA 3.53 Table 2, 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, chemical form).

RHA 3.15 [RESERVED]

RHA 3.16 SURVEYS AND MONITORING

3.16.1 Each licensee shall make or cause to be made, surveys that--

3.16.1.1 May be necessary for the licensee to comply with the regulations in this part; and

3.16.1.2 Are reasonable under the circumstances to evaluate--

3.16.1.2.1 The magnitude and extent of radiation levels; and

3.16.1.2.2 Concentrations or quantities of radioactive material; and

3.16.1.2.3 The potential radiological hazards.

3.16.2 The licensee shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated at least annually for the radiation measured.

3.16.3 All personnel dosimeters (except for direct and indirect reading pocket dosimeters and those dosimeters used to measure the dose to the extremities) that require processing to determine the radiation dose and that are used by licensees to comply with RHA 3.5, with other applicable provisions of this chapter, or with conditions specified in a license must be processed and evaluated by a dosimetry processor--

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

3.16.3.2 Approved in this accreditation process for the type of radiation or radiations included in the NVLAP program that most closely approximates the type of radiation or radiations for which the individual wearing the dosimeter is monitored.

RHA 3.17 CONDITIONS REQUIRING INDIVIDUAL MONITORING OF EXTERNAL AND INTERNAL OCCUPATIONAL DOSE

Each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this part. As a minimum--

3.17.1 Each licensee shall monitor occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the licensee and shall supply and require the use of individual monitoring devices by--

3.17.1.1 Adults likely to receive, in 1 year from sources external to the body, a dose in excess of 10 percent of the limits in RHA 3.5.1,

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

3.17.1.3 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). (Note: All of the occupational doses in RHA 3.5 continue to be applicable to the declared pregnant worker as long as the embryo/fetus dose limit is not exceeded.)

3.17.1.4 Individuals entering a high or very high radiation area.

3.17.2 Each licensee shall monitor (see RHA 3.8) the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

3.17.2.1 Adults likely to receive, in 1 year, an intake in excess of 10 percent of the applicable ALI(s) in Table 1, Columns 1 and 2, of Appendix B, RHA 3.53;

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

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

RHA 3.18 CONTROL OF EXPOSURE FROM EXTERNAL SOURCES IN RESTRICTED AREAS

3.18.1 Control of Access to High Radiation Areas

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

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

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

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

3.18.1.2 In place of the controls required by paragraph 3.18.1.1 of this section for a high radiation area, the licensee may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

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

3.18.1.4 The licensee shall establish the controls required by paragraphs 3.18.1.1 and 3.18.1.3 of this section in a way that does not prevent individuals from leaving a high radiation area.

3.18.1.5 Control is not required for 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 Department of Transportation provided:

3.18.1.5.1 The packages do not remain in the area longer than 3 days; and

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

3.18.1.6 Control of entrance or access to rooms or other areas in hospitals is not required 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 limits established in this part and to operate within the ALARA provisions of the licensee's radiation protection program.

3.18.2 Control of Access to Very High Radiation Areas

In addition to the requirements in 3.18.1, 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 grays) or more in 1 hour at 1 meter from a radiation source or any surface through which the radiation penetrates.

RHA 3.19 RESPIRATORY PROTECTION AND CONTROLS TO RESTRICT INTERNAL EXPOSURE IN RESTRICTED AREAS

3.19.1 Use of Process or Other Engineering Controls

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

3.19.2 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:

3.19.2.1 Control of access;

3.19.2.2 Limitation of exposure times;

3.19.2.3 Use of respiratory protection equipment; or

3.19.2.4 Other controls.

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.

3.19.3 Use of Individual Respiratory Protection Equipment

3.19.3.1 If the licensee uses respiratory protection equipment to limit intakes pursuant to 3.19.2:

3.19.3.1.1 The licensee shall use only respiratory protection equipment that is tested and certified by the National Institute for Occupational Safety and Health (NIOSH), except as otherwise noted in this regulation.

3.19.3.1.2 If the licensee wishes to use equipment that has not been tested or certified by NIOSH or for which there is no schedule for testing or certification, the licensee shall submit an application for authorized use of that equipment, except as provided in this regulation, 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.

3.19.3.1.3 The licensee shall implement and maintain a respiratory protection program that includes-

3.19.3.1.3.1 Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate doses;

3.19.3.1.3.2 Surveys and bioassays, as appropriate, to evaluate actual intakes;

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

3.19.3.1.3.4 Written procedures regarding selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; supervision and training of personnel; breathing air quality; storage; inventory and control; repair; quality assurance of respiratory protection equipment; limitations on periods of respirator use and relief from respirator use; monitoring, including air sampling and bioassays; and recordkeeping; and

3.19.3.1.3.5 Determination by a physician prior to initial fitting of face sealing respirators or before the first field 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.

3.19.3.1.3.6 Fit testing, with fit factor ≥ 10 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 1 year. Fit testing must be performed with the facepiece operating in the negative pressure mode.

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

3.19.3.1.5 The licensee shall use equipment within limitations for type and mode of use and shall provide proper visual, communication, and other special capabilities (such as low temperature work environments) when needed. The licensee shall also provide for 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.

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

3.19.3.1.7 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:

(1) Oxygen content (v/v) of 19.5-23.5%;
(2) Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
(3) Carbon monoxide (CO) content of 10 ppm or less;
(4) Carbon dioxide content of 1,000 ppm or less; and
(5) Lack of noticeable odor.

3.19.3.1.8 The licensee shall ensure that no objects, materials or substances, such as facial hair, or any conditions that interfere with the face--facepiece seal or valve function, and that are under the control of the respirator wearer, are present between the skin of the wearer’s face and the sealing surface of a tight-fitting respirator facepiece.

3.19.3.2 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.

3.19.4 Further restrictions on the use of respiratory protection equipment.

The Department may impose restrictions in addition to those in 3.19.2, 3.19.3 and Appendix A, RHA 3.52 to--

3.19.4.1 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

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

3.19.5 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, RHA 3.52. The Department may authorize a licensee to use higher assigned protection factors on receipt of an application that--

3.19.5.1 Describes the situation for which a need exists for higher protection factors; and

3.19.5.2 Demonstrates that the respiratory protection equipment provides these higher protection factors under the proposed conditions of use.

RHA 3.20 STORAGE AND CONTROL OF LICENSED MATERIAL

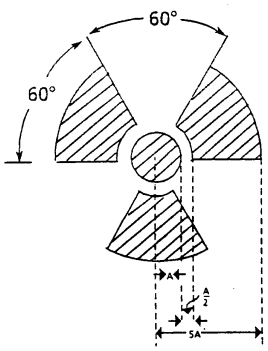
3.20.1 Security of stored material. The licensee shall secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas.

3.20.2 Control of material not in storage. The licensee shall control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area and that is not in storage.

RHA 3.21 CAUTION SIGNS

3.21.1 Standard radiation symbol. Unless otherwise authorized by the Department, the symbol prescribed by this part shall use the colors magenta, or purple, or black on yellow background. The symbol prescribed by this part is the three-bladed design:

RADIATION SYMBOL



3.21.1.1 Cross-hatched area is to be magenta, or purple, or black, and

3.21.1.2 The background is to be yellow.

3.21.1.2.1 Exception to color requirements for standard radiation symbol. Notwithstanding the requirements of paragraph 3.21.1 of this section, licensees are authorized to label sources, source holders, or device components containing sources of licensed materials that are subjected to high temperatures, with conspicuously etched or stamped radiation caution symbols and without a color requirement.

3.21.1.2.2 Additional information on signs and labels. In addition to the contents of signs and labels prescribed in this part, the licensee may 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.

RHA 3.22 POSTING REQUIREMENTS

3.22.1 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."

3.22.2 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."

3.22.3 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."

3.22.4 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."

3.22.5 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 10 times the quantity of such material specified in Appendix C, RHA 3.54 with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)."

RHA 3.23 EXCEPTIONS TO POSTING REQUIREMENTS

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

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

3.23.1.2 The area or room is subject to the licensee's control.

3.23.2 Rooms or other areas in hospitals that are occupied by patients are not required to be posted with caution signs pursuant to RHA 3.22 provided that the patient could be released from licensee control pursuant to RHA 4.32.

3.23.3 A room or area is not required to be posted with a caution sign because of the presence of a sealed source provided 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.

3.23.4 Rooms in hospitals or clinics that are used for teletherapy are exempt from the requirement to post caution signs under RHA 3.22 if--

3.23.4.1 Access to the room is controlled pursuant to RHA 4.62; and

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

RHA 3.24 LABELING CONTAINERS

3.24.1 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 must also provide sufficient information (such as the radionuclide(s) 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.

3.24.2 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.

RHA 3.25 EXEMPTIONS TO LABELING REQUIREMENTS

A licensee is not required to label:

3.25.1 Containers holding licensed material in quantities less than the quantities listed in Appendix C, RHA 3.54; or

3.25.2 Containers holding licensed material in concentrations less than those specified in Table 3 of Appendix B, RHA 3.53 or

3.25.3 Containers attended by an individual who takes the precautions necessary to prevent the exposure of individuals in excess of the limits established by this part; or

3.25.4 Containers when they are in transport and packaged and labeled in accordance with the regulations of the Department of Transportation[2], or

3.25.5 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 must be retained as long as the containers are in use for the purpose indicated on the record; or

3.25.6 Installed manufacturing or process equipment, such as reactor components, piping, and tanks.

RHA 3.26 PROCEDURES FOR RECEIVING AND OPENING PACKAGES

3.26.1 Each licensee who expects to receive a package containing quantities of radioactive material in excess of a Type A quantity, as defined in RHA 3.2.92 and Appendix A, 10CFR Part 71, shall make arrangements to receive--

3.26.1.1 The package when the carrier offers it for delivery; or

3.26.1.2 Notification of the arrival of the package at the carrier's terminal and to take possession of the package expeditiously.

3.26.2 Each licensee shall:

3.26.2.1 Monitor the external surfaces of a labeled[3a] package for radioactive contamination unless the package contains only radioactive material in the form of a gas or in special form as defined in 10 CFR 71.4;

3.26.2.2 Monitor the external surfaces of a labeled[3a] 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 RHA 3.2.92, and Appendix A, 10 CFR Part 71[3b]; and

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

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[2] Labelling of packages containing radioactive materials is required by the 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 DOT regulations 49 CFR 173.403 (m) and (w) and 173.421-424.

3[a] Labeled with a Radioactive White 1, Yellow II, or Yellow III label as specified in U.S. Department of transportation regulations, 49 CFR 172.403 and 172.436-440.

3[b] A copy of 10 CFR Part 71 may be obtained from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (Telephone 202-512-1800).

3.26.3 The licensee shall perform the monitoring required by paragraph 3.26.2 of this section as soon as practicable after receipt of the package, but not later than 3 hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours, or not later than 3 hours from the beginning of the next working day if it is received after working hours.

3.26.4 The licensee shall immediately notify the final delivery carrier and the S.C. Department of Health & Environmental Control, Bureau of Radiological Health, (803-545-4400 or 803-690-8286), by telephone, when:

3.26.4.1 Removable radioactive surface contamination exceeds the limits of 10CFR 71.87(i) or

3.26.4.2 External radiation levels exceed the limits of 10CFR 71.47.

3.26.5 Each licensee shall:

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

3.26.5.2 Ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened.

3.26.6 Licensees transferring special form sources in licensee-owned or licensee-operated vehicles to and from a work site are exempt from the contamination monitoring requirements of paragraph 3.26.2 of this section, but are not exempt from the survey requirement in paragraph 3.26.2 of this section for measuring radiation levels that is required to ensure that the source is still properly lodged in its shield.

RHA 3.27 WASTE DISPOSAL - GENERAL REQUIREMENTS

3.27.1 A licensee shall dispose of licensed material only--

3.27.1.1 By transfer to an authorized recipient as provided in RHA 3.32 or in the regulations in Parts II and VII; or

3.27.1.2 By decay in storage; or

3.27.1.3 By release in effluents within the limits in RHA 3.13 or

3.27.1.4 As authorized under RHA 3.28, 3.29, 3.30, or 3.31.

3.27.2 A person must be specifically licensed to receive waste containing licensed material from other persons for:

3.27.2.1 Treatment prior to disposal; or

3.27.2.2 Treatment or disposal by incineration; or

3.27.2.3 Decay in storage; or

3.27.2.4 Disposal at a land disposal facility licensed under Part VII of these regulations;

RHA 3.28 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 the regulations in this chapter, to dispose of licensed material generated in the licensee's activities. Each application shall include:

3.28.1 A description of the waste containing licensed material to be disposed of, including the physical and chemical properties important to risk evaluation, and the proposed manner and conditions of waste disposal; and

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

3.28.3 The nature and location of other potentially affected licensed and unlicensed facilities; and

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

RHA 3.29 DISPOSAL BY RELEASE INTO SANITARY SEWERAGE

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

3.29.1.1 The material is readily soluble (or is readily dispersible biological material) in water; and

3.29.1.2 The quantity of licensed or other radioactive material that the licensee releases into the sewer in 1 month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in Table 3 of Appendix B, RHA 3.53 and

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

3.29.1.3.1 The licensee shall determine the fraction of the limit in Table 3 of Appendix B, RHA 3.53 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 3 of Appendix B, RHA 3.53 and

3.29.1.3.2 The sum of the fractions for each radionuclide required by paragraph 3.29.1.3.1 of this section does not exceed unity; and

3.29.1.4 The total quantity of licensed and other radioactive material that the licensee releases into the sanitary sewerage system in a year does not exceed 5 curies (185 GBq) of hydrogen-3, 1 curie (37 GBq) of carbon-14, and 1 curie (37 GBq) of all other radioactive materials combined.

3.29.2 Excreta from individuals undergoing medical diagnosis or therapy with radioactive material is not subject to the limitations contained in paragraph 3.29.1 of this section.

RHA 3.30 TREATMENT OR DISPOSAL BY INCINERATION

A licensee may treat or dispose of licensed material by incineration only in the amounts and forms specified in RHA 3.31 or as specifically approved by the Department pursuant to RHA 3.28.

RHA 3.31 DISPOSAL OF SPECIFIC WASTES AND CERTAIN BYPRODUCT MATERIAL

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

3.31.1.1 0.05 microcurie (1.85 kBq), or less, of hydrogen-3 or carbon-14 per gram of medium used for liquid scintillation counting; and

3.31.1.2 0.05 microcurie (1.85 kBq), or less, of hydrogen-3 or carbon-14 per gram of animal tissue, averaged over the weight of the entire animal.

3.31.2 A licensee may not dispose of tissue under paragraph 3.31.1.2 of this section in a manner that would permit its use either as food for humans or as animal feed.

3.31.3 Licensed material as defined in paragraphs (3) and (4) of the definition of byproduct material set forth in RHA 1.2.6 may be disposed of in accordance with Part 3 of this Regulation, even though it is not defined as low-level radioactive waste. Therefore, any licensed byproduct material being disposed of at a facility, or transferred for ultimate disposal at a facility authorized to dispose of such material, must meet the requirements of RHA 3.32.

3.31.4 A licensee may dispose of byproduct material, as defined in paragraphs (3) and (4) of the definition of byproduct material set forth in RHA 1.2.6, at a disposal facility authorized to dispose of such material in accordance with any Federal or State solid or hazardous waste law, including the Solid Waste Disposal Act, as authorized under the Energy Policy Act of 2005.

3.31.5 The licensee shall maintain records in accordance with RHA 3.41.

RHA 3.32 TRANSFER FOR DISPOSAL AND MANIFESTS

3.32.1 The requirements of this section and Appendix D, RHA 3.55 are designed to control transfers of low-level radioactive waste by any waste generator, waste collector, or waste processor, as defined in this part, who ship low-level waste either directly, or indirectly through a waste collector or waste processor, to a low-level waste land disposal facility (as defined in Part VII of these regulations), establish a manifest tracking system, and supplement existing requirements concerning transfers and recordkeeping for those wastes.

3.32.2 Any licensee shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility must document the information required on NRC's Uniform Low-Level Radioactive Waste Manifest and transfer this recorded manifest information to the intended consignee in accordance with Section 3.55.1 of Appendix D, RHA 3.55.

3.32.3 Each shipment manifest must include a certification by the waste generator as specified in Section 3.55.2 of Appendix D, RHA 3.55.

3.32.4 Each person involved in the transfer for disposal and disposal of waste, including the waste generator, waste collector, waste processor, and disposal facility operator, shall comply with the requirements specified in Section 3.55.3 of Appendix D, RHA 3.55.

3.32.5 Any licensee shipping byproduct material as defined in paragraphs 3 and 4 of the definition of byproduct material set forth in RHA 1.2.6 intended for ultimate disposal at a land disposal facility licensed under Part 7 of this Regulation must document the information required on the NRC’s Uniform

Low-Level Radioactive Waste Manifest and transfer this recorded manifest information to the intended consignee in accordance with Appendix D to this part.

RHA 3.33 COMPLIANCE WITH ENVIRONMENTAL AND HEALTH PROTECTION REGULATIONS

Nothing in this subpart relieves the licensee from complying with other applicable Federal, State, and local regulations governing any other toxic or hazardous properties of materials that may be disposed of under this subpart.

RHA 3.34 RECORDS - GENERAL PROVISIONS

3.34.1 Each licensee shall use the units: curie, rad, rem, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by this part.

3.34.2 In the records required by this part, the licensee may record quantities in SI units in parentheses following each of the units specified in RHA 3.34.1. However, all quantities must be recorded as stated in RHA 3.34.1.

3.34.3 Not withstanding the requirements of 3.34.1 of this section, when recording information on shipment manifests, as required in 3.32.2 information must be recorded in the International System of Units(SI) or in SI and units as specified in 3.34.1 of this section.

3.34.4 The licensee shall make a clear distinction among the quantities entered on the records required by this part (e.g., total effective dose equivalent, shallow-dose equivalent, eye dose equivalent, deep-dose equivalent, committed effective dose equivalent).

3.34.5 Prior to license termination, each licensee authorized to possess radioactive material with a half-life greater than 120 days or source material, in an unsealed form, shall forward the following records to the Department:

3.34.5.1 Records of disposal of licensed material made under RHA 3.28 thru 3.31; and

3.34.5.2 Records required by RHA 3.36.2.4.

3.34.6 If licensed activities are transferred or assigned in accordance with RHA 2.10.2, each licensee authorized to possess radioactive material with a half-life greater than 120 days or source material, in an unsealed form, shall transfer the following records to the new licensee and the new licensee will be responsible for maintaining these records until the license is terminated:

3.34.6.1 Records of disposal of licensed material made under RHA 3.28 thru 3.31; and

3.34.6.2 Records required by RHA 3.36.2.4.

3.34.7 Prior to license termination, each licensee shall forward the records required by RHA 1.15.13 to the Department.

RHA 3.35 RECORDS OF RADIATION PROTECTION PROGRAMS

3.35.1 Each licensee shall maintain records of the radiation protection program, including:

3.35.1.1 The provisions of the program; and

3.35.1.2 Audits and other reviews of program content and implementation.

3.35.2 The licensee shall retain the records required by paragraph 3.35.1.1 of this section until the Department terminates each pertinent license requiring the record. The licensee shall retain the records required by paragraph 3.35.1.2 of this section for 3 years after the record is made.

RHA 3.36 RECORDS OF SURVEYS

3.36.1 Each licensee shall maintain records showing the results of surveys and calibrations required by RHA 3.16 and 3.26.2. The licensee shall retain these records for 3 years after the record is made.

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

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

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

3.36.2.3 Records showing the results of air sampling, surveys, and bioassays required pursuant to RHA 3.19.3.1.3.1 and 3.19.3.1.3.2; and

3.36.2.4 Records of the results of measurements and calculations used to evaluate the release of radioactive effluents to the environment.

RHA 3.37 DETERMINATION OF PRIOR OCCUPATIONAL DOSE

3.37.1 For each individual who is likely to receive in a year, an occupational dose requiring monitoring pursuant to RHA 3.17, the licensee shall:

3.37.1.1 Determine the occupational radiation dose received during the current year; and

3.37.1.2 Attempt to obtain the records of lifetime cumulative occupational radiation dose.

3.37.2 Prior to permitting an individual to participate in a planned special exposure, the licensee shall determine--

3.37.2.1 The internal and external doses from all previous planned special exposures; and

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

3.37.3 In complying with the requirements of paragraph 3.37.1 of this section, a licensee may-

3.37.3.1 Accept, as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual, or from the individual's most recent employer for

work involving radiation exposure, that discloses the nature and the amount of any occupational dose that the individual may have received during the current year;

3.37.3.2 Accept, as the record of lifetime cumulative radiation dose, an up-to-date S.C. Form 4, or equivalent, signed by the individual and counter-signed by an appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employer (if the individual is not employed by the licensee); and

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

3.37.4 The licensee shall record the exposure history, as required by paragraph 3.37.1 of this section, on S.C. Form 4, or other clear and legible record, of all the information required on that form[4.] The form or record must show each period in which the individual received occupational exposure to radiation or radioactive material and must be signed by the individual who received the exposure. For each period for which the licensee obtains reports, the licensee shall use the dose shown in the report in preparing S.C. Form 4. For any period in which the licensee does not obtain a report, the licensee shall place a notation on S.C. Form 4 indicating the periods of time for which data are not available.

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

3.37.5.1 In establishing administrative controls under RHA 3.5.6 for the current year, that the allowable dose limit for the individual is reduced by 1.25 rems (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

3.37.5.2 That the individual is not available for planned special exposures.

3.37.6 The licensee shall retain the records on S.C. Form 4 or equivalent until the Department terminates each pertinent license requiring this record. The licensee shall retain records used in preparing S.C. Form 4 for 3 years after the record is made.

RHA 3.38 RECORDS OF PLANNED SPECIAL EXPOSURES

3.38.1 For each use of the provisions of RHA 3.10 for planned special exposures, the licensee shall maintain records that describe:

3.38.1.1 The exceptional circumstances requiring the use of a planned special exposure; and

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

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[4]Licensees are not required to reevaluate the separate external dose equivalents and internal committed dose equivalents or intakes of radionuclides assessed under the regulations in Part III in effect before January 1, 1994. Further, occupational exposure histories obtained and recorded on S.C. Form 4 before January 1, 1994, would not have included effective dose equivalent but may be used in the absence of specific information on the intake of radionuclides by the individual.

3.38.1.3 What actions were necessary; and

3.38.1.4 Why the actions were necessary; and

3.38.1.5 How doses were maintained ALARA; and

3.38.1.6 What individual and collective doses were expected to result, and the doses actually received in the planned special exposure.

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

RHA 3.39 RECORDS OF INDIVIDUAL MONITORING RESULTS

3.39.1 Recordkeeping requirement. Each licensee shall maintain records of doses received by all individuals for whom monitoring was required pursuant to RHA 3.17, and records of doses received during planned special exposures, accidents, and emergency conditions. These records must include, when applicable--

3.39.1.1 The deep-dose equivalent to the whole body, lens dose equivalent, shallow-dose equivalent to the skin, and shallow-dose equivalent to the extremities; and

3.39.1.2 The estimated intake of radionuclides (see RHA 3.6); and

3.39.1.3 The committed effective dose equivalent assigned to the intake or body burden of radionuclides; and

3.39.1.4 The specific information used to assess the committed effective dose equivalent pursuant to RHA 3.8.1 and RHA 3.8.3, and when required by RHA 3.17, and

3.39.1.5 The total effective dose equivalent when required by RHA 3.6 and

3.39.1.6 The total of the deep-dose equivalent and the committed dose to the organ receiving the highest total dose.

3.39.2 Recordkeeping frequency. The licensee shall make entries of the records specified in paragraph 3.39.1 of this section at least annually.

3.39.3 Recordkeeping format. The licensee shall maintain the records specified in paragraph 3.39.1 of this section on S.C. Form 5, in accordance with the instructions for S.C. Form 5, or in clear and legible records containing all the information required by S.C. Form 5.

3.39.4 Privacy protection. The records required under this section should be protected from public disclosure because of their personal privacy nature. These records are protected by most State privacy laws.

3.39.5 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 shall also be kept on file, but may be maintained separately from the dose records.

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

RHA 3.40 RECORDS OF DOSE TO INDIVIDUAL MEMBERS OF THE PUBLIC

3.40.1 Each licensee shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public (see RHA 3.13).

3.40.2 The licensee shall retain the records required by paragraph 3.40.1 of this section until the Department terminates each pertinent license requiring the record.

RHA 3.41 RECORDS OF WASTE DISPOSAL

3.41.1 Each licensee shall maintain records of the disposal of licensed materials made under RHA 3.28, 3.29, 3.30, 3.31 and disposal by burial in soil.

3.41.2 The licensee shall retain the records required by paragraph 3.41.1 of this section until the Department terminates each pertinent license requiring the record. Requirements for disposition of these records, prior to license termination, are located in Section 3.34 for activities licensed under these parts.

RHA 3.42 VACATING PREMISES

Before a licensee vacates any location which may have been contaminated by radioactive material as a result of the licensee's activities the licensee shall, not less than 30 days prior to such vacating, notify the Department in writing of intent to vacate. The licensee shall decontaminate or have decontaminated the location to a degree consistent with subsequent use as an unrestricted area, in accordance with Appendix F, RHA 3.57.

RHA 3.43 FORM OF RECORDS

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

RHA 3.44 REPORTS OF THEFT OR LOSS OF LICENSED MATERIAL

3.44.1 Telephone reports. Each licensee shall report by telephone to the S.C. Department of Health and Environmental Control, Bureau of Radiological Health, 2600 Bull Street, Columbia, S.C. 29201, as follows:

3.44.1.1 Immediately after its occurrence becomes known to the licensee, any lost, stolen, or missing licensed material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in Appendix C, RHA 3.54 under such circumstances that it appears to the licensee that an exposure could result to persons in unrestricted areas; or

3.44.1.2 Within 30 days after the occurrence of any lost, stolen, or missing licensed material becomes known to the licensee, all licensed material in a quantity greater than 10 times the quantity specified in Appendix C, RHA 3.54 that is still missing at this time.

3.44.2 Reports must be made as follows:

3.44.2.1 Written reports. Each licensee required to make a report under paragraph 3.44.1 of this section shall, within 30 days after making the telephone report, make a written report setting forth the following information:

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

3.44.2.1.2 A description of the circumstances under which the loss or theft occurred; and

3.44.2.1.3 A statement of disposition, or probable disposition, of the licensed material involved; and

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

3.44.2.1.5 Actions that have been taken, or will be taken, to recover the material; and

3.44.2.1.6 Procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed material.

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

3.44.4 The licensee shall prepare any report filed with the Department pursuant to this section so that names of individuals who may have received exposure to radiation are stated in a separate and detachable part of the report.

RHA 3.45 NOTIFICATION OF INCIDENTS

3.45.1 Immediate notification. Notwithstanding any other requirements for notification, each licensee shall immediately notify the S.C. Department of Health & Environmental Control, Bureau of Radiological Health, 2600 Bull Street, Columbia, SC 29201, by telephone (803-545-4400) and confirming letter of any event involving radioactive material possessed by the licensee that may have caused or threatens to cause any of the following conditions--

3.45.1.1 An individual to receive:

3.45.1.1.1 A total effective dose equivalent of 25 rems (0.25 Sv) or more; or

3.45.1.1.2 A lens dose equivalent of 75 rems (0.75 Sv) or more;

3.45.1.1.3 A shallow-dose equivalent to the skin or extremities of 250 rads (2.5 Gy) or more; or

3.45.1.2 The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the

occupational 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); or

3.45.1.3 A loss of 1 working week or more of the operation of any facilities affected; or

3.45.1.4 Damage to property in excess of $200,000.

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

3.45.2.1 An individual to receive, in a period of 24 hours--

3.45.2.1.1 A total effective dose equivalent exceeding 5 rems (0.05 Sv); or

3.45.2.1.2 A lens dose equivalent exceeding 15 rems (0.15 Sv);

3.45.2.1.3 A shallow-dose equivalent to the skin or extremities exceeding 50 rems (0.5 Sv); or

3.45.2.2 The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational 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); or

3.45.2.3 A loss of 1 day or more of the operation of any facilities affected; or

3.45.2.4 Damage to property in excess of $2,000.

3.45.3 The licensee shall prepare any report filed with the Department pursuant to this section so that names of individuals who have received exposure to radiation or radioactive material are stated in a separate and detachable part of the report.

3.45.4 The provisions of this section do not include doses that result from planned special exposures, that are within the limits for planned special exposures, and that are reported under RHA 3.47.

RHA 3.46 REPORTS OF EXPOSURES, RADIATION LEVELS, AND CONCENTRATIONS OF RADIOACTIVE MATERIAL EXCEEDING THE LIMITS

3.46.1 Reportable events. In addition to the notification required by RHA 3.45, each licensee shall submit a written report within 30 days after learning of any of the following occurrences:

3.46.1.1 Any incident for which notification is required by RHA 3.45; or

3.46.1.2 Doses in excess of any of the following:

3.46.1.2.1 The occupational dose limits for adults in RHA 3.5; or

3.46.1.2.2 The occupational dose limits for a minor in RHA 3.11; or

3.46.1.2.3 The limits for an embryo/fetus of a declared pregnant woman in RHA 3.12; or

3.46.1.2.4 The limits for an individual member of the public in RHA 3.13; or

3.46.1.2.5 Any applicable limit in the license; or

3.46.1.2.6 The ALARA constraints for air emissions established under RHA 3.4.4; or

3.46.1.3 Levels of radiation or concentrations of radioactive material in--

3.46.1.3.1 A restricted area in excess of any applicable limit in the license; or

3.46.1.3.2 An unrestricted area in excess of 10 times any applicable limit set forth in this part or in the license (whether or not involving exposure of any individual in excess of the limits in RHA 3.13);

3.46.2 Contents of reports. Each report required by paragraph 3.46.1 of this section must describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

3.46.2.1 Estimates of each individual's dose; and

3.46.2.2 The levels of radiation and concentrations of radioactive material involved; and

3.46.2.3 The cause of the elevated exposures, dose rates, or concentrations; and

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

3.46.3 Each report filed pursuant to paragraph RHA 3.46.1 of this section must include for each occupationally overexposed[5] individual: the name, Social Security account number, and date of birth. The report must be prepared so that this information is stated in a separate and detachable part of the report.

3.46.4 All licensees, who make reports under paragraph 3.46.1 of this section shall submit the report in writing to the S.C. Department of Health & Environmental Control, Bureau of Radiological Health, 2600 Bull Street, Columbia, SC.

RHA 3.47 REPORTS OF PLANNED SPECIAL EXPOSURES

The licensee shall submit a written report to S.C. Department of Health & Environmental Control, Bureau of Radiological Health, 2600 Bull Street, Columbia, SC 29201 within 30 days following any planned special exposure conducted in accordance with RHA 3.10, informing the Department that a planned special exposure was conducted and indicating the date the planned special exposure occurred and the information required by RHA 3.38.

RHA 3.48 REPORTS TO INDIVIDUALS OF EXCEEDING DOSE LIMITS

[5]With respect to the limit for the embryo-fetus (RHA 3.12), the identifiers should be those of the declared pregnant woman.

When a licensee is required, pursuant to the provisions of RHA 3.46, 3.47, and 3.49, 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 the individual a report on his or her exposure data included in the report to the Department. This report must be transmitted at a time no later than the transmittal to the Department.

RHA 3.49 REPORTS OF INDIVIDUAL MONITORING

3.49.1 This section applies to each person licensed by the Department to--

3.49.1.1 Possess or use radioactive material for purposes of industrial radiography pursuant to Part V of these regulation; or

3.49.1.2 Receive radioactive waste from other persons for disposal under Part VII of these regulations; or

3.49.1.3 Possess or use at any time, for processing or manufacturing for distribution pursuant to Parts II or IV, of these regulations, radioactive material in quantities exceeding any one of the following quantities:

Radionuclide	Quantity of Radionuclide[1] in curies
Cesium-137	1
Cobalt-60	1
Gold-198	100
Iodine-131	1
Iridium-192	10
Krypton-85	1,000
Promethium-147	10
Technetium-99m	1,000

[1]The Department may require as a license condition, or by rule, regulation, or order pursuant to RHA 3.51, reports from licensees who are licensed to use radionuclides not on this list, in quantities sufficient to cause comparable radiation levels.

3.49.2 Each licensee in a category listed in paragraph 3.49.1 of this section shall submit an annual report of the results of individual monitoring carried out by the licensee for each individual for whom monitoring was required by RHA 3.17 during that year. The licensee may include additional data for individuals for whom monitoring was provided but not required. The licensee shall use S.C. Form 5 or electronic media containing all the information required by S.C. Form 5.

3.49.3 The licensee shall file the report required by 3.49.2, covering the preceding year, on or before April 30 of each year. The licensee shall submit the report to S.C. Department of Health & Environmental Control, Bureau of Radiological Health, 2600 Bull Street, Columbia, SC, 29201.

RHA 3.50 APPLICATIONS FOR EXEMPTIONS

The Department may, upon application by a licensee or upon its own initiative, grant an exemption from the requirements of the regulations in this part if it determines the exemption is authorized by law and would not result in undue hazard to life or property.

RHA 3.51 ADDITIONAL REQUIREMENTS

The Department may, by rule, regulation, or order, impose requirements on a licensee, in addition to those established in the regulations in this part, as it deems appropriate or necessary to protect health or to minimize danger to life or property.