TITLE 32: ENERGY
CHAPTER II: ILLINOIS EMERGENCY MANAGEMENT AGENCY
SUBCHAPTER b: RADIATION PROTECTION

PART 340
STANDARDS FOR PROTECTION AGAINST RADIATION

SUBPART A: GENERAL PROVISIONS

Section
340.10 Purpose
340.20 Scope
340.25 Incorporations by Reference
340.30 Definitions
340.40 Implementation

SUBPART B: RADIATION PROTECTION PROGRAMS

Section
340.110 Radiation Protection Programs

SUBPART C: OCCUPATIONAL DOSE LIMITS

Section
340.210 Occupational Dose Limits for Adults
340.220 Compliance with Requirements for Summation of External and Internal Doses
340.230 Determination of External Dose from Airborne Radioactive Material
340.240 Determination of Internal Exposure
340.250 Determination of Prior Occupational Dose
340.260 Planned Special Exposures
340.270 Occupational Dose Limits for Minors
340.280 Dose Equivalent to an Embryo/Fetus

SUBPART D: RADIATION DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC

Section
340.310 Dose Limits for Individual Members of the Public
340.320 Compliance with Dose Limits for Individual Members of the Public

SUBPART E: TESTING FOR LEAKAGE OR CONTAMINATION OF SEALED SOURCES

Section

340.410 Testing for Leakage or Contamination of Sealed Sources

SUBPART F: SURVEYS AND MONITORING

Section
340.510 General
340.520 Conditions Requiring Individual Monitoring of External and Internal Occupational Dose
340.530 Location of Individual Monitoring Devices
340.540 Calibration of Survey Instruments

SUBPART G: CONTROL OF EXPOSURE FROM EXTERNAL SOURCES IN RESTRICTED AREAS

Section
340.610 Control of Access to High Radiation Areas
340.620 Control of Access to Very High Radiation Areas
340.630 Control of Access to Very High Radiation Areas – Irradiators

SUBPART H: RESPIRATORY PROTECTION AND CONTROLS TO RESTRICT INTERNAL EXPOSURE IN RESTRICTED AREAS

Section
340.710 Use of Process or Other Engineering Controls
340.720 Use of Other Controls
340.730 Use of Individual Respiratory Protection Equipment

SUBPART I: STORAGE AND CONTROL OF LICENSED OR REGISTERED SOURCES OF RADIATION

Section
340.810 Security and Control of Licensed or Registered Sources of Radiation
340.820 Storage of Volatiles and Gases
340.830 Control of Volatiles and Gases

SUBPART J: PRECAUTIONARY PROCEDURES

Section
340.910 Caution Signs
340.920 Posting Requirements
340.930 Exceptions to Posting Requirements
340.940 Labeling Containers and Radiation Machines
340.950 Exemptions to Labeling Requirements

340.960 Procedures for Receiving and Opening Packages

SUBPART K: WASTE DISPOSAL

Section
340.1010 General Requirements
340.1020 Method for Obtaining Approval of Proposed Disposal Procedures
340.1030 Disposal by Release into Sanitary Sewerage
340.1040 Treatment or Disposal by Incineration
340.1045 Decay-In-Storage
340.1050 Disposal of Specific Wastes
340.1052 Classification of Radioactive Waste for Land Disposal
340.1055 Radioactive Waste Characteristics
340.1057 Labeling
340.1060 Transfer for Disposal and Manifests
340.1070 Compliance with Environmental and Health Protection Regulations

SUBPART L: RECORDS

Section
340.1110 General Provisions
340.1120 Records of Radiation Protection Programs
340.1130 Records of Surveys and Calibrations
340.1135 Records of Tests for Leakage or Contamination of Sealed Sources
340.1140 Records of Prior Occupational Dose
340.1150 Records of Planned Special Exposures
340.1160 Records of Individual Monitoring Results
340.1170 Records of Dose to Members of the Public
340.1180 Records of Waste Disposal
340.1190 Records of Testing Entry Control Devices for Very High Radiation Areas
340.1195 Form of Records (Repealed)

SUBPART M: REPORTS AND NOTIFICATIONS

Section
340.1205 Notification of Credible Threats
340.1210 Reports of Stolen, Lost or Missing Sources of Radiation
340.1220 Notification of Incidents
340.1230 Reports of Exposures, Radiation Levels and Concentrations of Radioactive Material Exceeding the Constraints or Limits
340.1240 Reports of Planned Special Exposures
340.1250 Notifications and Reports to Individuals
340.1260 Reports of Leaking or Contaminated Sealed Sources

340.1270 Reports of Missing Waste Shipments

SUBPART N: ADDITIONAL REQUIREMENTS

Section
340.1310 Vacating Premises
340.1320 Removal of Radioactive Contamination

340.APPENDIX A Decontamination Guidelines
340.ILLUSTRATION A Radiation Symbol

AUTHORITY: Implementing and authorized by the Radiation Protection Act of 1990 [420 ILCS 40].

SOURCE: Filed April 24, 1970 by the Department of Public Health; transferred to the Department of Nuclear Safety by P.A. 81-1516, effective December 3, 1980; amended at 5 Ill. Reg. 9586, effective September 10, 1981; codified at 7 Ill. Reg. 16027; recodified at 10 Ill. Reg. 11273; amended at 10 Ill. Reg. 17538, effective September 25, 1986; amended at 16 Ill. Reg. 11538, effective July 7, 1992; old Part repealed, new Part adopted at 17 Ill. Reg. 18507, effective January 1, 1994; amended at 19 Ill. Reg. 8264, effective June 12, 1995; emergency amendment at 27, Ill. Reg. 17273, effective November 18, 2002, for a maximum of 150 days; amended at 27 Ill. Reg. 5445, effective March 17, 2003; recodified from the Department of Nuclear Safety to the Illinois Emergency Management Agency at 27 Ill. Reg. 13641; amended at 29 Ill. Reg. 20841, effective December 16, 2005; amended at 31 Ill. Reg. 11593, effective July 26, 2007; amended at 35 Ill. Reg. 934, effective December 30, 2010; amended at 39 Ill. Reg. 15728, effective Novermber 24, 2015.

SUBPART A: GENERAL PROVISIONS

Section 340.10 Purpose

a) This Part establishes standards for protection against ionizing radiation resulting from activities conducted pursuant to licenses or registrations issued by the Illinois Emergency Management Agency (Agency). This Part is issued pursuant to the Radiation Protection Act of 1990 [420 ILCS 40].

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

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.20 Scope

Except as specifically provided in other regulations of the Agency, this Part applies to persons licensed or registered by the Agency to receive, possess, use, transfer or dispose of sources of radiation pursuant to 32 Ill. Adm. Code: Chapter II, Subchapters b and d. 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 32 Ill. Adm. Code 335 or to voluntary participation in medical research programs.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.25 Incorporations by Reference

All rules, standards and guidelines of agencies of the United States or nationally recognized organizations or associations that are incorporated by reference in this Part are incorporated as of the date specified in the reference and do not include any later amendments or editions. Copies of rules, standards and guidelines that have been incorporated by reference are available for public inspection and copying at the Agency, 1035 Outer Park Drive, Springfield, Illinois.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.30 Definitions

"Air-purifying respirator" or "APR" 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.

"Annual limit on intake" or "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 0.05 Sv (5 rem) or a committed dose equivalent of 0.5 Sv (50 rem) 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 to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions.

"Assigned protection factor" or "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 trained and fitted users.

"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.

"Chelating agent" means amine polycarboxylic acids (e.g., EDTA, DTPA), hydroxy-carboxylic acids, and polycarboxylic acids (e.g., citric acid, carbolic acid, and glucinic acid).

"Class" (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.

"Collector" means a licensee 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.

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

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

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

"Derived air concentration" or "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 would result in an intake of one ALI. For purposes of this definition, the condition of light work is an inhalation rate of 1.2 cubic meters of air per hour for 2,000 hours in a year. DAC values are given in table 1, column 3 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions.

"Derived air concentration-hour" or "DAC-hour" means the product of the

concentration of radioactive material in air (expressed as a fraction or multiple of the derived air concentration for each radionuclide) and the time of exposure to that radionuclide (expressed in hours). A licensee may take 2,000 DAC-hours to represent one ALI, equivalent to a committed effective dose equivalent of 0.05 Sv (5 rem).

"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.

"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).

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

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

"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.

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

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

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

"Inhalation class" (see "class").

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

"Lens dose equivalent" or "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).

"Loose-fitting face piece" means a respiratory inlet covering designed to form a partial seal with the face.

"Lung class" (see "class").

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

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

"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 another 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 32 Ill. Adm. Code 335, from voluntary participation in medical research programs or as a member of the public.

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

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

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

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

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

"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 a licensee. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released under 32 Ill. Adm. Code 335, or from voluntary participation in medical research programs.

"Qualitative fit test" or "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.

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

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

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

"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.

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

"Shipping paper" means NRC Form 540 and, if required, NRC Form 540A, which includes the information required by DOT in 49 CFR 172, revised October 1, 2008, exclusive of subsequent amendments or editions.

"Stochastic effect" (probabilistic effect) means a health effect that occurs randomly and for which the probability of the effect occurring, rather than its

severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects.

"Supplied-air respirator" or "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.

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

"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.

"User seal check" or "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.

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

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

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

"Weighting factor" (w_T), means the proportion of the risk of stochastic effects resulting from irradiation of an organ or tissue (T) 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 or Tissue	(w_T)
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12

Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30[a]
Whole Body	1.00[b]

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

[b]For the purpose of weighting the external whole-body dose, for adding it to the internal dose, a single weighting factor, (w_T) = 1.0, has been specified.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.40 Implementation

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

b) If a license condition exempts a licensee from a provision of this Part in effect before January 1, 1994, it also exempts the licensee from the corresponding provision of this Part, as revised effective January 1, 1994, until there is an amendment or renewal of the license that modifies or removes the condition.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART B: RADIATION PROTECTION PROGRAMS

Section 340.110 Radiation Protection Programs

a) Each licensee or registrant shall develop, document and implement a radiation protection program that ensures compliance with the provisions of this Part. (See Section 340.1120 of this Part for recordkeeping requirements relating to these programs.)

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

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

d) To implement the ALARA requirements of Section 340.110(b) of this Part and notwithstanding the requirements in Section 340.310 of this Part, a constraint on air emissions of radioactive materials to the environment, excluding radon-222 and its daughters, shall be established by licensees so that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent (TEDE) in excess of 0.1 mSv (10 mrem) per year from these emissions. If a licensee subject to this requirement exceeds this dose constraint, the licensee shall report the excess as provided in Section 340.1230 of this Part and promptly take appropriate corrective action to ensure against recurrence.

e) The registrant shall review, at intervals not to exceed 1 inspection cycle as specified in 32 Ill. Adm. Code 320.10(c), the radiation protection program content and implementation.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART C: OCCUPATIONAL DOSE LIMITS

Section 340.210 Occupational Dose Limits for Adults

a) The licensee or registrant shall control the occupational dose to individual adults, except for planned special exposures pursuant to Section 340.260, to the following dose limits:

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

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

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

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

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

B) A shallow dose equivalent of 0.5 Sv (50 rem) to the skin or to any extremity.

b) Doses received in excess of the annual limits, including doses received during accidents, emergencies and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime (see Section 340.260(e)).

c) When the external exposure is determined by measurement with an external personal monitoring device, the deep dose equivalent shall be used in place of the effective dose equivalent unless the effective dose equivalent is determined by a dosimetry method approved by the Agency. The assigned deep dose equivalent shall be for the portion of the body receiving the highest exposure. The assigned shallow dose equivalent shall be the dose averaged over the contiguous 10 square centimeters of skin receiving the highest dose.

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

d) 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.

e) Derived air concentration (DAC) and annual limit on intake (ALI) values are specified in table 1 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions, and may be used to determine the individual's dose (see Section 340.1160) and to demonstrate compliance with the occupational dose limits.

f) Notwithstanding 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 to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions.)

g) The licensee or registrant shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person during the current year (see Section 340.250(a) and (d)).

AGENCY NOTE: The purpose of this requirement is to ensure that no individual

receives an annual occupational dose in excess of the occupational dose limits set forth in this Section.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.220 Compliance with Requirements for Summation of External and Internal Doses

a) General Requirement. If the licensee is required to monitor individual occupational dose pursuant to both Section 340.520(a) and (b) of this Part, the licensee shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee or registrant is required to monitor individual occupational dose only pursuant to Section 340.520(a) of this Part or only pursuant to Section 340.520(b) of this Part, 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 pursuant to subsections (b), (c) and (d) of this Section. The dose equivalents for the lens of the eye, the skin and the extremities are not included in the summation, but are subject to separate limits.

b) 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:

1) The sum of the fractions of the inhalation ALI for each radionuclide; or

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

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

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

d) Intake Through Wounds or Absorption Through Skin. The licensee shall evaluate and, to the extent practicable, account for intakes through wounds or skin absorption. The intake through intact skin has been included in the calculation of DAC for hydrogen-3 and does not need to be further evaluated or accounted for pursuant to this subsection.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.230 Determination of External Dose from Airborne Radioactive Material

a) Licensees shall, when determining the dose from airborne radioactive material, include the contribution to the deep dose equivalent, lens dose equivalent and shallow dose equivalent from external exposure to the radioactive cloud (see footnotes 1 and 2 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions).

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

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.240 Determination of Internal Exposure

a) For purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee shall, when required pursuant to Section 340.520, take measurements of:

1) Concentrations of radioactive materials in air in work areas during conditions of operations; or

2) Quantities of radionuclides in the body after exposure to materials that could result in an intake; or

3) Quantities of radionuclides excreted from the body after exposure to materials that could result in an intake; or

4) Combinations of these measurements.

b) Unless respiratory protective equipment is used, as provided in Section 340.730, or the assessment of intake is based on bioassays, the licensee shall assume that an individual inhales radioactive material at the airborne concentration in which the individual is present.

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

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

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

3) Separately assess the contribution of fractional intakes of Class D, W or Y compounds of a given radionuclide (see appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions) to the committed effective dose equivalent.

d) If the licensee chooses to assess intakes of Class Y material using the measurements specified in subsections (a)(2) or (3), the licensee may delay the recording and reporting of the assessments for periods up to 7 months, unless otherwise required by Sections 340.1220 or 340.1230.

AGENCY NOTE: This delay permits the licensee to make additional measurements basic to the assessments.

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

1) The sum of the ratios of the concentration to the appropriate DAC value (e.g., D, W or Y) from appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions, for each radionuclide in the mixture; or

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

f) If the identity of each radionuclide in a mixture is known, but the concentration of

one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

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

1) The licensee uses the total activity of the mixture in demonstrating compliance with the dose limits in Section 340.210 and in complying with the monitoring requirements in Section 340.520(b);

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

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

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

1) 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 0.05 Sv (5 rem) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

2) For an ALI (and the associated DAC) determined by the nonstochastic organ dose limit of 0.5 Sv (50 rem), the intake of radionuclides that would result in a committed effective dose equivalent of 0.05 Sv (5 rem) (the stochastic ALI) is listed in parentheses in table 1 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions. The licensee may, as a simplifying assumption, use the stochastic ALI to determine committed effective dose equivalent. However, if the licensee uses the stochastic ALI, the licensee shall also demonstrate that the limit in Section 340.210(a)(1)(B) is met.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.250 Determination of Prior Occupational Dose

a) For each individual who may enter the licensee's or registrant's restricted area and is likely to receive, in a year, an occupational dose requiring monitoring pursuant to Section 340.520 of this Part, the licensee or registrant shall determine the occupational radiation dose received during the current year prior to allowing

such individual to enter a restricted area. In order to comply with this requirement, a licensee or registrant may 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 employers 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. To accomplish this, a licensee or registrant may use the NRC Form 5 or submit equivalent information.

AGENCY NOTE: Licensees and registrants also should attempt to obtain the records of cumulative occupational radiation dose.

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

1) Determine the cumulative occupational radiation dose.

A) In order to comply with this requirement, a licensee may accept, as the record of cumulative radiation dose, an up-to-date NRC Form 4, or equivalent, signed by the individual and countersigned by an appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employers (if the individual is not employed by the licensee); and

B) Obtain reports of the individual's dose equivalent for the time period subsequent to that included in NRC Form 4, or equivalent, as specified in subsection (b)(1)(A) of this Section. Such reports shall be signed by the individual and countersigned by an appropriate official of the most recent employers for work involving radiation exposure, or the individual's current employers (if the individual is not employed by the licensee). The information shall be recorded on NRC Form 5, or equivalent.

2) Determine the internal and external doses from all previous planned special exposures.

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

c) The licensee or registrant shall record the exposure history, as required by subsections (a) and (b) of this Section, on NRC Form 4 or 5, or equivalent, as applicable, or other clear and legible record containing all of the information required on that form.

1) The form or record shall show each period in which the individual received occupational exposure to sources of radiation and shall be signed by the individual who received the exposure. For each period for which the licensee or registrant obtains reports, the licensee or registrant shall use the dose shown in the report in preparing the exposure history. For any period in which the licensee or registrant does not obtain a report, the licensee or registrant shall place a notation on the exposure history indicating the periods of time for which data are not available.

2) For the purpose of complying with this requirement, licensees or registrants are not required to reevaluate the separate external dose equivalents and internal committed dose equivalents or intakes of radionuclides assessed before January 1, 1994. Further, although occupational exposure histories obtained and recorded before January 1, 1994, would not have included effective dose equivalent, such histories may be used in the absence of specific information on the intake of radionuclides by the individual.

d) If the licensee or registrant is unable to obtain a complete record of an individual's current and previously accumulated occupational dose, the licensee or registrant:

1) When establishing administrative controls pursuant to Section 340.210(g) of this Part for the current year, shall assume that the allowable dose limit for the individual is reduced by 12.5 mSv (1.25 rem) for each calendar quarter for which records were unavailable and the individual was engaged in activities that could have resulted in occupational radiation exposure; and

2) Shall not authorize the individual to receive any planned special exposures.

e) Records shall be retained in accordance with the requirements of Section 340.1140(a) of this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.260 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 Section 340.210 of this Part, provided that each of the following conditions are satisfied:

a) 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.

b) The management official of the licensee and employer, if the employer is not the licensee, specifically authorize the planned special exposure, in writing, before the exposure occurs.

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

1) Informed of the purpose of the planned operation; and

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

d) Prior to permitting an individual to participate in a planned special exposure, the licensee ascertains previous doses received during the lifetime of the individual as required by Section 340.250(b) of this Part.

e) Subject to Section 340.210(b) of this Part, the licensee shall not authorize a planned special exposure that would cause an individual's dose from all planned special exposures and all doses in excess of the limits to exceed:

1) The numerical values of any of the dose limits in Section 340.210(a) of this Part in any year; and

2) Five times the annual dose limits in Section 340.210(a) of this Part during the individual's lifetime.

f) The licensee maintains records of the conduct of a planned special exposure in accordance with Section 340.1150 of this Part and submits a written report in accordance with Section 340.1240 of this Part.

g) 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 exposure need not be considered in controlling future occupational dose of the individual pursuant to Section 340.210(a) of this Part but

shall be included in evaluations required by subsections (d) and (e) of this Section.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.270 Occupational Dose Limits for Minors

The annual occupational dose limits for minors are ten percent of the annual occupational dose limits specified for adult workers in Section 340.210 of this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.280 Dose Equivalent to an Embryo/Fetus

a) Except as otherwise provided in subsections (d) and (e) of this Section, the licensee or registrant shall ensure that the dose equivalent to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 5 mSv (0.5 rem). (For recordkeeping requirements, see Section 340.1160(d) of this Part.)

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

1) The deep dose equivalent to the declared pregnant woman during the entire pregnancy; and

2) The dose equivalent to the embryo/fetus from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman during the entire pregnancy.

c) The licensee or registrant shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in subsection (a) of this Section.

AGENCY NOTE: The National Council on Radiation Protection and Measurements report entitled "Recommendations on Limits for Exposure to Ionizing Radiation", NCRP 91, published June 1, 1987, recommends that no more than 0.5 mSv (0.05 rem) of the allowed dose to the embryo/fetus be received during any one month during a declared pregnancy.

d) If the declared pregnant woman has not notified the licensee or registrant of the estimated date of conception, the licensee or registrant shall ensure that the dose equivalent to an embryo/fetus, as specified in subsection (b) of this Section, due to occupational exposure of the declared pregnant woman does not exceed 0.5

mSv (0.05 rem) per month, during the remainder of the pregnancy. If after initially declaring her pregnancy, a declared pregnant woman advises the licensee or registrant of the estimated date of conception, the dose limits specified in subsections (a) and (e) of this Section shall apply.

AGENCY NOTE: The Agency encourages licensees and registrants to explain to declared pregnant workers that providing an estimated date of conception will enable the licensee or registrant to more accurately assess the radiation dose equivalent to the embryo/fetus and assist the licensee or registrant in determining appropriate precautions to be taken for the remainder of the pregnancy.

e) If by the time the woman informs the licensee or registrant of the estimated date of conception the dose equivalent to the embryo/fetus has exceeded 4.5 mSv (0.45 rem), the licensee or registrant shall be deemed to be in compliance with subsection (a) of this Section if the additional dose equivalent to the embryo/fetus as specified in subsection (b) of this Section does not exceed 0.5 mSv (0.05 rem) during the remainder of the pregnancy.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART D: RADIATION DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC

Section 340.310 Dose Limits for Individual Members of the Public

a) Each licensee or registrant shall conduct operations so that:

1) The dose in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with 32 Ill. Adm. Code 335, does not exceed 0.02 mSv (0.002 rem) in any one hour; and

2) The total effective dose equivalent to individual members of the public from a radiation machine does not exceed:

A) 5 mSv (0.5 rem) in any year at any location within a facility where a radiation machine was installed before January 1, 1994, and the use of the radiation machine does not change on or after January 1, 1994; or

B) 1 mSv (0.1 rem) in any year at any location within a facility where a radiation machine is installed or where the radiation machine or its use changes on or after January 1, 1994.

AGENCY NOTE: It is the Agency's intent to allow registrants using radiation machines in facilities designed to the 5 mSv (0.5 rem) limit to continue to use the 5 mSv (0.5 rem) total effective dose equivalent limit for a member of the public. This includes locations where the intensity of the radiation machine is not increased beyond the design basis, the type of radiation machine use is not changed and the type of facility use is not changed; or

3) The total effective dose equivalent to individual members of the public from a licensed operation does not exceed 1 mSv (0.1 rem) in any year, exclusive of the dose contribution from:

A) Background radiation;

B) Any medical administration the individual has received;

C) Exposure to individuals administered radioactive material and released in accordance with 32 Ill. Adm. Code 335;

D) Voluntary participation in medical research programs; and

E) A licensee's disposal of radioactive material into sanitary sewerage in accordance with Section 340.1030 of this Part.

b) A licensee may apply for prior Agency authorization to operate up to an annual dose limit for an individual member of the public of 5 mSv (0.5 rem). This application shall include the following information:

1) Demonstration of the need for and the expected duration of operations in excess of the limit in subsection (a)(3) of this Section;

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

3) The procedures to be followed to maintain the dose ALARA.

c) Prior to allowing a member of the public to enter a restricted area, the licensee or registrant shall give instructions on radiation hazards and protective measures to that individual.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.320 Compliance with Dose Limits for Individual Members of the Public

a) The licensee or registrant shall make or cause to be made surveys of radiation levels in unrestricted areas. In addition, licensees shall survey radioactive materials in effluents released to unrestricted areas. These surveys are to demonstrate compliance with the dose limits for individual members of the public in Section 340.310.

b) A licensee or registrant shall show compliance with the annual dose limit in Section 340.310 by:

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

2) Demonstrating that:

A) The annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in table 2 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions; and

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

c) Upon approval from the Agency, the licensee may adjust the effluent concentration values in table 2 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions, for members of the public to take into account the actual physical and chemical characteristics of the effluents (e.g., aerosol size distribution, solubility, density, radioactive decay equilibrium and chemical form).

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

SUBPART E: TESTING FOR LEAKAGE OR CONTAMINATION OF SEALED SOURCES

Section 340.410 Testing for Leakage or Contamination of Sealed Sources

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

1) Each sealed source, except as specified in subsection (b) of this Section, is

tested for leakage or contamination and the test results that confirm that the sealed source is not leaking or contaminated are received before the sealed source is put into use, unless the licensee has a certificate from the transferor indicating that the sealed source was tested within 6 months for beta and gamma emitting sources, or within 3 months for sources designed to emit alpha particles, before transfer to the licensee.

2) Each sealed source that is not designed to emit alpha particles is tested for leakage or contamination at intervals not to exceed 6 months or at alternative intervals approved by the Agency, pursuant to 32 Ill. Adm. Code 330.280(m), the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State.

3) Each sealed source that is designed to emit alpha particles is tested for leakage or contamination at intervals not to exceed 3 months or at alternative intervals approved by the Agency, pursuant to 32 Ill. Adm. Code 330.280(m), the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State.

4) Each sealed source that is required to be tested for leakage or contamination shall be removed from service if there is reason to suspect that the sealed source may have been damaged or may be leaking or contaminated. The source shall be kept out of service until test results that confirm there is no leakage or contamination are received.

5) Tests for leakage for all sealed sources, except brachytherapy sources manufactured to contain radium, shall be capable of detecting the presence of 185 Bq (0.005 µCi) of radioactive material on a test sample. Test samples shall be taken from the sealed source or from the surfaces of the container in which the sealed source is stored or mounted on which one might expect contamination to accumulate. For a sealed source contained in a device, test samples shall be obtained when the source is in the "off" position. If setting the source to the "off" position would disrupt the licensee's activities, test samples may be obtained while the source is in the "on" position, provided that the dose likely to be received by the individual while obtaining the samples will not be so great as to require monitoring pursuant to Section 340.520(a) of this Part.

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

7) Tests for contamination from radium daughters shall be taken on the interior surface of brachytherapy source storage containers and shall be capable of detecting the presence of 185 Bq (0.005 µCi) of a radium daughter which has a half-life greater than 4 days.

b) A licensee need not perform tests for leakage or contamination on the following sealed sources:

1) Sealed sources containing only radioactive material with a half-life of less than 30 days;

2) Sealed sources containing only radioactive material as a gas;

3) Sealed sources containing 3.7 MBq (100 µCi) or less of beta or photon emitting material or 370 kBq (10 µCi) or less of alpha emitting material;

4) Sealed sources containing only hydrogen-3;

5) Seeds of iridium-192 encased in nylon ribbon;

6) Sealed sources, except teletherapy and brachytherapy sources, that are stored, not being used and identified as in storage. The licensee shall, however, test each such sealed source for leakage or contamination and receive the test results that confirm that the sealed source is not leaking or contaminated before any use or transfer unless it has been tested for leakage or contamination within 6 months for beta and gamma emitting sources, or within 3 months for sources designed to emit alpha particles, before the date of use or transfer; and

7) Sealed sources distributed under a license issued pursuant to 32 Ill. Adm. Code 330.280(m), but only if the evaluation sheet for those sealed sources, as filed in the "Radioactive Material Reference Manual" maintained by the Department of Health and Human Services or in the "Registry of Radioactive Sealed Sources and Devices" maintained by the U.S. Nuclear Regulatory Commission, specifies that testing for leakage or contamination is not required.

c) Tests for leakage or contamination from sealed sources shall be performed by persons specifically authorized by the Agency, an Agreement State, a Licensing State or the Nuclear Regulatory Commission to perform such services.

d) Test results shall be kept as specified in Section 340.1135 of this Part.

e) The following shall be considered evidence that a sealed source is leaking:

1) The presence of 185 Bq (0.005 µCi) or more of removable contamination on any test sample.

2) Leakage of 37 Bq (0.001 µCi) of radon-222 per 24 hours for brachytherapy sources manufactured to contain radium.

3) The presence of removable contamination resulting from the decay of 185 Bq (0.005 µCi) or more of radium.

f) The licensee shall immediately withdraw a leaking or contaminated sealed source from use and shall take action to prevent the spread of contamination. The leaking or contaminated sealed source shall be repaired, decontaminated or disposed of in accordance with this Part.

g) Reports of test results for leaking or contaminated sealed sources shall be made pursuant to Section 340.1260 of this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART F: SURVEYS AND MONITORING

Section 340.510 General

a) Each licensee or registrant shall make, or cause to be made, surveys, including surveys of the subsurface, where appropriate:

1) That demonstrate compliance with this Part; and

2) That evaluate:

A) The extent of radiation levels;

B) Concentrations or quantities of radioactive material; and

C) The potential radiological hazards of radiation levels and residual radioactivity detected.

b) The licensee or registrant shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated at intervals not to exceed 12 months for the radiation measured or at

alternative intervals specified in regulations of the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State. To satisfy this requirement, the licensee shall:

1) Post a legible note on the instrument showing the date of calibration; and

2) Ensure that instrument calibrations are performed by persons specifically licensed by the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State to perform such calibrations.

c) On each day of use, prior to using an instrument to perform required monitoring, the licensee or registrant shall verify that the instrument is operational. Operational checks for radiation measurement or radiation detection instruments shall include verification of response to a source of radiation.

d) Except for those dosimeters used to measure the dose to any extremity, personnel dosimeters that require processing to determine the radiation dose and that are used by licensees or registrants to comply with Section 340.210, with other applicable provisions of 32 Ill. Adm. Code: Chapter II, Subchapters b and d or with conditions specified in a license shall be processed and evaluated by a qualified dosimetry processor. A dosimetry processor is qualified if:

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

2) It is approved by NVLAP for the type of radiation or radiations that most closely approximate the type of radiation or radiations for which the individual wearing the dosimeter is monitored.

e) A licensee or registrant shall obtain Agency approval prior to using pocket ionization chambers or electronic dosimeters to determine radiation dose, to comply with Section 340.210, or with other applicable provisions of 32 Ill. Adm. Code: Chapter II, Subchapters b and d or with conditions specified in a license. The Agency will grant approval provided the licensee or registrant submits information describing the type and range of the dosimeters and describes a program to ensure the accuracy, reliability, precision and security of the dosimetry data.

f) The licensee or registrant shall ensure that adequate precautions are taken to prevent deceptive exposure of an individual monitoring device.

(Source: Amended at 39 Ill. Reg. 15728, effective Novermber 24, 2015)

Section 340.520 Conditions Requiring Individual Monitoring of External and Internal Occupational Dose

Each licensee or registrant shall monitor doses from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits of this Part. As a minimum:

a) Each licensee or registrant shall monitor occupational dose from sources of radiation and shall supply and require the use of individual monitoring devices by:

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 Section 340.210(a);

2) Minors likely to receive, in 1 year from sources external to the body, a dose in excess of 10 percent of any of the applicable limits in Section 340.270;

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 1 mSv (0.1 rem); and

4) Individuals entering a high or very high radiation area.

b) Each licensee shall monitor, to determine compliance with Section 340.240, the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

1) Adults likely to receive, in 1 year, an intake in excess of 10 percent of the applicable ALIs in table 1, columns 1 and 2 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions; and

2) Minors and declared pregnant women likely to receive, in 1 year, a committed effective dose equivalent in excess of 0.5 mSv (0.05 rem).

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.530 Location of Individual Monitoring Devices

Each licensee or registrant shall ensure that individuals who are required to monitor occupational doses in accordance with Section 340.520(a) of this Part wear individual monitoring devices as follows:

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

b) An individual monitoring device used for monitoring the dose to an embryo/fetus of a declared pregnant woman, pursuant to Section 340.280(a) of this Part, shall be located at the waist under any protective apron being worn by the woman.

c) An individual monitoring device used for monitoring the eye dose equivalent, to demonstrate compliance with Section 340.210(a)(2)(A) of this Part, shall be located at the neck (collar), outside any protective apron being worn by the monitored individual, or at an unshielded location closer to the eye.

d) An individual monitoring device used for monitoring the dose to the extremities, to demonstrate compliance with Section 340.210(a)(2)(B) of this Part, shall be worn on the extremity likely to receive the highest exposure. Each individual monitoring device shall be oriented to measure the highest dose to the extremity being monitored.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.540 Calibration of Survey Instruments

a) Unless specified in another Part, a licensee shall have each survey instrument used to show compliance with this Part calibrated before first use, annually and following a repair that affects the calibration. A licensee shall:

1) Calibrate all scales with readings up to 10 mSv (1000 mrem) per hour with a radiation source;

2) Calibrate two separated readings on each scale or decade that will be used to show compliance; and

3) Conspicuously note on the instrument the date of calibration.

b) A licensee may not use survey instruments if the difference between the indicated exposure rate and the calculated exposure rate is more than 20 percent.

(Source: Added at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART G: CONTROL OF EXPOSURE FROM EXTERNAL SOURCES IN RESTRICTED AREAS

Section 340.610 Control of Access to High Radiation Areas

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

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

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

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

b) In place of the controls required by subsection (a) of this Section for a high radiation area, the licensee may substitute continuous direct or electronic surveillance to enable action to be taken to prevent unauthorized entry.

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

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

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

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

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

f) The licensee is not required to control entrance or access to rooms or other areas in hospitals solely because of the presence of patients containing radioactive

material, provided that there are personnel in attendance who are taking the necessary precautions, as required by 32 Ill. Adm. Code 335, 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.

g) The registrant shall control entrance or access to rooms or other areas containing sources of radiation capable of producing a high radiation area as described in this Section in accordance with the requirements for access and control specified in other applicable Parts of 32 Ill. Adm. Code: Chapter II, Subchapters b and d (i.e., 32 Ill. Adm. Code 350 for industrial radiography, 32 Ill. Adm. Code 360 for use of x-rays in the healing arts and 32 Ill. Adm. Code 390 for particle accelerators).

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.620 Control of Access to Very High Radiation Areas

In addition to the controls required by Section 340.610 of this Section, the licensee or registrant shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 5 Gy (500 rad) or more in 1 hour at 1 meter from a source of radiation or any surface through which the radiation penetrates.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.630 Control of Access to Very High Radiation Areas – Irradiators

a) This Section applies to licensees or registrants with sources of radiation in irradiators that are not self-shielded. This Section does not apply to sources of radiation that are used in teletherapy, in industrial radiography or in completely self-shielded irradiators in which the source is both stored and operated within the same radiation shielding barrier and, in the designed configuration of the irradiator, is always physically inaccessible to any individual and cannot create a radiation level of 5 Gy (500 rad) or more in 1 hour at 1 meter in an area that is accessible to any individual.

b) Each area in which there may exist radiation levels in excess of 5 Gy (500 rad) in 1 hour at 1 meter from a source of radiation that is used to irradiate matter shall meet the following requirements:

1) Each entrance or access point shall be equipped with entry control devices that:

A) Function automatically to prevent any individual from inadvertently entering a very high radiation area;

B) Permit deliberate entry into the area only after a control device is actuated that causes the radiation level within the area, from the source of radiation, to be reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in 1 hour; and

C) Prevent operation of the source of radiation if it would produce radiation levels in the area that could result in a deep dose equivalent to an individual in excess of 1 mSv (0.1 rem) in 1 hour.

2) Additional control devices shall be provided so that, upon failure of the entry control devices to function as required by subsection (b)(1) of this Section:

A) The radiation level within the area, from the source of radiation, is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in 1 hour; and

B) Conspicuous visible and audible alarm signals are generated to make an individual attempting to enter the area aware of the hazard. The alarm signals shall be located so that at least one other authorized individual, who is physically present, familiar with the activity, and prepared to render or summon assistance, is made aware of the failure of the entry control devices.

3) The licensee or registrant shall provide control devices so that, upon failure or removal of any physical radiation barriers, other than the shielded storage container for sealed sources:

A) The radiation level from the source of radiation is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in 1 hour; and

B) Conspicuous visible and audible alarm signals are generated to make potentially affected individuals aware of the hazard and the licensee or registrant or at least one other individual, who is familiar with the activity and prepared to render or summon assistance, aware of the failure or removal of the physical barrier.

4) When the shield for the stored sealed source is a liquid, the licensee shall provide means to monitor the integrity of the shield and to signal, automatically, loss of adequate shielding.

5) Physical radiation barriers that comprise permanent structural components, such as walls, that have no credible probability of failure or removal in ordinary circumstances need not meet the requirements of subsections (b)(3) and (4) of this Section.

6) Each area shall be equipped with devices that will automatically generate conspicuous visible and audible alarm signals to alert personnel in the area before the source of radiation can be put into operation and in time for any individual in the area to operate a clearly identified control device, which must be installed in the area and that can prevent the source of radiation from being put into operation.

7) Each area shall be controlled by use of devices and administrative procedures that ensure that the area is cleared of personnel prior to each use of the source of radiation.

8) Each area shall be checked by a radiation measurement to ensure that, prior to the first individual's entry into the area after any use of the source of radiation, the radiation level from the source of radiation in the area is below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in 1 hour.

9) The entry control devices required in subsection (b)(1) of this Section shall be tested for proper functioning (see Section 340.1190 of this Part for recordkeeping requirements).

   A) Testing shall be conducted prior to initial operation with the source of radiation on any day, unless operations were continued uninterrupted from the previous day;

   B) Testing shall be conducted prior to resumption of operation of the source of radiation after any unintentional interruption; and

   C) The licensee or registrant shall submit and adhere to a schedule for periodic tests of the entry control and warning systems.

10) The licensee or registrant shall not conduct operations, other than those necessary to place the source of radiation in safe condition or to effect

repairs on controls, unless control devices are functioning properly.

11) Entry and exit portals that are used in transporting matter to and from the irradiation area, and that are not intended for use by individuals, shall be controlled by such devices and administrative procedures as are necessary to physically protect and warn against inadvertent entry by any individual through these portals. Exit portals for irradiated matter shall be equipped to detect and signal the presence of any loose sealed sources that are carried toward such an exit and to automatically prevent loose sealed sources from being carried out of the area.

c) Registrants, licensees or applicants for licenses for sources of radiation that are within the purview of subsection (b) of this Section and that will be used in a variety of positions or in locations (e.g., open fields or forests) that make it impracticable to comply with certain requirements of subsection (b) of this Section, such as those for the automatic control of radiation levels, may apply to the Agency for approval of alternative safety measures. Alternative safety measures shall provide personnel protection at least equivalent to those specified in subsection (b) of this Section. At least one of the alternative measures shall include an entry-preventing interlock control based on a measurement of the radiation that ensures the absence of high radiation levels before an individual can gain access to the area where such sources of radiation are used.

d) The entry control devices required by subsections (b) and (c) of this Section shall be established in such a way that no individual will be prevented from leaving the area.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART H: RESPIRATORY PROTECTION AND CONTROLS TO RESTRICT INTERNAL EXPOSURE IN RESTRICTED AREAS

Section 340.710 Use of Process or Other Engineering Controls

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

b) The licensee shall measure airflow rates initially and semiannually thereafter to assure proper ventilation system performance. Records of the evaluation of ventilation system performance shall be maintained for Agency inspection and shall include:

1) The date of evaluation;

2) Results of ventilation rate measurements;

3) Manufacturer, model and serial number of the measurement instrument used; and

4) The identity of the individual performing the measurements.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.720 Use of Other Controls

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

1) Control of access; or

2) Limitation of exposure times; or

3) Use of respiratory protection equipment; or

4) Other controls.

b) If the licensee performs an ALARA analysis to determine whether respirators shall be used, the licensee may consider safety factors other than radiological factors. The licensee shall also consider the impact of respirator use on workers' industrial health and safety.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.730 Use of Individual Respiratory Protection Equipment

a) If the licensee uses respiratory protection equipment to limit intakes pursuant to Section 340.720 of this Part:

1) Except as provided in subsection (a)(2) of this Section, the licensee shall use only respiratory protection equipment that is tested and certified or had certification extended by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration

(NIOSH/MSHA).

2) The licensee may use equipment that has not been tested or certified by NIOSH/MSHA, has not had certification extended by NIOSH/MSHA, or for which there is no schedule for testing or certification, provided the licensee has submitted to the Agency and the Agency has approved an application for authorized use of that equipment, including a demonstration by testing, or a demonstration on the basis of 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) The licensee shall implement and maintain a respiratory protection program that meets the requirements of the Occupational Safety and Health Administration as set forth in 29 CFR 1910.134, effective April 18, 1998.

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.

b) When estimating dose to individuals from intake of airborne radioactive materials, the licensee may make allowance for respiratory protection equipment used to limit intakes pursuant to Section 340.720 of this Part. To estimate dose, the concentration of radioactive material in the air that is inhaled when respirators are worn is initially assumed to be the average ambient concentration in air without respirator protection, divided by the assigned protection factor. If the dose is later found to be greater than initially estimated, the corrected value shall be used; if the dose is later found to be less than initially estimated, the corrected value may be used. Protection factors for respirators are specified in Appendix A to 10 CFR 20, effective January 1, 2004.

c) The licensee shall obtain authorization from the Agency before assigning respiratory protection factors in excess of those specified in Appendix A to 10 CFR 20, effective January 1, 2004, exclusive of subsequent amendments or editions. The Agency shall authorize a licensee to use higher protection factors on receipt of an application that:

1) Demonstrates that a need exists for higher protection factors; and

2) Demonstrates that the respiratory protection equipment provides these

higher protection factors under the proposed conditions of use.

d) The licensee shall notify the Agency, in writing, at least 30 days before the date that respiratory protection equipment is first used pursuant to the provisions of either subsection (a) or (b) of this Section.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART I: STORAGE AND CONTROL OF LICENSED OR REGISTERED SOURCES OF RADIATION

Section 340.810 Security and Control of Licensed or Registered Sources of Radiation

a) The licensee shall secure licensed radioactive material from unauthorized removal or access.

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

c) Unless otherwise specified in 32 Ill. Adm. Code 335, 350 or 351 or by the Agency, the licensee shall conduct a physical inventory at intervals not to exceed 6 months to account for each sealed source received and possessed under the license schedule item and shall maintain a record of such inventories. The inventory records shall include the radionuclide, activity, activity assay date, manufacturer, model and serial number, location of the sealed source, date of the inventory and the identity of the individuals performing the inventory. 32 Ill. Adm. Code 350 and 351 allow for 3 months physical inventory.

d) For sources that are removed from storage for use or transport, the record shall include:

1) The number and activity of sources removed from storage, the time and date they were removed from storage, the name of the individual who removed them from storage and the location of use; and

2) The number and activity of sources returned to storage, the time and date they were returned to storage and the name of the individual who returned them to storage.

e) Records of inventories shall be maintained for 5 years from the date of each inventory.

f) The registrant shall use devices or administrative procedures to prevent unauthorized use of registered radiation machines.

g) Security requirements for portable gauges. Each portable gauge licensee shall use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal whenever portable gauges are not under the control and constant surveillance of the licensee.

(Source: Amended at 31 Ill. Reg. 11593, effective July 26, 2007)

Section 340.820 Storage of Volatiles and Gases

a) A licensee shall store unopened radioactive gases and volatile radioactive material, including iodine as sodium iodide, in the shipper's radiation shield and container; or

b) A licensee shall store opened containers from which material is extracted in a properly functioning, ventilated device such as a glove box or fume hood.

(Source: Added at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.830 Control of Volatiles and Gases

a) A licensee who uses or stores radioactive volatile materials or gases shall do so with a system that will keep airborne concentrations within the limits prescribed in this Part.

b) The system shall either be directly vented to the atmosphere through an air exhaust or provide for collection and decay or disposal of the volatile material or gas in a shielded container.

c) A licensee shall use or store radioactive gases only in rooms that are at negative pressure compared to surrounding rooms or hallways.

d) A licensee shall post, at the area of use or storage, emergency procedures to be followed in the event of a gas spill.

e) In the event of evacuation because of a spill or leak, the licensee shall use a radiation detection survey instrument upon room re-entry to ensure radiation levels have returned to background levels.

f) A licensee shall check the operation of reusable collection systems monthly and measure the ventilation rates available in areas of use at intervals not to exceed 6

months. The licensee shall maintain a record of these checks and measurements for 5 years. The record shall include the model and serial number of the collection system, results of all checks recommended by the manufacturer of the collection system, the ventilation rates measured, the date of the checks and measurements, and the identity of the individual who performed the checks and measurements.

g) Contaminated charcoal trap filters, air handling systems and respiratory equipment shall be disposed of in accordance with this Part.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

SUBPART J: PRECAUTIONARY PROCEDURES

Section 340.910 Caution Signs

a) Standard Radiation Symbol. Unless otherwise authorized by the Agency, the symbol prescribed by this Part shall use the colors magenta, purple or black on yellow background. The symbol prescribed by this Part is the three-bladed design shown in Illustration A of this Part.

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

c) Additional Information on Signs and Labels. In addition to the contents of signs and labels prescribed in this Part, the licensee or registrant may provide, on or near the required signs and labels, information to make individuals aware of potential radiation exposures and to minimize the exposures.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.920 Posting Requirements

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

b) Posting of High Radiation Areas. The licensee or registrant shall post each high radiation area with a conspicuous sign or signs bearing the radiation symbol and

the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA".

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

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

e) Posting of Areas or Rooms in Which Licensed Material is Used or Stored. The licensee shall post each area or room in which there is used or stored an amount of licensed material exceeding ten times the quantity of such material specified in Appendix C to 10 CFR 20, effective January 1, 2004, exclusive of subsequent amendments or editions, with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)".

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.930 Exceptions to Posting Requirements

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

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

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

b) Rooms or other areas in hospitals that are occupied by patients are not required to be posted with caution signs pursuant to Section 340.920 of this Part provided that the patient door posting requirements of 32 Ill. Adm. Code 335.5030(a)(5) or 335.7030(b) are met.

c) Rooms or other areas in hospitals that are occupied by patients are not required to be posted with caution signs, provided that:

1) A patient being treated with a permanent implant could be released from confinement pursuant to 32 Ill. Adm. Code 335.2110; or

2) A patient being treated with a therapeutic radiopharmaceutical could be released from confinement pursuant to 32 Ill. Adm. Code 335.5030(b).

d) 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 (12 inches) from the surface of the sealed source container or housing does not exceed 0.05 mSv (0.005 rem) per hour.

e) A room or area is not required to be posted with a caution sign because of the presence of radiation machines used solely for diagnosis in the healing arts.

f) If a room or area in which radioactive material or radiation machines are used for the treatment of patients is required to be posted with the words, "GRAVE DANGER, VERY HIGH RADIATION AREA" in accordance with 340.920(c) of this Part, the following words may be substituted: "DANGER, VERY HIGH RADIATION AREA".

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.940 Labeling Containers and Radiation Machines

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

b) Each licensee shall, 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.

c) Each registrant shall ensure that each radiation machine is labeled in a manner that cautions individuals that radiation is produced when it is energized.

Section 340.950 Exemptions to Labeling Requirements

A licensee is not required to label:

a) Containers holding licensed material in quantities less than the quantities listed in appendix C to 10 CFR 20, published at 60 Fed. Reg. 20186, April 25, 1995, exclusive of subsequent amendments or editions; or

b) Containers holding licensed material in concentrations less than those specified in Table 3 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions; or

c) Containers attended by an individual who takes the precautions (e.g., controlling access) necessary to prevent the exposure of individuals in excess of the limits established by this Part; or

d) Containers when they are in transport, provided the containers are packaged and labeled in accordance with the regulations of the U.S. Department of Transportation; or

AGENCY NOTE: Labeling of packages containing radioactive materials is required by the U.S. Department of Transportation if the amount and type of radioactive material exceeds the limits for an excepted quantity or article as defined and limited by 49 CFR 173.403 and 173.421 through 173.424, revised October 1, 2008, exclusive of subsequent amendments or editions.

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

f) Installed manufacturing or process equipment, such as piping and tanks.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.960 Procedures for Receiving and Opening Packages

a) Each licensee who is authorized to receive a package containing quantities of radioactive material in excess of a Type A quantity, as defined in 32 Ill. Adm. Code 341.20, as listed in 49 CFR 173.435 published October 1, 1993, or as derived from 49 CFR 173.433 published October 1, 2004 shall:

1) Make arrangements to receive the package when the carrier offers it for

delivery; or

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

b) Each licensee shall:

1) Monitor the external surfaces of a labeled package for radioactive contamination unless the package contains only radioactive material in the form of a gas or in special form radioactive material as defined in 32 Ill. Adm. Code 310.20;

AGENCY NOTE: Labeled means labeled with a Radioactive White I, Radioactive Yellow II or Radioactive Yellow III label as specified in U.S. Department of Transportation regulations, 49 CFR 172.403 and 172.436-440, published October 1, 2004.

2) Monitor the external surfaces of a labeled package for radiation levels unless the package contains quantities of radioactive material that are less than or equal to the Type A quantity; and

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

c) The licensee shall perform the monitoring required by subsection (b) of this Section as soon as 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 if there is evidence of degradation of package integrity, such as a package that is crushed, wet or damaged. If a package is received after working hours, and has no evidence of degradation of package integrity, the package shall be monitored no later than 3 hours from the beginning of the next working day.

d) The licensee shall immediately notify the final delivery carrier and the Agency by telephone, and shall confirm the initial contact within 24 hours by overnight letter or telefacsimile to the Agency, when:

1) Removable radioactive surface contamination exceeds the limits of 32 Ill. Adm. Code 341.10 (49 CFR 173.443); or

2) External radiation levels exceed the limits of 32 Ill. Adm. Code 341.10 (49

CFR 173.443).

e) Each licensee shall:

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

2) Ensure that the procedures are followed and that special instructions for the type of package being opened are adhered to.

(Source: Amended at 31 Ill. Reg. 11593, effective July 26, 2007)

SUBPART K: WASTE DISPOSAL

Section 340.1010 General Requirements

a) A licensee shall dispose of licensed material only:

1) By transfer to an authorized recipient as provided in Section 340.1060 or in 32 Ill. Adm. Code 330, 332 or 601, or to the U.S. Department of Energy; or

2) By release in effluents within the limits in Section 340.310; or

3) As authorized pursuant to Sections 340.1020, 340.1030, 340.1040 or 340.1050.

b) A person shall be specifically licensed by the Agency prior to receiving waste containing licensed material from any other point of generation for:

1) Storage for decay; or

2) Treatment prior to disposal; or

3) Treatment or disposal by incineration; or

4) Disposal at a land disposal facility licensed pursuant to 32 Ill. Adm. Code 601; or

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

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.1020 Method for Obtaining Approval of Proposed Disposal Procedures

A licensee or applicant for a license may apply to the Agency for approval of proposed procedures, not otherwise authorized in 32 Ill. Adm. Code: Chapter II, Subchapters b and d, to dispose of licensed material generated in the licensee's operations. Each application shall include:

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

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

c) The nature and location of other potentially affected facilities; and

d) Analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1030 Disposal by Release into Sanitary Sewerage

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

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

2) The quantity of licensed 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 to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions;

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

A) The licensee shall determine the fraction of the limit in table 3 of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions, 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 to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007, exclusive of subsequent amendments or editions; and

B) The sum of the fractions for each radionuclide required by subsection (a)(3)(A) of this Section does not exceed unity;

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

5) In determining compliance with subsections (a)(1) through (4), the licensee shall not include the activity from radioactive material excluded by subsection (b).

b) Excreta from individuals undergoing medical diagnosis or therapy with radioactive material are not subject to the limitations contained in subsection (a).

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.1040 Treatment or Disposal by Incineration

A licensee may treat or dispose of licensed material by incineration only in the amounts and forms specified in Section 340.1050 of this Part or as specifically approved by the Agency pursuant to Section 340.1020 of this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1045 Decay-In-Storage

A licensee may store waste containing or composed of radioactive material with a physical half-life of less than 120 days for "decay-in-storage" before disposal as normal waste without regard to its radioactivity if it:

a) Holds the radioactive material for a minimum of 10 half-lives; and

b) Pursuant to Section 340.510(a) and (b), performs radiation surveys prior to disposal of the radioactive material to ensure that the material's radioactivity cannot be distinguished from background radiation levels. The package/container surface shall be surveyed with an appropriate radiation detection survey instrument set on its most sensitive scale, with no interposed

shielding between the detector and the material, in a low background radiation environment; and

c) Maintains records of monitoring to include: date of disposal; date placed in storage; manufacturer, model and serial number of the survey instrument used; background radiation levels; and measured radiation levels; and

d) Records the identity of the individual performing the monitoring; and

e) Removes or obliterates all radiation labels.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.1050 Disposal of Specific Wastes

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

1) 1.85 kBq (0.05 µCi), or less, of hydrogen-3, carbon-14 or iodine-125 per gram of medium used for scintillation counting; and

2) 1.85 kBq (0.05 µCi), or less, of hydrogen-3, carbon-14 or iodine-125 per gram of animal tissue, averaged over the weight of the entire animal.

b) A licensee shall not dispose of tissue pursuant to subsection (a)(2) of this Section in a manner that would permit its use either as food for humans or as animal feed.

c) The licensee shall maintain records in accordance with Section 340.1180 of this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1052 Classification of Radioactive Waste for Land Disposal

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

institutional controls, waste form and disposal methods are effective.

b) Classes of waste.

1) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in Section 340.1055(a) of this Part. If Class A waste also meets the stability requirements set forth in Section 340.1055(b) of this Part, it is not necessary to segregate the waste for disposal.

2) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability (as defined in 32 Ill. Adm. Code 601.20) after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in Section 340.1055 of this Part.

3) Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in Section 340.1055 of this Part.

c) Classification determined by long-lived radionuclides. If the radioactive waste contains only radionuclides listed in Table 1 of this Section, classification shall be determined as follows:

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

2) If the concentration exceeds 0.1 times the value in Table 1, but does not exceed the value in Table 1, the waste is Class C.

3) If the concentration exceeds the value in Table 1, the waste is not generally acceptable for land disposal.

4) For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions rule described in subsection (g) of this Section.

Table 1

Radionuclide	Concentration curies/cubic meter
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3
I-129	0.08
Alpha emitting transuranic radionuclides with half-life greater than five years	100
Pu-241	3,500
Cm-242	20,000
Ra-226	100

AGENCY NOTE: Units are nanocuries per gram.

d) Classification determined by short-lived radionuclides. If the waste does not contain any of the radionuclides listed in Table 1, classification shall be determined based on the concentrations shown in Table 2 of this Section. However, as specified in subsection (f) of this Section, if radioactive waste does not contain any nuclides listed in either Table 1 or Table 2, it is Class A.

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

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

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

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

5) For wastes containing mixtures of the radionuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule described in subsection (g) of this Section.

Table 2

Radionuclide	Concentration (curies/cubic meter)

	Column 1	Column 2	Column 3
Total of all radionuclides with less than 5-year half-life	700	–	–
H-3	40	–	–
Co-60	700	–	–
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

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

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

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

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

f) Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If the waste does not contain any radionuclides listed in either Tables 1 or 2, it is Class A.

g) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. Example: A waste contains Sr-90 in a concentration of 50 Ci/m3 and

Cs-137 in a concentration of 22 Ci/m3. Since the concentrations both exceed the values in Column 1, Table 2, they must be compared to Column 2 values. For Sr-90 fraction, 50/150 = 0.33, for Cs-137 fraction, 22/44 = 0.5; the sum of the fractions = 0.83. Since the sum is less than 1.0, the waste is Class B.

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

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1055 Radioactive Waste Characteristics

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

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

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

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

4) Solid waste containing liquid shall contain as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume.

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

6) Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors or fumes harmful to persons transporting, handling or disposing of the waste. This does not apply to radioactive gaseous waste

packaged in accordance with subsection (a)(8) of this Section.

7) Waste must not be pyrophoric. Pyrophoric materials contained in wastes shall be treated, prepared and packaged to be nonflammable. (See 32 Ill. Adm. Code 601 for definition of pyrophoric.)

8) Wastes in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20°C (68°F). Total activity shall not exceed 100 Ci per container.

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

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

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

2) Notwithstanding the provisions in subsections (a)(3) and (a)(4) of this Section, liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form.

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

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1057 Labeling

Each package of waste shall be clearly labeled to identify whether it is Class A, Class B or Class C waste, in accordance with Section 340.1052 of this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1060 Transfer for Disposal and Manifests

a) Each licensee who transports or offers for transportation low-level radioactive waste intended for ultimate disposal at a licensed low-level radioactive waste disposal facility shall prepare a manifest reflecting information requested on the applicable NRC Forms 540 (Uniform Low-Level Radioactive Waste Manifest (Shipping Paper)) and 541 (Uniform Low-Level Radioactive Waste Manifest (Container and Waste Description)) and, if necessary, on an applicable NRC Form 542 (Uniform Low-Level Radioactive Waste Manifest (Manifest Index and Regional Compact Tabulation)).

AGENCY NOTE: For guidance in completing these forms, refer to the instructions that accompany the forms. NRC Forms 540, 540A, 541, 541A, 542 and 542A and the accompanying written instructions may be obtained from the Information and Records Management Branch, Office of Information Resources Management, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

b) NRC Forms 540 and 540A shall be completed and shall physically accompany each low-level radioactive waste shipment. Each licensee shipping low-level radioactive waste shall transfer manifest information to the consignee.

c) Upon agreement between the shipper and the consignee, NRC Forms 541, 541A, 542 or 542A may be completed, transmitted and stored in electronic media with the capability of producing legible, accurate and complete records on the respective forms. Copies of manifests required by this Section may be legible carbon copies, photocopies or computer printouts that reproduce the data in the format of the uniform manifest.

d) Licensees are exempt from the manifesting requirements of this Section when shipping:

1) Low-level radioactive waste for processing and when they expect its return (i.e., for storage under their license) prior to disposal at a licensed disposal facility;

2) Low-level radioactive waste that is being returned to the licensee who is the waste generator; or

3) Radioactively contaminated material to a waste processor that becomes the processor's residual waste.

e) Each licensee shipping low-level radioactive waste shall also comply with the reporting requirements specified in 32 Ill. Adm. Code 609.

f) Each shipper of radioactive waste shall provide the following information regarding the waste shipment on the uniform manifest:

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

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

3) The name, address and telephone number, or the name and USEPA identification number, for the carrier transporting the waste;

4) The date of the waste shipment;

5) The total number of packages/disposal containers;

6) The total disposal volume and disposal weight in the shipment;

7) The total radionuclide activity in the shipment;

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

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

AGENCY NOTE: The reporting requirements of the uniform manifest meet the reporting requirements of USDOT for the shipments of waste. Therefore, no additional DOT forms are required for shipments of low-level radioactive waste. However, the uniform manifest does not meet the reporting requirements of USEPA for the shipment of hazardous, medical or other waste. Any additional USEPA requirements shall be met by using an additional USEPA manifest. In addition, the uniform manifest reporting requirements do not meet the tracking requirements of 32 Ill. Adm. Code 609.

g) For waste shipments in disposal containers, each shipper shall provide the following information on the uniform manifest regarding the waste and each disposal container of waste in the shipment:

1) An alphabetic or numeric identification that identifies each disposal container in the shipment;

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

3) The volume displaced by the disposal container;

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

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

6) A physical and chemical description of the waste;

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

8) The approximate volume of waste within a container;

9) The sorbing or solidification media, if any, and the identity of the manufacturer of the solidification media and brand name;

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

11) The total radioactivity within each container; and

12) For wastes consigned to a disposal facility, the classification of the waste shall be identified on the manifest pursuant to Section 340.1052. Waste not meeting the structural stability requirements of Section 340.1055(b) shall also be identified on the manifest.

h) For waste shipments delivered without a disposal container, the shipper of the radioactive waste shall provide the following information on the uniform manifest:

1) The approximate volume and weight of the waste;

2) A physical and chemical description of the waste;

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

4) For wastes consigned to a disposal facility, the classification of the waste shall be identified on the manifest pursuant to Section 340.1052. Waste not meeting the structural stability requirements of Section 340.1055(b) shall also be identified on the manifest;

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

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

i) For waste comprised of mixtures of waste originating from different waste generators, the shipper shall provide the following information on the uniform manifest:

AGENCY NOTE: The origin of the low-level radioactive waste resulting from a processor's activities may be attributable to one or more "waste generators" as defined in this Part.

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

2) For heterogeneous mixtures of waste, such as the combined products from a large compactor, identify each generator contributing waste to the disposal container, and for discrete waste types (i.e., activated materials, contaminated equipment, mechanical filters, sealed source/devices and wastes in solidification/stabilization media), the identities and activities of

individual radionuclides contained on these waste types within the disposal container. For each waste generator, provide the following:

A) The volume of waste;

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

C) The total weight percentage of chelating agents for any waste containing more than 0.1 percent chelating agent by weight, plus the identity of the principal chelating agent;

D) The sorbing or solidification media, if any, and the identity of the solidification media vendor and brand name if the media is claimed to meet stability requirements in Section 340.1055(b); and

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

j) An authorized representative of the licensee shall certify, by signing and dating the shipment manifest, that the transported materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the requirements of USDOT regulations and this Part. A collector, in signing the certification, is certifying that nothing has been done to the collected waste that would invalidate the waste generator's certification.

k) Any licensee who transfers radioactive waste to a land disposal facility or a licensed waste collector shall comply with the requirements in subsections (k)(1) through (9). Any licensee who transfers waste to a licensed waste processor for waste treatment or repackaging shall comply with the requirements of subsections (k)(4) through (9). The licensee shall:

1) Prepare all wastes so that the waste is classified according to Section 340.1052 and meets the waste characteristics requirements in Section 340.1055;

2) Label each disposal container (or transport package if potential radiation hazards preclude labeling of the individual disposal container) of waste to identify whether it is Class A waste, Class B waste, Class C waste or greater than Class C waste, in accordance with Section 340.1052;

3) Conduct a quality assurance program to assure compliance with Sections 340.1052 and 340.1055 (the program shall include management evaluation of audits);

4) Prepare the appropriate NRC Uniform Low-Level Radioactive Waste Manifest form as required by this Part;

5) Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that receipt of the manifest precedes the low-level radioactive waste shipment, or the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using either or both of these methods is acceptable;

6) Include NRC Form 540 (and NRC Form 540A, if required) with the shipment regardless of the option chosen in subsection (k)(5);

7) Receive acknowledgement of the receipt of the shipment in the form of a signed copy of NRC Form 540;

8) Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by the Agency; and

9) For any shipments or any part of a shipment for which acknowledgement of receipt has not been received within the times set forth in this Part, conduct an investigation in accordance with Section 340.1270.

l) Any waste collector licensee who handles only prepackaged waste shall comply with subsections (l)(1) and(2) and (l)(7) through (12). Any licensed waste processor who treats or repackages waste shall comply with subsections (l)(1) and (l)(3) through (12).

1) Acknowledge receipt of the waste from the shipper within one week after receipt by returning a signed copy of NRC Form 540 to the shipper;

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

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

4) Prepare all wastes so that the waste is classified according to Section 340.1052 and meets the waste characteristics requirements in Section 340.1055;

5) Label each package of waste to identify whether it is Class A waste, Class B waste or Class C waste, in accordance with Sections 340.1052 and 340.1055;

6) Conduct a quality assurance program to assure compliance with Sections 340.1052 and 340.1055 (the program shall include management evaluation of audits);

7) Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that receipt of the manifest precedes the low-level radioactive waste shipment, or the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using either or both of these methods is acceptable;

8) Include NRC Form 540 (and NRC Form 540A, if required) with the shipment regardless of the option chosen in subsection (l)(7);

9) Receive acknowledgement of the receipt of the shipment in the form of a signed copy of NRC Form 540;

10) Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by the Agency;

11) For any shipments or any part of a shipment for which acknowledgement of receipt has not been received within the times set forth in this Part, conduct an investigation in accordance with Section 340.1270; and

12) Notify the shipper and the Agency when any shipment or part of a shipment has not arrived within 60 days after receipt of an advance

manifest, unless notified by the shipper that the shipment has been cancelled.

m) Any licensed land disposal facility operator shall:

1) Acknowledge receipt of low-level radioactive waste within 1 week after receipt by returning, at a minimum, a signed copy of NRC Form 540 to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the operator. If any discrepancy exists between materials listed on the Uniform Low-Level Radioactive Waste Manifest and materials received, copies or electronic transfer of the affected forms shall be returned indicating the discrepancy;

2) Maintain copies of all completed manifests and electronically store the information required by 32 Ill. Adm. Code 606.40 until the Agency terminates the license; and

3) Notify the shipper and the Agency when any shipment or part of a shipment has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been cancelled.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.1070 Compliance with Environmental and Health Protection Regulations

Nothing in this Subpart K relieves the licensee from complying with other applicable federal, State and local regulations governing any other toxic or hazardous properties of materials that are disposed of pursuant to this Subpart.

SUBPART L: RECORDS

Section 340.1110 General Provisions

a) Each licensee or registrant shall use the SI units becquerel, gray, sievert and coulomb/kilogram or the special units curie, rad, rem and roentgen, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by this Part.

b) The licensee or registrant shall make a clear distinction among the quantities entered on the records required by this Part (e.g., total effective dose equivalent, total organ dose equivalent, shallow dose equivalent, lens dose equivalent, deep dose equivalent, committed effective dose equivalent).

c) No licensee or registrant shall subtract radiation exposures from official personnel monitoring records without the prior written approval of the Agency.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1120 Records of Radiation Protection Programs

a) Each licensee or registrant shall maintain records of the radiation protection program required pursuant to Section 340.110 of this Part, including:

1) The provisions of the program; and

2) Audits and other reviews of program content and implementation.

b) The licensee or registrant shall retain the records required by subsection (a)(1) of this Part until the Agency terminates each license or registration for which the record is required. The licensee or registrant shall retain the records required by subsection (a)(2) of this Section for 5 years after the record is made.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1130 Records of Surveys and Calibrations

a) Each licensee or registrant shall maintain records showing the results of surveys and calibrations required by Sections 340.510 and 340.960(b). The licensee or registrant shall retain these records for 5 years after the record is made.

1) Records of surveys shall include:

A) The location and date of the survey and the model and serial number of the instrument used to perform the survey;

B) The identity of the individual performing the survey; and

C) The results of the survey and any corrective actions that were taken as a result.

2) For each survey instrument calibrated in accordance with Section 340.510(b), the licensee shall maintain the following records:

A) A copy of the licensee's own calibration procedures or a copy of a license issued by the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State authorizing

the person that performed the calibrations to perform calibrations as a customer service; and

B) A record identifying the manufacturer, model and serial number of the instrument that was calibrated, the calibration results, the identity of the individual who performed the calibration and the date of the calibration.

3) Each licensee authorized to perform instrument calibrations shall maintain a copy of each calibration document created in accordance with subsection (a)(2)(B) and a copy of the procedures followed to perform that calibration.

4) The licensee shall retain a record of each check required in Section 340.540(a) for 5 years. The record shall include the manufacturer, model and serial number of the instrument being checked, a description of the source used, the radiation level indicated by the instrument being checked, the identity of the individual who performed the check, and the date of the check.

b) The licensee or registrant shall retain each of the following records until the Agency terminates each license or registration for which the record is required:

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

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

3) Records showing the results of air sampling, surveys and bioassays required pursuant to Section 340.730(a)(3)(A) and (B);

4) Records of the results of measurements and calculations used to evaluate the release of radioactive effluents to the environment; and

5) Records from surveys describing the location and amount of subsurface residual radioactivity identified at the site.

(Source: Amended at 39 Ill. Reg. 15728, effective Novermber 24, 2015)

Section 340.1135 Records of Tests for Leakage or Contamination of Sealed Sources

a) Records of tests for leakage or contamination required by Section 340.410 of this Part shall be kept in units of becquerel or microcurie and maintained for inspection by the Agency for 5 years after the records are made.

b) The records of tests for leakage and/or contamination shall contain the manufacturer, model and serial number, if assigned, of each source tested, the identity of each source radionuclide, the results for each test sample expressed in Bq or µCi, the date the sample was collected, the date the sample was analyzed, the identity of the individual who collected the samples and the identity of the individual who analyzed the samples.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1140 Records of Prior Occupational Dose

a) The licensee or registrant shall retain the records of prior occupational dose and exposure history as specified in Section 340.250 of this Part until the Agency terminates each pertinent license or registration requiring this record. The licensee or registrant shall retain records used in preparing the prior occupational dose and exposure history for 3 years after the record is made.

b) Upon termination of the license or registration, the records of prior occupational dose and exposure history shall be transferred to the Agency.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1150 Records of Planned Special Exposures

a) For each use of the provisions of Section 340.260 of this Part for planned special exposures, the licensee shall maintain records that describe:

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

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

3) What actions were necessary;

4) Why the actions were necessary;

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

6) What individual and collective doses were expected to result; and

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

b) The licensee shall retain the records until the Agency terminates each license for which these records are required.

c) Upon termination of the license, the records of doses received during planned special exposures shall be transferred to the Agency.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1160 Records of Individual Monitoring Results

a) Recordkeeping Requirement. Each licensee or registrant shall maintain records of doses received by all individuals for whom monitoring was required pursuant to Section 340.520 of this Part, and records of doses received during planned special exposures, accidents and emergency conditions. These records shall include, when applicable:

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

2) The estimated intake of radionuclides (see Section 340.220 of this Part);

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

4) The specific information used to calculate the committed effective dose equivalent pursuant to Section 340.240(c) of this Part;

5) The total effective dose equivalent when required by Section 340.220 of this Part; and

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

AGENCY NOTE: Assessments of dose equivalent and records made using units in effect before January 1, 1994, need not be changed.

b) Recordkeeping Frequency. The licensee or registrant shall make entries of the records specified in subsection (a) of this Section at intervals not to exceed 1 year.

c) Recordkeeping Format. The licensee or registrant shall maintain the records specified in subsection (a) of this Section on Agency forms IL 473-0298 (IDNS Form 4) and IL 473-0299 (IDNS Form 5), as applicable, in accordance with the instructions for the forms, or in clear and legible records containing all the information required by the forms.

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

e) The licensee or registrant shall retain each required form or record until the Agency terminates each license or registration for which the record is required.

f) Upon termination of the license or registration, the records of doses received by individuals shall be transferred to the Agency.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1170 Records of Dose to Members of the Public

a) Each licensee or registrant shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public (see Sections 340.310 and 340.320 of this Part).

b) The licensee or registrant shall retain the records required by subsection (a) of this Section until the Agency terminates each license or registration for which the record is required.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1180 Records of Waste Disposal

a) Each licensee shall maintain records of the disposal of licensed materials made pursuant to Sections 340.1020 through 340.1052 and 340.1060 and 32 Ill. Adm. Code 601. Each licensee shall also maintain records of disposal by burial in soil, including burials authorized before January 28, 1981, pursuant to 10 CFR 20.304.

AGENCY NOTE: Prior to January 28, 1981, the U.S. Nuclear Regulatory Commission permitted licensees to dispose of small quantities of licensed

materials by burial in soil without specific Nuclear Regulatory Commission authorization. This was authorized pursuant to 10 CFR 20.304, which has been rescinded.

b) The licensee shall retain the records required by subsection (a) until the Agency terminates each license for which the record is required.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.1190 Records of Testing Entry Control Devices for Very High Radiation Areas

a) Each licensee or registrant shall maintain records of tests made pursuant to Section 340.630(b)(9) of this Part on entry control devices for very high radiation areas. These records must include the date, time and results of each such test of function.

b) The licensee or registrant shall retain the records required by subsection (a) of this Section for 3 years after the record is made.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1195 Form of Records (Repealed)

(Source: Repealed at 35 Ill. Reg. 934, effective December 30, 2010)

SUBPART M: REPORTS AND NOTIFICATIONS

Section 340.1205 Notification of Credible Threats

Upon notification to or by any Federal, State or local law enforcement agency or the U.S. Department of Homeland Security that radioactive material in possession by the licensee is the subject of a credible threat, the licensee shall:

a) follow the instructions from the law enforcement agency; and

b) notify the Agency within 1 hour by calling the Agency's 24-hour emergency number at (217)782-7860 or (800)782-7860. This notification is required unless otherwise instructed by the law enforcement agency.

AGENCY NOTE: "Credible threat" means any threat to radioactive material that a licensee believes warrants notice to law enforcement or any threat that law enforcement believes warrants notice to a licensee.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1210 Reports of Stolen, Lost or Missing Sources of Radiation

a) Telephone Reports. Each licensee or registrant shall report to the Agency by telephone each stolen, lost or missing source of radiation immediately after its absence becomes known to the licensee or registrant. This requirement does not apply to sources of radiation that are not required to be licensed or registered.

b) Written Reports. Each licensee or registrant required to make a report pursuant to subsection (a) of this Section shall, within 30 days after making the telephone report, make a written report to the Agency setting forth the following information:

1) A description of the source of radiation involved, including for radioactive material, the kind, quantity and chemical and physical form; and, for radiation machines, the type of unit, the manufacturer, model and serial number;

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

3) A statement of disposition, or probable disposition, of the source of radiation involved;

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

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

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

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

d) The licensee or registrant shall prepare any report filed with the Agency pursuant

to this Section so that names of individuals who may have received exposure to radiation are stated in a separate and detachable portion of the report.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1220 Notification of Incidents

a) Immediate Notification. Notwithstanding any other requirements for notification, each licensee or registrant shall immediately report to the Agency discovery of an event that prevents immediate protective actions necessary to avoid releases of radioactive material or doses in excess of the regulatory limits, or each event involving a source of radiation possessed by the licensee or registrant that may have caused or threatens to cause any of the following conditions:

1) An individual to receive:

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

B) A lens dose equivalent of 0.75 Sv (75 rem) or more; or

C) A shallow dose equivalent to the skin or extremities or a total organ dose equivalent of 2.5 Gy (250 rad) or more; or

2) The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the ALI, except the provisions of this subsection (a) do not apply to locations where personnel are not normally stationed during routine operations, such as hot cells or process enclosures.

b) 24 Hour Notification. Each licensee or registrant shall, within 24 hours of discovery of the event, report to the Agency each event involving loss of control of a licensed or registered source of radiation possessed by the licensee or registrant that may have caused, or threatens to cause, any of the following conditions:

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

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

B) A lens dose equivalent exceeding 0.15 Sv (15 rem); or

C) A shallow dose equivalent to the skin or extremities or a total

organ dose equivalent exceeding 0.5 Sv (50 rem); or

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

c) Additional 24 Hour Notifications for Licensees. Each licensee shall notify the Agency within 24 hours after the discovery of any of the following events involving radioactive material:

1) An unplanned contamination event that:

A) Requires access to the contaminated area by workers or the public to be restricted for more than 24 hours by imposing radiological controls in addition to those established by the licensee prior to the event or by prohibiting entry into the area;

B) Involves a quantity of material greater than five times the lowest annual limit on intake specified in 10 CFR 20, appendix B, published at 72 Fed. Reg. 55922, October 1, 2007, for the material; and

C) Results in access to the area being restricted for a reason other than to either comply with operating procedures established by the licensee, or to allow radionuclides with a half-life of less than 24 hours to decay prior to decontamination.

2) An event in which equipment is disabled or fails to function as designated when:

A) The equipment is required by regulation or license condition to prevent releases or doses exceeding regulatory limits, or to mitigate the consequences of an accident;

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

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

3) An event that requires unplanned medical treatment at a medical facility of an individual with radioactive contamination on the individual's clothing or body.

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

A) The quantity of material involved is greater than five times the lowest annual limit on intake specified in 10 CFR 20, appendix B, published at 72 Fed. Reg. 55922, October 1, 2007, for the material; and

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

d) Licensees or registrants shall make the reports required by subsections (a) through (c) by initial contact by telephone to the Agency and shall confirm the initial contact within 24 hours by overnight letter or telefacsimile to the Agency.

e) The licensee or registrant shall prepare each written report filed with the Agency pursuant to this Section so that names of individuals who have received exposure to sources of radiation are stated in a separate and detachable portion of the report.

f) The provisions of this Section do not apply to doses that result from planned special exposures, provided such doses are within the limits for planned special exposures and are reported pursuant to Section 340.1240.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.1230 Reports of Exposures, Radiation Levels and Concentrations of Radioactive Material Exceeding the Constraints or Limits

a) Reportable Events. In addition to the notification required by Section 340.1220 of this Part, each licensee or registrant shall submit a written report to the Agency within 30 days after learning of any of the following occurrences:

1) Incidents for which notification is required by Section 340.1220 of this Part; or

2) Doses in excess of any of the following:

A) The occupational dose limits for adults in Section 340.210 of this

Part; or

B) The occupational dose limits for a minor in Section 340.270 of this Part; or

C) The limits for an embryo/fetus of a declared pregnant woman in Section 340.280 of this Part; or

D) The limits for an individual member of the public in Section 340.310 of this Part; or

E) Any applicable limit in the license; or

F) The ALARA constraints for air emissions established pursuant to Section 340.110(d) of this Part; or

3) Levels of radiation or concentrations of radioactive material in:

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

B) An unrestricted area in excess of ten times any applicable limit set forth in this Part or ten times any applicable limit set forth in the license, whether or not involving exposure of any individual in excess of the limits in Section 340.310.

b) Contents of Reports

1) Each report required by subsection (a) of this Section shall include a description of the event, including the date, time and location of the event, the manufacturer and model number of any equipment that failed or malfunctioned and the identity, quantities and chemical forms of any radionuclides involved. Each report shall also describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

A) Estimates of each individual's dose;

B) The levels of radiation and concentrations of radioactive material involved;

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

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

2) Each report filed pursuant to subsection (a) of this Section shall include for each individual exposed: the name, Social Security account number and date of birth. With respect to the limit for the embryo/fetus in Section 340.280 of this Part, the identifiers shall be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable portion of the report.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1240 Reports of Planned Special Exposures

The licensee shall submit a written report to the Agency within 30 days following any planned special exposure conducted in accordance with Section 340.260 of this Part, informing the Agency that a planned special exposure was conducted and indicating the date the planned special exposure occurred and the information required by Section 340.1150 of this Part.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1250 Notifications and Reports to Individuals

a) Requirements for notification and reports to individuals of exposure to radiation or radioactive material are specified in 32 Ill. Adm. Code 400.130.

b) When a licensee or registrant is required by Section 340.1230 or 340.1240 to report to the Agency an exposure of an individual to radiation or radioactive material, the licensee or registrant shall also notify the individual. The notice shall be transmitted at a time not later than the transmittal to the Agency and shall comply with the provisions of 32 Ill. Adm. Code 400.130(a).

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.1260 Reports of Leaking or Contaminated Sealed Sources

The licensee shall file a report within 5 days with the Agency if the test for leakage or contamination required pursuant to Section 340.410 of this Part indicates a sealed source is leaking or contaminated. The report shall describe the equipment involved, the test results and the corrective action taken.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1270 Reports of Missing Waste Shipments

Any shipment or part of a shipment for which acknowledgement is not received within the times set forth in Subpart K of this Part shall:

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

b) Be traced and reported. The investigation shall include tracing the shipment and filing a report with the Agency. Each licensee who conducts a trace investigation shall file a written report with the Agency within 2 weeks after completion of the investigation.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

SUBPART N: ADDITIONAL REQUIREMENTS

Section 340.1310 Vacating Premises

Each specific licensee shall, no less than 30 days before vacating or relinquishing possession or control of premises which may have been contaminated with radioactive material as a result of his activities, notify the Agency in writing of intent to vacate.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.1320 Removal of Radioactive Contamination

Notwithstanding any exemptions contained in this Part, any person who uses, possesses, or stores radioactive material in such a manner as to cause uncontrolled contamination of any area shall, upon order of the Agency, remove or provide for the removal of such contaminants at his own expense through the use of an authorized transferee and shall decontaminate the installation to the lowest practicable level. Unless another value is specified in 32 Ill. Adm. Code 332, the values specified in Appendix A of this Part may be used as guidelines for this purpose. These values, however, may be modified at specific installations at the discretion of the Agency.

(Source: Amended at 29 Ill. Reg. 20841, effective December 16, 2005)

Section 340.APPENDIX A Decontamination Guidelines

a) Surface Contamination Guide

Alpha Emitters:

Removable	555 mBq (15 pCi) per 100 cm^2 33 dpm per 100 cm^2	average over any one surface
	1.67 Bq (45 pCi) per 100 cm^2 100 dpm per 100 cm^2	maximum
Total Fixed	16.7 Bq (450 pCi) per 100 cm^2 1,000 dpm per 100 cm^2	average over any one surface
	83.3 Bq (2,250 pCi) per 100 cm^2 5,000 dpm per 100 cm^2	maximum

Beta-Gamma Emitters:

Removable (all beta-gamma emitters except hydrogen-3)	3.7 Bq (100 pCi) per 100 cm^2 222 dpm per 100 cm^2	average over any one surface
	18.5 Bq (500 pCi) per 100 cm^2 1,110 dpm per 100 cm^2	maximum
Removable (hydrogen-3)	37 Bq (1,000 pCi) per 100 cm^2 2,220 dpm per 100 cm^2	average over any one surface
	185 Bq (5,000 pCi) per 100 cm^2	maximum
Total Fixed	2.5 microSv (250 microrem) per hour at 1 cm from surface	

b) Concentration in air and water: tables I and II of appendix B to 10 CFR 20, published at 72 Fed. Reg. 55922, October 1, 2007.

c) Concentrations in soil and other materials except water:

1) Radioactive material except source material and radium: Column II of 32 Ill. Adm. Code 330.Appendix A.

2) Source material and radium: Concentration of radionuclides above background concentrations for total radium, averaged over areas of 100 square meters, shall not exceed:

A) 185 mBq (5 pCi) per gram of dry soil, averaged over the first 15 centimeters below the surface; and

B) 185 mBq (5 pCi) per gram of dry soil, averaged over layers of 15 centimeters thickness more than 15 centimeters below the surface.

d) The level of gamma radiation measured at a distance of 100 centimeters from the surface shall not exceed background.

AGENCY NOTE: This appendix shall be used only as a guide. The Agency may require lower values in specific instances, depending upon radionuclides, type of surface, intended present and future use, etc.

(Source: Amended at 35 Ill. Reg. 934, effective December 30, 2010)

Section 340.ILLUSTRATION A Radiation Symbol

1. Cross-hatched area is to be magenta or purple.

2. Background is to be yellow.