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

PART 422
REGULATIONS FOR RADON SERVICE PROVIDERS

Section

AUTHORITY: Implementing and authorized by Section 20 of the Radon Industry Licensing Act [420 ILCS 44/20] and Section 10 of the Radon Resistant Construction Act [420 ILCS 52/10].

SOURCE: Emergency rule adopted at 21 Ill. Reg. 1568, effective January 1, 1998, for a maximum of 150 days; adopted at 22 Ill. Reg. 10499, effective June 1, 1998; recodified from the Department of Nuclear Safety to the Illinois Emergency Management Agency at 27 Ill. Reg. 13641; amended at 29 Ill. Reg. 3212, effective February 22, 2005; amended at 33 Ill. Reg. 14479, effective October 9, 2009; amended at 37 Ill. Reg. 20240, effective December 9, 2013.

Section 422.10 Purpose and Scope

a) This Part establishes licensing requirements for individuals who perform services to measure the presence of radon or radon progeny, and individuals who perform mitigation services to reduce the concentration of radon or radon progeny.

b) The Part also establishes licensing requirements for laboratories that perform analysis of radon and radon progeny detection or measurement devices.

c) Nothing in the Radon Industry Licensing Act [420 ILCS 44] or this Part shall be construed to limit or affect in any respect the practice of persons properly licensed under other statutes or regulations with respect to their professions.

Section 422.15 Incorporations by Reference

a) 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 these rules, standards and guidelines that have been incorporated by reference are available for public inspection and copying at the Illinois Emergency Management Agency, 1035 Outer Park Drive, Springfield, Illinois.

b) In addition, copies of ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories Compliance may be obtained through the American National Standards Institute (ANSI), 1430 Broadway, New York, New York 10018 and directly from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Copies of ISO/IEC 17025 can also be obtained from the Illinois Emergency Management Agency, 1035 Outer Park Drive, Springfield, Illinois 62704.

(Source: Added at 29 Ill. Reg. 3212, effective February 22, 2005)

Section 422.20 Definitions

As used in this Part:

"Act" means the Radon Industry Licensing Act [420 ILCS 44].

"Active Mitigation System", also known as "Active Soil Depressurization" or "ASD", means *a family of radon mitigation systems involving mechanically driven soil depressurization, including sub-slab depressurization (SSD), drain tile depressurization (DTD), block wall depressurization (BWD), and sub-membrane depressurization (SMD).* [420 ILCS 52]

"Agency" means the Illinois Emergency Management Agency (IEMA).

"Altering" means to change or modify a building or building design, or to revise, rather than repair, a mitigation system or mitigation system design.

"As Low As Is Reasonably Achievable" or "ALARA" means making every reasonable effort to maintain exposures to radiation as far below the dose limits in 32 Ill. Adm. Code: Chapter II, Subchapters b and d as is practical consistent with the purpose for which the licensed or registered activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to the public health and safety and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed or registered sources of radiation in the public interest.

"Backdrafting" means a condition where the normal movement of combustion products up a flue, resulting from the buoyant forces on the hot gases, is reversed, so that the combustion products can enter the house. Backdrafting of combustion appliances (such as fireplaces and furnaces) can occur when depressurization in the house overwhelms the buoyant force on the hot gases. Backdrafting can also be caused by high air pressures or blockage at the chimney or flue termination.

"Backer Rod" means a semi-rigid foam material resembling a rope of various diameters used to fill around pipes, etc., and to assist in making a sealed penetration. For example, where a pipe is inserted through a concrete slab, a length of backer rod is jammed into the opening around the pipe. Caulking is then applied to the space above the backer rod and between the outside of the pipe and the slab opening. The purpose of the backer rod is to hold the semi-fluid caulk in place until it sets or hardens. It is most important that a sealant only adhere to the 2 sides of the joint and not the base of the joint (third side). Adhesion to all 3 sides will prevent the sealant from elongating properly and will cause sealant failure.

"Batch" means a group of passive detectors manufactured by the same entity at the same time.

"Block Wall Depressurization" means a radon mitigation technique that depressurizes the void network within a block wall foundation by drawing air from inside the wall and venting it to the outside.

"Client" means any person who contracts for measurement or mitigation services.

"Combination Foundations" means buildings constructed with more than one foundation type, e.g., basement/crawlspace or basement/slab-on-grade.

"Commercial Building" means a type of building that is designed for commercial

use, but not limited to office buildings, warehouses, retail facilities, schools, recreational facilities, assisted living facilities and buildings that combine these uses.

"Communication Test" means a diagnostic test designed to qualitatively measure the ability of a suction field and air flow to extend through the material beneath a concrete slab floor and thus evaluate the potential effectiveness of a sub-slab depressurization system. This qualitative test is commonly conducted by applying suction on a centrally located hole drilled through the concrete slab and simultaneously observing the movement of smoke downward into small holes drilled in the slab at locations separated from the central suction hole. (See also Pressure Field Extension.)

"Continuing Education Credits" or "CE Credits" means those continuing education credits received for documented successful completion of Agency-approved CE courses or for instructing an approved CE course.

"Crawlspace" means a foundation type with an open area beneath the livable space of a dwelling that typically has either a concrete slab or earthen floor. The crawlspace can have an open height of a few inches to several feet. The crawlspace may or may not be ventilated to the outdoors.

"Crawlspace Depressurization" means a radon control technique designed to achieve lower air pressure in the crawlspace relative to indoor air pressure by use of a fan-powered vent drawing air from within the crawlspace. (See also Mechanically Ventilated Crawlspace System.)

"Diagnostic Tests" means procedures used to identify or characterize conditions within buildings that may contribute to radon entry or elevated radon levels or may provide information regarding the performance of a mitigation system.

"Drain Tile Depressurization" or "DTD" means a type of active soil depressurization system where the suction point piping attaches to a drain tile or is located in the gas-permeable material near the drain tile. The drain tile may be inside or outside the footings of the building.

"Drain Tile Loop" means a continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a basement or crawlspace footing.

"Dwelling" means a single family home or a single unit within a multiple family complex.

"Eave" means the border of a roof that overhangs any wall.

"Electret Ion Chamber" or "Electret" means an electrostatically charged piece – usually a disk – of Teflon, called an electret, located inside an electrically

conducting plastic chamber of a known air volume. The electret serves as a source of high voltage needed for the chamber to operate as an ion chamber. It also serves as a sensor for the measurement of ionization in air. The ions produced inside the sensitive volume of the chamber are collected by the electret causing a depleted charge. The measurement of the depleted charge during the exposure period is a measure of integrated ionization during the measurement period. The electret charge is read before and after the exposure using a specially built non-contact electret voltage reader.

"Footprint" means each foundation type in direct contact with soil or other material.

"Foundation Type" means basement, crawlspace, slab-on-grade or any other construction technique approved by local building code.

"Government Entity" means the State, a State agency, a political subdivision, or any entity of local government.

"HVAC" means heating, ventilation and air conditioning.

"Home Environment Measurement" means a short term or long term measurement of radon in a single family home, duplex or condominium.

"Individual" means any human being.

"Interfere" means *to adversely or potentially adversely impact the successful completion of an indoor radon measurement by changing the radon or radon progeny concentrations or altering the performance of measurement equipment or an indoor radon mitigation system installation or operation.* [420 ILCS 44/15]

"Laboratory" means any organization that analyzes or calibrates radon or radon progeny measurement devices or detectors.

"Laboratory Analysis" means *the act of analyzing the radon or radon progeny concentrations with passive devices, or the act of calibrating radon or radon progeny measurement devices, or the act of exposing radon or radon progeny devices to known concentrations of radon or radon progeny as a compensated service.* [420 ILCS 44/15]

"Living Area" means any area in a building that is, or could be, adapted for human habitation whether the area is located in a basement, over a crawlspace, or situated on a slab-on-grade.

"Long Term Measurement" means measurements lasting 91 days or more; closed building conditions are not required, but are recommended. Long term measurements are not time-sensitive and, therefore, real estate testing options do

not apply.

"Measurement" means any radon or radon progeny tests, laboratory analysis, or exposure in a known radon or radon progeny environment, as in a radon chamber.

"Mechanically Ventilated Crawlspace System" means a radon control technique designed to increase ventilation within a crawlspace, achieve higher air pressure in the crawlspace relative to air pressure in the soil beneath the crawlspace, or achieve lower air pressure in the crawlspace relative to air pressure in the living spaces, by use of a fan. (See also Crawlspace Depressurization.)

"Mitigation" means *the act of repairing or altering a building or building design for the purpose in whole or in part of reducing the concentration of radon in the indoor atmosphere.* [420 ILCS 44/15]

"Mitigation System" means any system or steps designed to reduce radon concentrations in the indoor air of a building.

"Multi-Family Building" means a building, 3 stories or less, designed to house more than 4 families in separate units that do not have a common HVAC system for multiple units.

"New Residential Construction" means *any original construction of a single-family home or a dwelling containing 2 or fewer apartments, condominiums, or town houses.* [420 ILCS 52]

"NIST" means the United States Department of Commerce, Technology Administration, National Institute of Standards and Technology (formerly National Bureau of Standards).

"Passive Monitor" means a measurement tool that does not require external power or batteries to operate, such as charcoal detectors or alpha track detectors.

"Passive New Construction Pipe" or "PNC" means *a pipe installed in new construction that relies solely on the convective flow of air upward for soil gas depressurization and may consist of multiple pipes routed through conditioned space from below the foundation to above the roof.* [420 ILCS 52]

"Performance Audit" means an examination of a program, function or operation or of the management systems, procedures and records of a radon contractor to assess whether the entity is complying with the Radon Industry Licensing Act [420 ILCS 44], this Part and its Quality Assurance Program.

"Perimeter Channel Drain" means a system for collecting water in a basement by means of a large gap or channel between the concrete floor and the wall.

Collected water may flow to aggregate beneath the slot ("French Drain") or to a sump where it can be drained or pumped away.

"Person" means an entity including, but not limited to, *an individual*, company, corporation, *firm, group, association, partnership, joint venture, trust, or government agency or subdivision.* [420 ILCS 44/15]

"Picocurie Per Liter" or "pCi/L" means 2.2 disintegrations per minute of radioactive material per liter of air.

"Pressure Field Extension" means the distance that a pressure change is induced in the sub-slab area, measured from a single or multiple suction points. (See also Communication Test.)

"QAP" means Quality Assurance Program.

"Radon" means a *gaseous radioactive decay product of uranium or thorium.* [420 ILCS 44/15]

"Radon Chamber" means a facility in which radon measurement devices or detectors are exposed to known radon concentrations.

"Radon Contractor" or "Contractor" means a *person licensed to perform radon or radon progeny mitigation or to perform measurements* of *radon or radon progeny in an indoor atmosphere.* [420 ILCS 44/15]

"Radon Progeny" means any *combination of the radioactive decay products of radon.* [420 ILCS 44/15]

"Radon Resistant Construction" means *the installation of passive new construction pipe during new residential construction.* [420 ILCS 52]

"Radon Service Provider" means a radon contractor, laboratory, or person who performs laboratory analysis.

"Real Estate Testing" means short-term measurements that may be requested by a party not residing in the dwelling and that are performed in, or as a result of, or in expectation of, a real estate transaction and are time-limited due to this transaction.

"Re-Entrainment" means the unintended re-entry into a building of radon that is being exhausted from the vent of a radon mitigation system.

"Renewal" means issuance of a license that is expiring, has expired or has been previously terminated.

"Research" means Agency-approved scientific investigation by testing and/or mitigating for radon or radon progeny.

"Residential Building Code" means *an ordinance, resolution or law that establishes standards applicable to new residential construction*. [420 ILCS 52]

"Residential Building Contractor" means *any individual, corporation or partnership that constructs new residential* buildings. [420 ILCS 52]

"Residential Real Estate Measurement" means a measurement of radon in a single family home, duplex or condominium involved in a real estate transaction. Based on the time sensitive nature of real estate transactions, only short term measurements are appropriate and specific protocols are required.

"School Screening Measurement" means a measurement of radon performed by school district staff in accordance with the School Code [105 ILCS 5].

"Sealing and Caulking" means to plug and make tight to reduce the passage of gas. Sealing and caulking enhances radon reduction techniques; however, sealing and caulking alone has not been shown to lower radon levels significantly or consistently.

"Short Term Measurement" means measurements conducted for at least 48 hours and up to 90 days; closed building conditions are required for measurements lasting seven days or less and recommended throughout.

"Soil Gas" means the gas mixture present in soil that may contain radon.

"Soil Gas Retarder" means a continuous membrane of 6 mil (3 mil cross-laminated) polyethylene or equivalent flexible material used to retard the flow of soil gases into a building.

"Stack Effect" means the overall upward movement of air inside a building that results from heated air rising and escaping through openings in the building envelope, thus causing indoor air pressure in the lower portions of a building to be lower than the pressure in the soil beneath or surrounding the building foundation.

"Subfloor" means a concrete slab and other approved permanent floor system that directly contacts the ground and is within the walls of the living spaces of the building.

"Sub-Membrane Depressurization" or "SMD" means a radon control technique designed to achieve lower air pressure in the space under a soil gas retarder membrane laid on the crawlspace floor and sealed, relative to air pressure in the crawlspace, by use of a vent or fan-powered vent drawing air from beneath the membrane.

"Sub-Slab Depressurization (Active)" or "SSD (Active)" means a radon control technique designed to achieve lower sub-slab pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the concrete slab.

"Sub-Slab Depressurization (Passive)" or "SSD (Passive)" means a radon control technique designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a vent pipe (without a fan) routed through the conditioned space of a building and connecting the sub-slab area to the outdoor air. This system relies primarily on the convective flow of warmed air upward in the vent to draw air from beneath the concrete slab.

"Suitable for Occupancy" means a structural area in a home currently lived in or an area not currently used for occupancy, such as a basement, that an occupant or homeowner could use for living space without renovations. This includes an unfinished basement that could be used regularly as, for example, a recreation room, playroom, exercise room or workshop.

"USEPA" means the United States Environmental Protection Agency.

"Working Level" or "WL" means any combination of short-lived radon progeny in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha particle energy. The short-lived radon progeny for radon-222 are: polonium-218, lead-214, bismuth-214 and polonium-214.

"Working Level Month" or "WLM" means a unit of exposure used to express the accumulated human exposure to radon decay products. It is calculated by multiplying the average working level to which a person has been exposed by the number of hours exposed and dividing the product by 170.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.30 Exemptions from Requirements for a License

The Agency may, upon application or upon its own initiative, grant such exemptions or exceptions from the requirements of this Part as it determines are authorized by law and will not result in a hazard to public health and safety. The following persons are exempt from the licensing requirements of this Part:

a) A person performing radon measurements or mitigation on a dwelling in which the person resides.

b) A person temporarily practicing in Illinois who possesses a license granted by another state's regulatory authority that is recognized by this State under principles of mutual reciprocity.

c) Retail stores that only sell or distribute radon sampling devices but are not engaged in a relationship with the client for other services such as home inspection or representation as in a real estate transaction and that do not perform laboratory analysis, measurement or mitigation services.

d) Persons who do not perform radon measurements or mitigation, but who are employed for the purpose of disseminating beneficial information to the public for agencies that the USEPA considers to be partners in providing accurate radon information to the public, such as educational institutions, the American Lung Association, the National Safety Council, and the National Association of City and County Governments and State and local public health officials who disseminate radon measurement devices to the public.

e) A person performing diagnostic tests for the purpose of assessing site decontamination in accordance with a radioactive materials license granted by the Agency. Diagnostic tests shall not be used as a basis for a decision to, or not to, mitigate the radon level within a building.

f) Employees of the Agency performing measurements or mitigations as part of their official duties.

g) A residential building contractor or his or her subcontractor that installs radon resistant construction.

AGENCY NOTE: Only a radon contractor may install a radon vent fan or upgrade a passive new construction pipe to an active mitigation system.

h) School district employees performing radon screening measurements in accordance with the exemptions outlined in Sections 10-20.48 and 34-18.39 of the School Code [105 ILCS 5/10-20.48 and 34-18.39].

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.40 Categories of Licenses

a) The following types of licenses are issued by the Agency to individuals:

1) Radon Measurement Professional license;

2) Radon Measurement Technician license;

3) Radon Mitigation Professional license; and

4) Radon Mitigation Technician license.

b) The Agency also issues licenses to persons performing radon-related laboratory

analysis.

(Source: Amended at 29 Ill. Reg. 3212, effective February 22, 2005)

Section 422.45 Form, Location and Retention of Records

a) Each record required by this Part and other applicable Parts of Title 32 shall be legible throughout the specific retention period. The record may be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of reproducing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate and complete records during the required retention period. Records such as letters, drawings and specifications shall include all pertinent information, stamps, initials and signatures. Adequate safeguards against tampering with and loss of records shall be maintained throughout the retention period, even if the license expires or is terminated.

b) Each professional licensee shall maintain the records required by this Part and, at the request of the Agency, make his or her records required in accordance with this Part, and make himself or herself, available during normal business hours, in the offices of the Agency, for a performance audit of the license.

c) At the time of application for a license or renewal, the applicant shall specify, for Agency approval, a location where records required by this Part and other applicable Parts of Title 32 Ill. Adm. Code shall be maintained for inspection by the Agency. This location shall be in Illinois or within 50 miles of the Illinois border and at the location where the licensed professional who ensures the Quality Assurance Program is implemented is located.

d) Records required by this Part or other Parts of Title 32, including but not limited to records of radon measurements, mitigations, Quality Assurance Programs, calibration measurements, equipment repairs and worker protection plans, shall be retained by the licensee for at least 5 years or the length of time of any warranty or guarantees, whichever is longer.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.50 Application for Licenses

a) Any person applying to the Agency for a new license or a renewal of a license to perform radon-related measurement, mitigation or laboratory analysis services shall:

1) Submit a complete and legible application form;

2) Pay the appropriate non-refundable fee prescribed in Section 422.100; and

3) Meet the licensing requirements, as applicable, and as set forth in Section 422.60.

b) Any person who anticipates conducting radon-related measurement, mitigation, or laboratory analysis services shall receive the license prior to providing such services in Illinois.

c) The Agency may at any time after the filing of the original application, and before the expiration or termination of the license, require further statements in order to enable the Agency to determine whether the application should be granted or denied or whether an existing license should be modified or revoked.

d) An application for renewal of a license shall be submitted at least 30 days prior to the expiration date of the license. An application shall be deemed filed on the date that it is received by the Agency. A radon service provider shall not provide radon services after the expiration date of a license.

e) The application for renewal shall demonstrate successful completion of continuing education requirements as specified in Section 422.80, as applicable, satisfactory inspection or audit results, submittal of a complete and accurate application form for renewal and the payment of the appropriate fee as specified in Section 422.100.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.60 Requirements for Issuance or Renewal of Licenses

a) The Agency shall issue a Radon Measurement Professional license to any individual who fulfills the following requirements:

1) Is at least 18 years of age.

2) Provides evidence of relevant work experience and education that meets any one of the following criteria:

A) Documented work history approved by the Agency demonstrating completion of 50 radon measurements; or

B) No experience. A new license performance audit will be performed by the Agency.

3) Provides proof of successful completion of the USEPA Radon Measurement Operators Course, or an equivalent indoor radon and radon progeny measurement course approved by the Agency.

4) Has successfully completed a USEPA Radon Measurement Examination, or an equivalent examination approved by the Agency.

5) Submits a complete and accurate application form prescribed by the Agency that includes, but is not limited to:

A) Home address;

B) Home phone number;

C) Work address;

D) Work phone number;

E) Email address;

F) A description of all types of indoor radon measurements performed and any other related services offered;

G) A description of all measurement devices the applicant or licensee plans to use;

H) A worker protection program description acceptable to the Agency that includes, but is not limited to, methods to reduce or minimize the radon or radon progeny exposures in the work area; and

I) A Quality Assurance Program description acceptable to the Agency that includes, but is not limited to:

i) A policy statement committing to provide quality work;

ii) A description of management and structure of the organization;

iii) A listing of personnel, their qualifications and training;

iv) Procedures for procurement of items and services;

v) Procedures for maintaining documents and records;

vi) A description of relevant computer hardware and software;

vii) A planning process for radon and radon progeny services;

viii) Procedures for calibration and testing of instruments;

ix) A corrective action program; and

x) Standard operating procedures.

6) Submits standard operating procedures for the performance of radon or radon progeny measurements in each of the following categories for which they offer services: home, multi-family building, or school and commercial building measurements.

AGENCY NOTE: The Agency recommends using the "ANSI/AARST Standard: Protocol for Conducting Radon and Radon Decay Product Measurements in Multifamily Buildings" in preparing multi-family building standard operating procedures.

7) For an individual requesting renewal evidence of meeting the continuing education requirements in Section 422.80.

b) The Agency shall issue a Radon Measurement Technician license to any individual authorizing work under the general supervision of a Radon Measurement Professional licensee, if the applicant meets the following requirements:

1) Is at least 18 years of age.

2) Provides proof of successful completion of the USEPA Radon Measurement Operators Course, or an equivalent indoor radon and radon Progeny measurement course approved by the Agency.

3) Has successfully completed a USEPA Radon Measurement Examination, or an equivalent examination approved by the Agency.

4) Submits a complete and accurate application form prescribed by the Agency that includes, but is not limited to:

A) Home address;

B) Home phone number;

C) Work address;

D) Work phone number; and

E) Email address.

5) For an individual requesting renewal, evidence of meeting the continuing

education requirements in Section 422.80.

c) The Agency shall issue a Radon Mitigation Professional license to any individual who fulfills the following requirements:

1) Is at least 18 years of age.

2) Provides evidence of relevant work experience and education that meets any of the following criteria:

A) At least 4 years of design and construction of buildings, or associated heating, ventilation and air conditioning (HVAC), or closely related activities approved by the Agency;

B) Documented work history approved by the Agency demonstrating completion of 50 radon mitigation installations; or

C) No experience. A new license performance audit will be performed by the Agency.

3) Provides proof of successful completion of the USEPA Radon Mitigation Course, or an equivalent indoor radon and radon progeny mitigation course approved by the Agency.

4) Has successfully completed a USEPA Radon Mitigation Examination, or an equivalent mitigation examination approved by the Agency.

5) Submits a complete and accurate application form prescribed by the Agency that includes, but is not limited to:

A) Home address;

B) Home phone number;

C) Work address;

D) Work phone number;

E) Email address;

F) A description of all diagnostic tests that may be performed to determine the mitigation strategy and any other radon related services offered;

G) A description of all mitigation system designs or strategies offered. Materials and design controls shall be included in the professional

licensees' Quality Assurance Program description;

H) A worker protection program description acceptable to the Agency, to be followed when performing mitigation installations, that includes, but is not limited to, methods to reduce or minimize the radon or radon progeny concentrations in the work area;

I) A Quality Assurance Program description acceptable to the Agency that includes, but is not limited to:

i) A policy statement committing to provide quality work;

ii) A description of management and structure of the organization;

iii) A listing of personnel, their qualifications and training;

iv) Procedures for procurement of items and services;

v) Procedures for maintaining documents and records;

vi) A description of relevant computer hardware and software;

vii) A planning process for radon and radon progeny services;

viii) Procedures for calibration and testing of instruments;

ix) A corrective action program; and

x) Standard operating procedures.

6) Provides proof of insurance as specified in Section 422.70(q).

7) Submits standard operating procedures for the performance of mitigations in each of the following categories for which they offer services: home, multi-family building, or school and commercial building mitigations.

8) For an individual requesting renewal, evidence of meeting the continuing education requirements in Section 422.80.

d) The Agency shall issue a Radon Mitigation Technician license to any individual authorizing work under the general supervision of a Radon Mitigation Professional licensee, if the applicant meets the following requirements:

1) Is at least 18 years of age.

2) Provides proof of successful completion of the USEPA Radon Mitigation Operators Course, or an equivalent indoor radon and radon progeny mitigation course approved by the Agency.

3) Has successfully completed a USEPA Radon Mitigation Examination, or an equivalent examination approved by the Agency.

4) Submits a complete and accurate application form prescribed by the Agency that includes, but is not limited to:

A) Home address;

B) Home phone number;

C) Work address;

D) Work phone number; and

E) Email address.

5) For an individual requesting renewal, evidence of meeting the continuing education requirements in Section 422.80.

e) The Agency shall issue a Laboratory Analysis license to any person who submits a complete and accurate application form prescribed by the Agency that includes:

1) The name of one individual who is responsible for the laboratory radon analytical activities;

2) A description of all measurement devices used and services offered; and

3) Documentation of a Quality Assurance Program that meets one of the following:

A) A quality assurance program description consistent with ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories Compliance published June 29, 2005, exclusive of subsequent amendments or editions; or

B) Is successfully enrolled in an independent third party accreditation/certification program consistent with national laboratory accreditation and certification standards, or an equivalent program approved by the Agency, for the devices listed in subsection (e)(2).

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.65 Terminating a License

a) Any person licensed by the Agency may cease licensed activities and terminate his or her license at any time.

b) The licensee desiring to terminate his or her license shall submit to the Agency, within 15 days after ceasing to provide licensed services, the following information:

1) A request in writing stating the last date of any licensed activity.

2) The original license document.

3) The location where records will be maintained in compliance with Section 422.45.

c) The licensee shall allow the Agency to perform an audit that was scheduled before the licensee submitted a request to terminate the license.

AGENCY NOTE: Failure to pay the annual fee DOES NOT automatically terminate an Illinois radon license. The Agency must be notified in writing if a license is to be terminated.

(Source: Added at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.70 Conditions of Licenses

a) Any person licensed by the Agency to perform radon measurement shall perform in accordance with the measurement protocol provided in Section 422.130 as applicable to the measurement type performed and the devices used.

b) Any person licensed by the Agency to perform radon measurements shall use devices approved by USEPA, prior to the retirement of the USEPA Radon Proficiency Program, or the Agency to measure radon and radon progeny.

c) No unlicensed individual shall perform radon measurement or mitigation activities without the direct on-site supervision of a licensed individual.

d) Within 45 days after providing radon measurements, the individual providing the service shall report the results in picocuries per liter (pCi/L) to the occupant, the owner of the building, his/her representatives or the client.

e) Licensees shall comply with 32 Ill. Adm. Code 340. This means that the radiation exposure shall not exceed 30 pCi/L or 0.3 WL, based on continuous workplace exposure for 40 hr/week, 52 weeks per year and shall not exceed 4 working level

months (WLM) over a 12 month period, using an equilibrium ratio of 50 percent to convert radon exposure to WLM.

f) Records of radon measurements, mitigations, Quality Assurance Programs, calibration measurements, equipment repairs and worker protection plans shall be retained by the licensee for a least 5 years or the length of time of any warranty or guarantees, whichever is longer.

g) No person shall interfere with, or cause another to interfere with, the successful completion of a radon measurement or the installation or operation of a radon mitigation.

h) The radon laboratory licensee shall notify the Agency in writing within 5 working days when it loses or replaces the individual named pursuant to Section 422.60(e)(1).

i) A licensee shall return the original license document to the Agency within 15 days after ceasing to provide licensed services, unless the license has expired.

j) Mitigators who are also licensed to perform measurements shall not perform radon measurements before or after the installation of a mitigation system at the same address as the mitigation installation, unless a measurement has been made by another independent person in accordance with this Part.

k) Licensees shall inform the Agency of changes in biographical information, such as addresses and telephone numbers within 10 days after the change is effective.

l) Substantive changes to license application representations require an amendment to the license and Agency approval. Licensees shall request amendments to documents at least 30 days prior to the effective date of the desired revision.

m) The licensee shall comply with all the applicable provisions of this Part.

n) The licensee shall comply with the Agency-approved Quality Assurance Program.

o) Professional licensees shall be located in Illinois or within 50 miles of the Illinois border. Professional licensees shall provide general supervision of technician licensees working under their Quality Assurance Program.

p) Radon contractors or residential building contractors installing research or innovative radon techniques or otherwise deviating from the standards in this Part shall notify the Agency in writing. Approval from the Agency in writing must be received prior to the commencement of work. When the research is conducted, a performance standard shall be applied, for example, post-mitigation radon levels shall be below USEPA's action level (4.0 pCi/L). Written notification to the Agency shall include:

1) Written acknowledgement signed by the client stating that the client understands the reasons the contractor plans to deviate from the standards of this Part;

2) The technical bases for the measurement or mitigation technique and description of the functional accomplishments that will be achieved; and

3) The identity of the client and the address of the building, including the zip code.

q) A Radon Mitigation Professional engaged in the business of radon mitigation shall obtain and maintain in full force and effect during the operation of the business public liability and property damage insurance that meets the requirements of the Home Repair and Remodeling Act [815 ILCS 513]. The licensee or applicant for a license shall provide proof of this insurance to the Agency annually. Illinois Radon Mitigation System tags will not be issued without valid proof of insurance.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.75 State Radon License Exam

a) Any person applying to the Agency to take the measurement or mitigation Radon License Exam shall:

1) Submit a complete and legible application form;

2) Provide proof of successful completion of the USEPA Radon Measurement Operators Course, or an equivalent indoor radon and radon progeny measurement course approved by the Agency.

b) No person shall take the Radon License Exam more than once in any 28 day period.

c) Persons who have a physical or mental disability that requires reasonable accommodation in accordance with the Americans With Disabilities Act (42 USC 101 et seq.) shall, in addition to subsection (a):

1) Submit a complete and legible application form 30 days prior to the exam date;

2) Provide a physician's statement of the disability that includes a list of accommodations that are needed to take the exam.

(Source: Added at 33 Ill. Reg. 14479, effective October 9, 2009)

Section 422.80 Continuing Education Requirements

All applicants for renewal of individual licenses shall provide evidence of having participated in an Agency-approved program of continuing education as indicated in this Section:

a) The required continuing education per year for categories of licenses issued pursuant to this Part is as follows:

1)	Radon Measurement Professional	6 credits
2)	Radon Measurement Technician	6 credits
3)	Radon Mitigation Professional	6 credits
4)	Radon Mitigation Technician	6 credits

AGENCY NOTE: An individual who is licensed for both Measurement and Mitigation needs 6 credits per year for each license (i.e., 12 credits per year).

b) Continuing education (CE) credits may be obtained via participation in courses or teaching approved courses.

c) Licensed individuals shall receive CE credits for an approved radon course only once during a 5 year interval.

d) The basis for a unit of continuing education credit shall be the contact hour (50 minutes) of lecture. Activity other than lecture shall be submitted to the Agency for evaluation in accordance with Section 422.85.

e) Licensees shall submit required documentation for CE as part of the application for renewal.

f) CE credit shall be given for courses approved by the Agency in accordance with the procedures specified in Section 422.85.

g) For courses not approved by the Agency, a licensee may submit the information required by Section 422.85 to the Agency for approval. The documentation shall be submitted at least 180 days prior to license expiration.

(Source: Amended at 33 Ill. Reg. 14479, effective October 9, 2009)

Section 422.85 Agency Approval of Radon Courses

a) Persons offering continuing education for a licensed individual may apply for approval by submitting to the Agency, 90 days prior to the start of the course, the following:

1) A completed application on a form prescribed by the Agency that shall include, but not be limited to, the following information:

A) Name, business address, telephone number, fax number and e-mail address of the person providing the training;

B) Type of course and title; and

C) Total hours of supervised instruction within the course;

2) Copies of the syllabus and all training materials to be used in the training course;

3) Pertinent biographical information or credentials of all individuals instructing the training course participants; and

4) Criteria for course approval upon which successful completion of the course by participants will be judged pursuant to subsection (e) of this Section.

AGENCY NOTE: Operators of training courses shall submit a separate application for each course, but if a single course will provide instruction for more than one type of licensed individual, only one application is required.

b) To maintain approval of a training course, the course operator shall do all of the following:

1) Issue a certificate of completion to each individual who successfully completes the course;

2) Submit to the Agency a list of all individuals who successfully completed the course within 30 days after completion of the course. The list shall include name, business address, telephone number and radon license number;

3) Request, in writing, the Agency's approval of any changes that would render the information contained in the application for approval inaccurate; and

4) For a revised course, submit within 30 days before first teaching the revised course, an informational copy of the complete revised course, whether or not the revisions render the information contained in the application for approval inaccurate.

c) The Agency may refuse to issue an approval and may revoke or suspend an

approval issued pursuant to this Part if the operator of the course fails to meet the criteria specified in subsection (a) or (b) of this Section or if the course is not updated to incorporate new information pertinent to licensed activities.

d) Approval of a training course shall be valid until the course is revised.

e) Criteria for CE Course Approval

1) General Format for Course Approval

A) Opening pages/introduction of the course shall include the following:

i) Name of the sponsor/course provider.

ii) Name of the course developer, if different than the sponsor/provider.

iii) Name/title of the course. The title shall be the same as approved by the Agency.

iv) Course description.

v) Course objectives.

vi) Other references or source materials required for the course (e.g., textbook).

vii) Course instructions shall include the following statements:

- "In order to receive CE credit, you shall first complete the course content. When completed, go to the last page of the course to access the post-test."

- "Submit the completed answers to determine if you have passed the post-test assessment. You must obtain a score of at least 70% to receive the CE credit. You will have no more than 3 attempts to successfully complete the post-test."

viii) CE credits: Number of CE credits awarded for successful completion of the course.

ix) Approving organization statement: "Approved by Illinois Emergency Management Agency, Radon Program" and the course number.

x) Statement about seeking CE credit for repeating a course: "This course may be available in multiple formats or from different sponsors. The Illinois Emergency Management Agency, Radon Program, does not allow CE courses such as Internet courses, home study programs or directed reading to be repeated for CE credit in the same 5 year period."

AGENCY NOTE: The Illinois Emergency Management Agency, Radon Program, will approve CE credits for courses that have similar content. However, the credits cannot be for the same course completed from different formats. For example, two different courses on Radiation Protection would be acceptable. Two courses, one on CD and one as a home study, with the same content would not be acceptable.

xi) Statement concerning a course awarded multiple CE course numbers. Depending on the situation, a course may be awarded credit through multiple evaluation programs for use by different credentialing organizations. Different course numbers are then awarded to the same course. In such situations, each course number and the approving authority for each course number shall be listed.

xii) CE sponsor contact information shall be provided for participants who have questions regarding the CE course.

B) Additional Requirements for an Online CE Course

i) Hardware and software requirements for the course.

ii) Access options (for example, dial-up, broadband, cable, DSL).

2) Agency Approval for Number of CE Credits

A) Evaluation of Content

i) For an original approval, the course title shall match the title that was submitted on the CE credit application form.

ii) For renewal applications, the title shall match the title approved by the Agency.

iii) The content shall support the stated objectives.

iv) The content shall be current and accurate.

v) The content shall provide sufficient depth and scope of the subject matter.

vi) Content taken from other copyrighted materials shall be appropriately identified as such and referenced.

vii) Documentation of appropriate permissions for use of reprinted materials shall be clearly referenced.

viii) All supporting materials (e.g., images, photos, diagrams, charts, tables and text) shall be legible and labeled correctly.

ix) Acronyms shall be spelled out with the first use or a glossary of terms shall be provided.

x) Credit requested to be awarded for the course shall be determined by the length of time it takes to complete the course. Time utilized to complete the post-test may be considered part of learning the course information.

xi) The CE application materials shall include a description of the grading and documentation process. A copy of the certificate to be awarded and the post-test, with correct answers indicated, shall be included.

xii) CE sponsors for courses that were developed by others (i.e., individuals or organizations) shall indicate the following information on the application for the CE credit: The name of the individual or organization that developed the course and an affirmation statement that the developer of the course has granted the CE sponsor permission to use and distribute the course.

xiii) For all formats of any course and at all sites, the Agency shall be provided with access (i.e., user ID and password) in order to evaluate the course in the manner that it is being presented. For electronic courses, access shall be provided

prior to the course being made available for use by customers.

3) Assessment (Post-Test)

A) Possible Uses for the Post-Test

i) Post-Test Used to Assess Participation. Multiple choice questions shall be provided to help determine if a person has participated in the course. Answers do not need to be provided to the participant.

ii) Post-Test Used as a Learning Tool. Multiple choice questions shall be provided to help determine a level of learning. If a question is answered incorrectly, detailed information is provided to explain the questions and answers.

B) Format Evaluation

i) Post-tests shall have a minimum number of questions based upon the number of CE credits requested to be awarded to the course (i.e., 5 questions for each credit hour).

ii) When submitted for evaluation, the correct answers to the post-test questions shall be referenced (with paragraph and page numbers) in the content of the course.

iii) Additionally, for online courses:

- The participant shall not be able to go directly to the post-test from the introductory page without at least "paging" or "scrolling" through the content. (This may be accomplished by requiring the participant to page through the content before reaching the post-test. For example, do not place access to the post-test at the beginning of the course.)

- The CE course content may be printed for review; however, the post-test shall not be available to print.

- If the sponsor is using a test item, all questions and answers that a participant might see shall be provided to the Agency for review.

C) Scoring

i) A maximum of three attempts to pass the post-course assessment is allowed. No CE credit will be awarded if there are three failed attempts. (See subsection (e)(1)(A)(viii) of this Section.)

ii) If a participant fails to score at least 70% on the post-test, the number of incorrect answers or the percent correct may be provided, but the individual questions answered incorrectly shall not be identified. Post-test question security shall be maintained.

4) Certificates of Participation

A) Certificate Format

i) Certificates shall contain the participant name, course, date completed, credits earned, approving organization (i.e., IEMA, Radon Program), reference number, sponsor name and/or logo and signature of the sponsor or its authorized representative. (The same certificate information is required for all formats of a course, i.e., Internet, print, live, etc.)

ii) The certificate shall reflect the "date of completion" as the date the sponsor received the completed post-test.

iii) All post-tests received shall be date/time stamped (or date collected and recorded) for verification purposes.

B) Certificate Distribution

i) The certificate shall be awarded only after successful completion of the course.

ii) The participant shall not be able to alter the information for the on-line certificate in any way before printing.

iii) Duplicate on-line certificates may be made available by the CE sponsor for re-printing.

(Source: Amended at 33 Ill. Reg. 14479, effective October 9, 2009)

Section 422.90 Renewal of Licenses

a) Licenses shall be renewed in accordance with Section 422.60.

b) All applicants seeking renewal shall complete the continuing education requirements in Section 422.80 except, when the license has been expired or terminated, the person may take the appropriate qualification course and Radon Licensing Exam as an alternative to the required CE.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.100 Fees

a) The annual fee in all categories shall be as follows:

Radon Measurement Professional license – Individual	$500
Radon Measurement Technician license – Individual	$250
Radon Mitigation Professional license – Individual	$500
Radon Mitigation Technician license – Individual	$250
Laboratory Analysis	$500

b) An individual license application fee of $125 shall accompany a new application when filed with the Agency. A laboratory application fee of $500 shall accompany a new application when filed with the Agency.

c) All fees assessed in accordance with this Section are non-refundable.

d) The appropriate fees shall be paid within 60 days after the date on the statement issued by the Agency.

e) The fee for an Illinois Mitigation System Tag shall be $50. Only Radon Mitigation Professionals shall purchase Illinois Mitigation System Tags from the Agency. Illinois Mitigation System Tags shall be purchased in amounts not less than 5 per transaction.

f) Effective January 1, 2014, an application fee of $125 shall accompany an application for the State Radon License Exam.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.110 Reports to the Agency

a) All individuals licensed to perform radon measurements and former licensees shall submit to the Agency the following information of all radon and radon progeny measurements individually on an annual basis by a method prescribed by the Agency. The file submitted to the Agency shall be an ASCII, comma delimited file.

1) Address, city, state, zip code.

2) Start date and time the measurement began.

3) End date and time the measurement was completed.

4) Location where test was performed (i.e., basement, crawlspace, slab, other).

5) Room use (i.e., living, family, bedroom).

6) Whether a PNC or ASD radon reduction system is currently in use and, if the system is ASD, include the mitigation tag number for systems installed after November 1, 2009.

7) Result of the measurements taken in pCi/L.

8) The type of test performed (i.e., duplicate, simultaneous).

9) Device used (i.e., AC, AT, CR, LS, ES, etc.).

10) Serial number of the device used.

11) The lab used or manufacturer of the device.

12) The permanent vents at this location (i.e., crawlspace, fireplace, fresh air intake).

13) Status of the permanent vents during the test (i.e., open, closed).

14) An indication of whether the test was valid.

15) Brief description of why the test was invalid.

b) All individuals licensed to perform radon mitigations and former licensees shall submit to the Agency the following information of all radon and radon progeny mitigations individually on an annual basis by a method prescribed by the Agency. The file submitted to the Agency shall be an ASCII, comma delimited file.

1) Address, city, state and zip code where mitigation was conducted.

2) Date mitigation system was installed.

3) Indication of whether an active soil depressurization system was installed.

4) Indication of whether radon resistant new construction techniques were

used.

5) The Illinois Mitigation System Tag number issued by IEMA installed on the system.

c) All individuals licensed to perform laboratory analysis who report results to home occupants, owners or their representative shall submit to the Agency the following information of all complete radon and radon progeny measurements on an annual basis by a method prescribed by the Agency. The files submitted to the Agency shall be an ASCII, comma delimited file.

1) Address, city, state, zip code.

2) Start date and time the measurement began.

3) End date and time the measurement was completed.

4) Result of the measurements taken in pCi/L.

5) Device used (i.e., AC, AT, CR, LS, ES, etc.).

6) Serial number of the device used.

7) The lab used or manufacturer of the device.

AGENCY NOTE: In general, this type of file can be generated by most spreadsheet and database software. Instructions for the specific information and formatting are available from the Agency or on the Agency website.

d) All licensees shall report apparent non-compliances with either the Radon Industry Licensing Act or this Part to the professional licensee upon discovery; then to the Agency in writing within 45 days upon discovery unless appropriate corrective action has been performed within 30 days after discovery.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.120 Disciplinary Action by the Agency

a) The Agency may refuse to issue or to renew, or may suspend or revoke, a person's license, or take other disciplinary action as the Agency may deem proper, including fines not to exceed $1,000 for each violation, with regard to any license for any one or a combination of the following causes or those listed in Section 45 of the Radon Industry Licensing Act [420 ILCS 44/45]:

1) Knowingly causing a material misstatement or misrepresentation to be made in the application for a license, if such misstatement or

misrepresentation would impair the Agency's ability to assess and evaluate the applicant's qualifications for a license pursuant to this Part, such as a misstatement or misrepresentation regarding training or experience;

2) Willfully evading the statute or regulations pertaining to a license, or willfully aiding another person in evading the statute or regulations pertaining to a license;

3) Having been convicted in any state of a crime that is a felony under the laws of this State or having been convicted of a felony in a federal court, unless such individual demonstrates to the Agency that he/she has been sufficiently rehabilitated to warrant the public trust;

4) Misrepresenting the capabilities of a device for detecting and measuring radon or radon progeny or misrepresenting the results of a test to detect or measure radon or radon progeny;

5) Gross and willful overcharging for professional services, including filing false statements for collection of fees or moneys for which services are not rendered;

6) A person knowingly makes a false material statement to an Agency employee during the course of official Agency business;

7) Failure to make records available for audit or inspection at all reasonable times, such as during usual business hours;

8) *Failing, within 60 days, to provide information in response to a written request made by the Agency that has been sent by mail to the licensee's last known address* [420 ILCS 44/45(g)];

9) *Failure to file a return or to pay the tax, penalty or interest shown in a filed return, or to pay any final assessment of tax, penalty, or interest, as required by a tax Act administered by the Department of Revenue, until such time as the requirements of any such tax Act are satisfied* [420 ILCS 44/45(q)];

10) Failing to repay an education loan guaranteed by the Illinois Student Assistance Commission as provided in Section 80 of the Nuclear Safety Law of 2004 [20 ILCS 3310/80]; or

11) Failing to meet child support orders as required in Section 10-65 of the Illinois Administrative Procedure Act [5 ILCS 100/10-65]. The action will based solely upon the certification of delinquency made by the Department of Healthcare and Family Services, Division of Child Support Enforcement, or the certification of violation made by the court. Further

process, hearing or redetermination of the delinquency or violation by the Agency shall not be required (see IAPA Section 10-65(c)).

b) If, based upon any of the grounds in subsection (a) of this Section or Section 45 of the Radon Industry Licensing Act, disciplinary action is initiated, the Agency shall notify the person and shall provide an opportunity for a hearing in accordance with 32 Ill. Adm. Code 200. An opportunity for a hearing shall be provided before the Agency takes action to suspend or revoke a person's license, unless the Agency has evidence of imminent danger as provided in subsection (d) of this Section.

c) If the Agency finds that removal or refusal to issue or renew accreditation is warranted, the usual action shall be a suspension or denial of licensure for up to one year. The term of suspension or denial may be reduced by the Director, based upon evidence presented, if the conditions leading to the Preliminary Order for Suspension can be cured in less than 1 year. However, if the Agency finds that the causes are of a serious or continuous nature, such as past actions that posed an immediate threat to public health or safety, deficiencies that cannot be cured within one year or frequent child support arrearages, the Agency shall revoke the person's license or deny the application.

d) The Director may summarily suspend the license of a licensee without a hearing, simultaneously with the institution of proceedings for a hearing, if the Director finds that evidence in his or her possession indicates that continuation of the contractor in practice would constitute an imminent danger to the public. *If the Director summarily suspends a license without a hearing, a hearing by the* Agency *shall be held within 30 days after the suspension has occurred and shall be concluded without appreciable delay.* [420 ILCS 44/50] The hearing shall be held in accordance with 32 Ill. Adm. Code 200.

e) When a person's license is suspended or revoked, the person shall surrender the license to the Agency and cease licensed activities.

f) A person whose license has been revoked may seek reinstatement of the license by filing with the Agency a petition for reinstatement. Petitions may be filed one year or more after the beginning of the revocation period. The person shall be afforded a hearing in accordance with 32 Ill. Adm. Code 200 and shall bear the burden of proof of establishing that the license should be reinstated due to rehabilitation or other just cause.

g) A person who violates any provisions of this Part shall be guilty of a business offense and shall be assessed a penalty in accordance with Section 35 of the Act.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.130 Measurement Protocol

a) Measurement Location

1) Short-term or long-term measurements shall be made, at the same time, in each lowest structural area suitable for occupancy. For example, a split-level building with a basement, a slab-on-grade room and a room over crawlspace shall have measurements made in each of the foundation types: the basement, a slab-on-grade room and a room over the crawlspace.

A) Measurements shall be made in rooms that can be regularly occupied by individuals, such as family rooms, living rooms, dens, playrooms and bedrooms.

B) Charcoal canisters of any type shall not be placed in bathrooms, kitchens, laundry rooms, spa rooms or other areas of high humidity.

C) When the area of the home being tested is over 2000 square feet, an additional test location is required for each 2000 square feet of the area being tested.

D) Measurement devices shall be placed in the general breathing zone and shall be:

i) Undisturbed during the measurement period;

ii) At least 3 feet from exterior doors, windows to the outside, or ventilation ducts;

iii) Out of the direct flow of air from the ventilation duct;

iv) At least 1 foot from exterior walls;

v) 20 inches to 6 feet from the floor;

vi) At least 4 inches away from other objects horizontally or vertically above the detector;

vii) At least 4 feet from heat, fireplaces and furnaces, out of direct sunlight, etc.;

viii) At least 7 feet from sump pits.

E) Measurement devices may be suspended in the general breathing zone and, if suspended, shall be 20 inches to 6 feet above the floor and at least 1 foot below the ceiling.

F) Measurements made in closets, cupboards, sumps, crawlspaces or nooks within the foundation shall not be used as a representative measurement and shall not be the basis for a decision to, or not to, mitigate the radon level within a building.

b) Measurements

1) A short-term measurement shall range in duration from 48 hours to 90 days, depending upon the measurement device used. Unoccupied homes shall be tested with the HVAC system set and operating throughout the measurement interval in the normal range, such as 72 degrees F plus or minus 5 degrees F.

A) Short-term measurements shall be made under closed-building conditions. In measurements lasting more than seven days and less than 90 days, closed-house conditions shall be maintained as much as possible while the measurement is in progress.

B) Closed building conditions shall begin at least 12 hours prior to the beginning of the measurement period for measurements lasting less than 96 hours.

C) The following conditions shall be complied with during closed-building conditions:

i) Operation of permanently installed HVAC systems shall continue during closed-building conditions. Radon Measurement licensees shall inform the resident in writing that operation of dryers, range hoods, bathroom fans and other mechanical systems that draw air out of the building may adversely affect the measurement results.

ii) In buildings having permanently installed radon mitigation systems, the mitigation system shall be functioning during the measurement interval.

iii) Air conditioning systems that recycle interior air may be operated during closed-building conditions.

iv) All windows shall be kept closed. Individuals licensed in accordance with the Home Inspector License Act [225 ILCS 441] may momentarily open and reclose windows when performing an inspection, after informing the measurement licensee of the inspection.

v) All external doors shall be closed except for normal entry and exit. Structural openings due to disrepair or structural defects shall be repaired to correct their condition prior to initiation of closed-building conditions. All exterior windows and doors shall be inspected by a Radon Measurement Professional licensee or Radon Measurement Technician at the placement and retrieval of the detectors and the result of the inspection documented for the measurement file.

vi) Whole-house fans shall not be operated. Portable window fans shall be removed from the window or sealed in place. Window air conditioning units shall only be operated in a recirculating mode. If the building contains an air handling system, the air handling system shall not be set for continuous operation unless the air handling equipment is specifically used for radon control and is so labeled.

vii) Fireplaces or combustion appliances, except water heaters and cooking appliances, shall not be operated unless they are the primary sources of heat for the building.

viii) Ceiling fans, portable dehumidifiers, portable humidifiers, portable air filters and window air conditioners shall not be operated within 20 feet of the detector.

D) Short-term measurements of less than 96 hours shall not be conducted during severe storms or periods of sustained high winds (30 miles per hour or more). Radon Measurement licensees shall check and document local weather forecasts prior to placing short-term measurement devices when the measurement period is less than 96 hours.

AGENCY NOTE: The National Weather Service defines a severe storm as a storm that generates winds of 58 mph and/or ¾-inch diameter hail and that may produce tornadoes – not necessarily in that order.

E) The Radon Measurement licensee shall document that instructions describing closed-building conditions in subsection (b)(1) were provided for the person who controls the building in accordance with subsections (d)(1) and (2).

2) The Radon Measurement licensee shall advise the resident in accordance with Appendix A.

3) Follow-up measurements shall be conducted in the same location as the initial measurement, provided the initial measurement was performed in accordance with acceptable measurement placement protocol.

4) The results of both initial and follow-up measurements and the average of duplicate measurements shall be reported. The average shall be considered appropriate as the basis for determining the need for mitigation.

c) Options for Real Estate Testing

1) Option 1: Simultaneous Testing

A) Simultaneous testing shall be comprised of a minimum of 2 indoor radon measurements conducted simultaneously with similar measurement devices (see Appendix C).

B) Simultaneous tests shall be:

i) Co-located and spaced 4 to 5 inches apart;

ii) Exposed for the same measurement period; and

iii) Produce results in the same units (pCi/L or WL).

C) The results of both measurements and the average of the simultaneous measurements shall be reported and shall be considered appropriate as the basis for determining the need for mitigation.

D) Simultaneous measurement results that are both less than 4.0 pCi/L shall agree with a Relative Percent Difference (RPD) of less than 67 percent. RPD is the difference between the 2 results divided by the average of the 2 results times 100. If the RPD is greater than 67 percent, the Radon Measurement Professional licensee shall investigate, document and correct the sources of the error.

E) When one of the measurements is equal to or greater than 4.0 pCi/L and one is less than 4.0 pCi/L, and the higher result is greater than twice the lower result, the client shall be informed of the large discrepancy and the simultaneous measurements repeated at no added cost to the client.

F) Simultaneous measurement results that are both equal to or greater than 4.0 pCi/L shall agree with a RPD of less than 36 percent. If the RPD is greater than 36 percent, the Radon Measurement Professional licensee shall investigate, document and correct the

sources of the error.

G) The precision of simultaneous measurements shall be monitored and recorded in the quality assurance records. The analysis of data from simultaneous measurements shall be plotted on range control charts. If the precision estimated by the user is not within the precision expected of the measurement method, the cause of the problem shall be investigated and corrective action taken in accordance with the licensee's Agency-approved quality program.

2) Option 2: Continuous Monitor Testing

A) This option requires an active continuous monitor that has the capability to integrate and record a new result at least hourly. Shorter integration periods and more frequent data logging afford greater ability to detect unusual variations in radon or radon progeny concentrations.

B) The minimum test measurement period shall be 48 hours. The first 4 hours of data from a continuous monitor may be discarded or incorporated into the result using system correction factors. There shall be at least 44 contiguous hours of usable data to produce a valid average.

i) The "backing out" of data (i.e., removal of portions imbedded in the 44 contiguous hours of monitoring) shall invalidate the measurement.

ii) The periodic results shall be averaged to produce a result that is reported to the client.

3) Additional Requirement for Real Estate Option Testing

A) Real Estate Option tests shall be conducted in accordance with subsections (a)(1) and (b)(1).

B) The measurement exposure time shall be a minimum of 48 hours.

C) Measurement licensees shall establish controls consistent with the devices used in their measurements to prevent interference and document those controls in accordance with subsection (l)(1).

d) Non-Interference Agreement

1) The buyer, seller, occupant, real estate professional or other individual in control of the property shall sign a non-interference agreement indicating

an understanding of the testing conditions, the penalties for interference with an in-progress radon measurement, and that any test interference that is detected will be documented in the report and will invalidate the measurement results.

2) If such an agreement cannot be or will not be signed by the buyer, seller, occupant, real estate professional or other individual in control of the property, the Radon Measurement licensee shall document on the agreement why the signature was not obtained. The agreement shall be retained for inspection by the Agency.

e) Radon Measurement In Progress Notification. The licensee shall post at every building entry and in a conspicuous location a Radon Measurement In Progress Notification. The Notice shall be posted upon initiation of a radon measurement. A copy of a Radon Measurement In Progress Notice is provided in Appendix D.

f) Multi-Family Building Measurements. Professional licensees shall submit standard operating procedures for the performance of multi-family building measurements.

AGENCY NOTE: This subsection does not apply to measurements in an individual condominium unit.

1) Initial measurements shall be short-term measurements of at least 48 hours to 90 days, depending on the device used, and shall be made in regularly occupied rooms in contact with the soil, whether the contact is slab-on-grade, a basement, a berm, a room above a crawlspace or any combination.

A) Regularly occupied rooms include bedrooms, offices, dens, family rooms, work areas and play rooms.

B) A minimum of one detector shall be placed per every 2000 square feet of open floor area.

2) Regularly occupied rooms shall be tested simultaneously.

A) The licensee shall ensure that each occupant/resident is provided information regarding necessary test conditions.

B) The licensee shall perform and document a surveillance of the building to determine the rooms needing testing prior to placement.

3) Follow-up Measurements

A) Follow-up measurements shall be performed in every room with a short-term, initial measurement result of 4.0 pCi/L or greater, unless measurements are during a real estate transaction. Refer to Appendix A.

B) If performing measurements in accordance with subsection (c), Options for Real Estate Testing, follow-up measurements are not required. Refer to Appendix B.

4) During both initial and follow-up measurements, the HVAC system shall be operated normally. An understanding of the design, operation and maintenance of a building's HVAC system and how it influences indoor air conditions is essential for understanding, managing and developing a measurement strategy in multi-family buildings. If the units of a building have a common HVAC system, the building shall be tested by a licensee licensed to perform measurements in commercial buildings.

5) The Radon Measurement Professional licensee shall recommend in writing to the multi-family building management, owners or representatives that a decision to mitigate be based on Appendix A or Appendix B, as applicable.

6) Multi-family building measurements shall be performed in accordance with subsections (a) through (e) and (h) through (n).

A) A Device Placement Log and Floor Plan shall be finalized for each multi-family building in which radon or radon progeny measurements are made.

B) All measurements devices, including duplicate measures and blanks, shall be noted on the Device Placement Log and by serial number.

7) Requirements for Specific Multi-Family Building Designs

A) Slab-on-Grade Design. Measure a regularly-occupied room in each unit in contact with the ground.

B) Crawlspace Design. Measure a regularly-occupied room directly in each unit above an enclosed crawlspace.

C) Basement Design. In addition to measuring a regularly-occupied basement room in each unit, measure a regularly-occupied room in each unit above the basement that has at least one wall with substantial contact with the ground.

g) School and Commercial Building Measurements. Professional licensees shall

submit standard operating procedures for the performance of school and commercial building measurements.

1) Initial measurements shall be short-term measurements of at least 48 hours to 90 days, depending on the device used, and shall be made in all frequently occupied rooms in contact with the soil, whether the contact is slab-on-grade, a basement, berm, a room above a crawlspace or any combination.

    A) Frequently occupied rooms include classrooms, offices, conference rooms, gymnasiums, auditoriums, cafeterias and break rooms.

    B) Testing need not be conducted in infrequently used areas such as storage rooms, stairwells, restrooms, utility closets, elevator shafts or hallways.

    C) A minimum of one detector shall be placed per every 2000 square feet of open floor area.

    D) Schools and commercial buildings shall only be tested for radon during periods when the HVAC system is operating as it does normally when the buildings are occupied, even if the testing occurs when school is not in session or during long holidays.

2) All frequently occupied rooms shall be tested simultaneously.

    A) The licensee shall ensure that the teacher or frequent adult user of the room being tested is aware of the detector.

    B) The licensee shall perform and document a surveillance of the building to determine the rooms needing testing prior to placement.

    C) The measurement professional shall review any School Screening Measurements available and may accept those measurements as valid in determining any additional appropriate testing strategies.

3) Follow-up measurements shall be performed in every room with a short-term, initial measurement result of 4.0 pCi/L or greater. Refer to Appendix A.

4) During both initial and follow-up measurements, the HVAC system shall be operated normally.

5) The Radon Measurement Professional licensee shall recommend in writing to the school or commercial building management, owners or representatives that a decision to mitigate not be based on initial

measurement results.

6) School and commercial building measurements shall be performed in accordance with subsections (a) and (b).

A) School and commercial building measurements of less than 96 hours duration shall be performed under closed-building conditions as described in subsection (b)(1).

B) Duplicate measurements shall be performed and shall represent 10 percent of all the detectors deployed, or a maximum of 50 detectors, whichever is less, within the building.

C) Blank measurements shall be performed and shall represent 5 percent of all the detectors deployed, or a maximum of 25 detectors, whichever is less, within the building.

D) Licensees using passive monitors shall conduct spiked measurements at the rate required in Section 422.140(a)(2)(B)(ii).

E) A Device Placement Log and Floor Plan shall be finalized for each school or commercial building in which radon or radon progeny measurements are made. All measurement devices, including duplicate measures and blanks, shall be noted on the Device Placement Log and Floor Plan by serial number.

7) Requirements for Specific School and Commercial Building Designs

A) Slab-on-Grade Design. Measure all frequently-occupied rooms in contact with the ground.

B) Open-Plan or Pod Design. If sections of a pod have moveable walls that can physically separate them from other sections, measure each section separately. If moveable walls are absent or inoperable, measure the pod as one room placing detectors every 2000 square feet.

C) Crawlspace Design. Measure all rooms directly above an enclosed crawlspace.

D) Basement Design. In addition to measuring all frequently-occupied basement rooms, measure all frequently occupied rooms above the basement that have at least one wall with substantial contact with the ground.

8) The on-site presence of the Licensed Radon Measurement Professional

providing supervision is required for all radon measurement activities at schools and commercial buildings.

h) New Construction Testing Conditions

1) Newly constructed buildings shall not be tested for radon or radon progeny unless the installation of the following items is completed:

A) All insulation;

B) All exterior doors with associated hardware shall be installed prior to testing;

C) All windows;

D) All fireplaces and fireplace dampers;

E) All heating, air conditioning, and plumbing appliances;

F) All ceiling covers;

G) All interior trim and coverings for the exterior walls;

H) All exterior siding, weatherproofing and caulking;

I) All interior and exterior structural components; and

J) Any interior or exterior work that may adversely affect the measurement validity.

2) Unoccupied homes shall be tested with the HVAC system set and operating in the normal range, such as 72 degrees F plus or minus 5 degrees F.

i) Post-Mitigation Testing

1) Post-mitigation measurements shall not be conducted if temporary radon reduction measures are in use.

2) Post-mitigation measurements shall be conducted to determine a system's effectiveness after a permanent radon reduction system has been fully operational for at least 24 hours but not later than 30 days following completion and activation of a mitigation system. The mitigation system shall be operated normally and continuously during the entire measurement period.

3) Post-mitigation measurements shall be conducted in accordance with subsections (a), (b) and (c).

j) Temporary Radon Reduction Measures

1) Temporary radon reduction measures include:

A) The introduction of unconditioned air into the building; or

B) Closure of normally accessible areas of the building; or

C) Lowering the thermostat below its normal use range, such as 72 degrees F plus or minus 5 degrees F.

2) Any of the conditions listed in subsection (k) of this Section shall invalidate measurement results. The Radon Measurement licensee shall not conduct a measurement until the conditions have been corrected. The Radon Measurement licensee shall inform the client and other parties involved in a real estate transaction that these conditions invalidate the measurement results.

3) Any improper radon reduction efforts that may affect the measurement results identified prior to, during, or after initial, follow-up, real estate option or post-mitigation measurements shall invalidate the measurement results. The Radon Measurement licensee shall not conduct a measurement until the improper conditions have been corrected.

4) Post-mitigation measurements shall not be conducted if any improper radon reduction efforts that may affect the measurement results are identified.

k) When Radon Measurements Shall Not Be Made

1) Short-term radon measurements of less than 96 hours shall not be conducted during severe storms or periods of sustained high winds (30 miles per hour or more). Radon Measurement licensees shall check and document local weather forecasts prior to placing short-term measurement devices when the measurement period is less than 96 hours.

AGENCY NOTE: The National Weather Service defines a severe storm as a storm that generates winds of 58 mph, and/or ¾-inch diameter hail and that may produce tornadoes – not necessarily in that order.

2) Radon measurements of any duration shall not be made during renovation of a building, especially renovations involving structural changes, or during

renovations of the HVAC systems or any change that disturbs the normal airflow of the building.

AGENCY NOTE: When renovations are planned, radon measurements should be made prior to renovations and immediately upon the completion of renovations.

l) Quality Assurance for Radon Measurements.

1) Radon Measurement licensees shall abide by the Quality Assurance Program described in Section 422.60(a)(5)(I).

2) Measurements not performed in accordance with subsections (a), (b) and (c) shall be considered inappropriate for the purpose of determining the need for mitigation or the effectiveness of a mitigation service.

m) Measurement Documentation

1) Radon Measurement Professional licensees shall ensure that sufficient information on each measurement is recorded in a permanent record to allow for future data comparisons, interpretations and reporting to clients.

2) Radon Measurement Professional licensees shall keep the following information in a measurement record that shall be maintained for inspection for a minimum of 5 years. Additional method-specific documentation is outlined in Section 422.140.

A) A complete copy of the measurement report.

B) A description of any non-interference controls used and copies of non-interference agreements completed in accordance with subsection (d); and

C) A record of any quality control measures associated with the test, such as the results of simultaneous measurements, diagnostic measurements, duplicate measurements, and calculations associated with the measurement.

n) Measurement Results

1) Measurement results shall be reported in the units that the device measures.

2) Any measurement results based on radon gas shall be reported to no more than one decimal place, e.g., 4.3 pCi/L.

3) All valid individual measurement results shall be reported.

4) When using continuous radon monitors, hourly readings shall be included.

5) Measurements made in separate locations shall not be averaged.

6) The average of collocated measurement devices shall be reported, as well as the individual results. Standard mathematical rules shall be followed; i.e., if the average of two measurements produces a result of 3.95 pCi/L, the result shall be reported as 4.0 pCi/L.

7) Any quality control measurements shall be reported as such.

o) Measurement Reports

1) Radon Measurement Professional licensees shall return radon measurement results to the occupant, the owner of the building, his/her representatives or the client within 45 days after retrieving exposed devices. As a minimum, the measurement report shall contain:

A) Measurement results reported in accordance with subsection (n).

B) The exact start and stop dates and times of the measurement period.

C) The address of the building measured, including the zip code.

D) A description of the measurement device used, its manufacturer, model or type, and serial numbers or other unique device identification numbers.

E) The names and Illinois radon license numbers of the licensees placing and retrieving the devices.

F) The name and Illinois license number of the laboratory analyzing the device, if applicable.

G) A statement describing recommendations concerning retesting or mitigation provided to the occupant, the owner of the building, his/her representatives or the client in accordance with Appendix A or B, as appropriate.

H) A statement of whether a mitigation system was observed in the building during placement or retrieval. The statement shall indicate whether the system is PNC or ASD. If the system is ASD, the statement shall indicate whether the mitigation system is operating and the mitigation tag number for systems installed after November 1, 2009.

I) A statement describing any observed tampering, interference or deviations from the required measurement conditions.

J) A description of the condition of any permanent vents that allow outdoor air into the building, such as crawlspace vents or combustion air supply to combustive appliances.

K) A description of any severe weather conditions.

L) The exact locations of all measurement devices deployed and any information that would allow for future data comparisons and interpretations. Licensees shall provide the exact locations by one of the following methods:

i) A scale diagram of the footprint of the building identifying the windows and doors, finished and unfinished areas, room use, furnaces, hot water heaters, dryers, combustion appliances, crawlspace vents, fireplaces, mitigation systems, floor drains and foundation types, indicating the front of the home and any other pertinent information that may affect the measurement.

ii) A copy of Appendix E for each foundation type measured.

2) Laboratories receiving an exposed device that has been delivered for analysis shall return results to the client within 45 days. At a minimum, the measurement report shall contain:

A) Measurement results reported in accordance with subsection (n).

B) The exact start and stop dates of the measurement period.

C) The address of the building measured, including the zip code.

D) A description of the measurement device used, its manufacturer, model or type, and serial numbers or other unique device identification numbers.

E) The name and Illinois license number of the laboratory analyzing the device.

p) Devices Placed by Clients. Radon licensees shall provide the client with the following:

1) For licensees providing measurement devices to clients, sufficient detectors to ensure that testing is performed consistent with this Part.

2) The Agency's address and telephone number.

3) Devices that will be placed by the client shall be accompanied by instructions on how to use the device. These instructions shall be consistent with this Section and include specific information on the minimum and maximum length of time that the device shall be exposed.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.140 Device Protocol

a) Quality Assurance

1) Professional licensees providing measurement services using radon and radon product measurement devices shall establish and maintain a Quality Assurance Program (QAP). These programs shall include written procedures for attaining quality assurance objectives and a system for recording and monitoring the results of the quality assurance measurements for each device used. The QAP shall include the maintenance of control charts and related statistical data.

2) The objective of quality assurance is to ensure that data are scientifically sound and of known precision and accuracy. This subsection (a)(2) discusses the 6 general categories of quality control measurements. Specific guidance is provided for each method in the relevant protocol.

A) Calibration Measurements. Calibration measurements are samples collected or measurements made in a known radon environment, such as a radon chamber. Instruments providing immediate results, such as continuous working level and radon monitors, shall be operated in a radon chamber to establish individual instrument calibration factors.

i) Calibration measurements must be conducted to determine and verify the conversion factors used to derive the concentration results. These factors are determined normally for a range of concentrations and exposure times, and for a range of other exposure and/or analysis conditions pertinent to the particular device.

ii) Determination of these calibration factors is a necessary part of the laboratory analysis and is the responsibility of the laboratory. These calibration measurement procedures,

including the frequency of tests and the number of devices to be tested, shall be specified in the QAP maintained by manufacturers and analysis laboratories.

iii) Licensees providing measurements with active devices are required to recalibrate their instruments at least once every 12 months.

B) Known Exposure Measurements (Spikes). Known exposure measurements or spiked samples consist of detectors that have been exposed to known concentrations in a radon chamber. These detectors, such as charcoal canisters, alpha track detectors and electret ion chambers, are labeled and submitted to the laboratory in the same manner as ordinary samples to preclude special processing.

i) Suppliers and analysis laboratories shall provide for the blind introduction of spiked samples into their measurement processes and the monitoring of the results in their QAP.

ii) Licensees using passive monitorsshall conduct spiked measurements (i.e., exposure in a radon chamber where the environmental radon level is controlled) to aid the Agency in verifying the accuracy of the entire measurement system. The licensee shall conduct 3 spiked measurements per 100 measurements, with a minimum of 3 spiked measurements per year. For example, a licensee conducting only 70 measurements in a year must conduct at least 3 spiked measurements. A licensee conducting 500 measurements during a one-year period must conduct at least 15 spiked measurements (3 per each 100). No more than 6 spiked measurements will be required to be taken within any single month. For example, a licensee performing more than 200 measurements in one month is not required to perform more than 6 spiked measurements that month. Licensees are encouraged to take their spiked measurements from multiple batches when possible and to take more than the minimally required spiked measurements at their discretion. Devices shall be exposed in a radon chamber at a minimum of 3 different radon concentrations, such as approximately 4.0, 10-30 and 30-100 pCi/L.

iii) Spikes shall be labeled in the same manner as field detectors to ensure identical processing. The results of analyses of

detectors exposed to known radon concentrations shall be monitored and recorded. Any significant deviation from the known concentration to which they were exposed shall be investigated and corrective action taken.

C) Background Measurements. Background measurements are required both for continuous monitors and for passive detectors requiring laboratory analysis.

i) Licensees using continuous monitors shall perform sufficient instrument background measurements to establish a reliable instrument background and to act as a check on instrument operation.

AGENCY NOTE: Calibration laboratories routinely perform background measurements of continuous monitors during the calibration of instruments.

ii) Passive detectors requiring laboratory analysis require one type of background measurement made in the laboratory and another in the field.

iii) Laboratories shall measure the background of a statistically significant number of unexposed detectors from each batch or lot to establish the laboratory background for the batch and the entire measurement system. This laboratory blank value is subtracted (by the laboratory) from the field sample results reported to the user, and shall be made available to the users for quality assurance purposes.

iv) Laboratories performing these measurements shall calculate the lower limit of detection (LLD) for their measurement systems. This LLD is based on the detector and analysis system's background and can restrict the ability of some measurement systems to measure low concentrations.

v) Licensees using passive detectors shall employ field controls (called blanks) equal to approximately 5 percent of the detectors that are deployed, or 25 each month, whichever is smaller.

vi) These controls shall be set aside from each detector shipment, kept sealed and in a low radon environment, labeled in the same manner as the field samples to preclude special processing, and returned to the analysis laboratory

along with each shipment. These field blanks measure the background exposure that may accumulate during shipment and storage. The results shall be monitored and recorded.

vii) The recommended action to be taken if the concentrations measured by one or more of the field blanks is significantly greater than the LLD is dependent upon the type of detector and is discussed in the protocol for each method.

D) Duplicate Measurements. Duplicate measurements provide a check on the precision of the measurement result and allow the user to make an estimate of the relative precision. Large precision errors may be caused by detector manufacture or improper data transcription or handling by suppliers, laboratories, or technicians performing placements. Precision error can be an important component of the overall error; therefore, licensees performing measurements shall monitor precision.

i) Duplicate measurements shall be side-by-side measurements made in at least 10 percent of the total number of measurement locations, or 50 each month, whichever is smaller. The locations selected for duplicate measurement shall be distributed systematically throughout the entire population of samples.

ii) The precision of duplicate measurements shall be monitored and recorded in the quality assurance records. The analysis of data from duplicates shall be plotted on range control charts. If the precision estimated by the user is not within the precision expected of the measurement method, the cause of the problem shall be investigated.

iii) Detectors shall be treated identically in every respect. They shall be shipped, stored, opened, installed, removed and processed together, and not identified as duplicates to the processing laboratory.

E) Routine Instrument Performance Checks. Proper functioning of analysis equipment and operator usage require that the equipment and measurement system be subject to routine checks. Regular monitoring of equipment and operators is vital to ensure consistently accurate results. Performance checks include the frequent use of an instrument check source. Components of the device (such as a pump, battery or electronics) shall be checked regularly and the results noted in a record. Each user shall develop

methods for regularly monitoring (preferably daily with use) their measurement system and for recording and reviewing results.

F) Cross-checks. Professional licensees using active monitors shall check their monitors for bias on a regular basis. Ideally, such measurements are made in a radon chamber. Exposure in a radon chamber is required during calibration. It can be difficult to expose active monitors more often than once every 12 months. It is important to more frequently assess the continued satisfactory operation of the instrument response and to ensure damage from shipping has not occurred prior to an instrument being placed into service after calibration. Cross-checks shall be performed prior to placing an instrument being returned to service after calibration and at 6 months (plus or minus a month) after calibration. The following conditions shall be met:

i) Where feasible, a cross-check shall begin with an instrument background measurement.

ii) The cross-check measurement shall be made in an environment that has been chosen for its stability and radon concentration that is above the lower limit of detection.

iii) Cross-checks shall be side-by-side measurements.

iv) One of the instruments shall have been calibrated within the last 45 days.

v) A measurement of at least 48 hours duration shall be conducted.

vi) The bias of cross-check measurements shall be monitored and recorded in the quality assurance records. If the bias estimated by the user is not within the bias expected of the measurement, the cause of the problem shall be investigated and corrective action taken in accordance with the licensee's Agency-approved QAP.

b) Protocol for using continuous radon monitors (CRs) to measure indoor radon concentrations

1) Refer to Section 422.130 for a list of general conditions that shall be met and standard information that shall be documented.

2) When performing a radon measurement, the CR shall be programmed to run continuously, recording periodically (hourly or more frequently) the radon

concentration for at least 48 hours. Longer measurements may be required per the continuous monitor type and the radon level being measured.

3) If the first 4 hours of data from a 48-hour measurement are discarded because data are produced prior to the establishment of equilibrium conditions in the test device, the remaining hours of data shall be averaged and shall be sufficient to represent a 2-day measurement.

4) Every CR shall be calibrated in a radon chamber, approved by the Agency, before being placed into service, and after any repairs or modifications that could affect the calibration. Subsequent recalibrations and background checks shall be performed at least once every 12 months. Each scintillation cell requires an individual calibration factor.

5) Background measurements shall be performed after every 1,000 hours of operation of scintillation cell-type CRs and whenever any type of CR is calibrated. The background shall be checked by purging the monitor with clean, aged air or nitrogen in accordance with the manufacturer's instructions. In addition, the background count rate shall be monitored in accordance with the manufacturer's instruction.

6) Licensees providing measurement services with CR devices shall perform duplicate measurements. The performance and analysis of duplicates shall be completed in accordance with subsection (a)(2)(D).

7) Pumps and flow meters shall be checked before and after each measurement in accordance with the manufacturer's instruction.

8) Licensees providing measurement services with CR devices shall perform cross-checks. The performance and analysis of cross-checks shall be completed in accordance with subsection (a)(2)(F).

c) Protocol for using alpha track (AT) detectors to measure indoor radon concentrations

1) Refer to Section 422.130 for a list of general conditions that shall be met and standard information that shall be documented.

2) The laboratory background level for each batch of ATs shall be established by each laboratory licensed by the Agency. Laboratories shall measure the background of a statistically significant number of unexposed ATs that have been processed according to the licensee's Quality Assurance Program implementing/operating procedures.

3) Every AT laboratory system shall be calibrated in a radon chamber at least once every 12 months. Determination of a calibration factor requires

exposures of ATs to a known radon concentration in a radon chamber. These calibration exposures shall be used to obtain or verify the conversion factor between net tracks per unit area and radon concentration.

A) ATs shall be exposed in a radon chamber at a minimum of 3 different radon concentrations such as approximately 4.0, 10-30 and 30-100 pCi/L or exposure levels similar to those found in the tested buildings.

B) Expose a minimum of 10 detectors at each radon concentration of the chamber.

C) A calibration factor shall be determined for each batch or sheet of detector material received from the supplier. Alternatively, calibration factors may be established for several sheets, and these factors extended to detectors from sheets exhibiting similar sensitivities (within pre-established tolerance limits).

D) Analysis instruments shall be checked at least daily for operability prior to operation. Analysis instruments do not need to be checked on days not used.

4) Licensees providing measurement services with AT devices shall perform known exposure measurements (spikes). The performance and analysis of spikes shall be completed in accordance with subsection (a)(2)(B).

5) Licensees providing measurement services with AT devices shall perform duplicate measurements. The performance and analysis of duplicates shall be completed in accordance with subsection (a)(2)(D).

6) Licensees providing measurement services with AT devices shall perform background measurements. The performance of background measurements shall be completed in accordance with subsection (a)(2)(C).

A) The results shall be monitored and recorded. If one or a few field blanks have concentrations significantly greater than the LLD established by the supplier, it may indicate defective packaging or handling and the licensee shall investigate the cause. If the average value from the field control devices (field blanks) is significantly greater than the LLD established by the supplier, this average value shall be subtracted from the individual values reported for the other devices in the exposure group.

B) It may be advisable to use 3 sets of detectors (pre-exposure, field and post-exposure background) in order to allow the most

thorough and complete evaluation of radon levels. For example, one group of detectors (pre-exposure detectors) may be earmarked for background measurement and returned for processing immediately after the other detectors are deployed. The results from these detectors determine if the number of tracks acquired before deployment is significant and should be subtracted from the gross result. The second set of background detectors (post-exposure background detectors) are obtained just before the field monitors are to be collected and are opened and kept in the same location as the returning field monitors for the same duration, and returned with them. Finally, this "post-exposure background" is subtracted from the field results, if found to be significant. In general, a value of 1 pCi/L or greater for any blank AT indicates a significant level that should be investigated and potentially subtracted from the field AT results.

d) Protocol for using electret ion chamber radon (ES or EL) detectors to measure indoor radon concentration.

1) Refer to Section 422.130 for a list of general conditions that shall be met and standard information that shall be documented.

2) Every short-term and long-term electret system and the electret reader(s) shall be calibrated in a radon chamber, approved by the Agency. Initial calibration for the system is provided by the manufacturer. Subsequent recalibrations shall be performed at least once every 12 months. Determination of calibration factors for short-term or long-term detectors requires exposure of detectors to known concentrations of radon-222 in a radon exposure chamber. Since short-term and long-term electret detector systems are also sensitive to gamma radiation, a gamma exposure rate measurement in the test chamber is also required annually.

3) The following is provided to manufacturers and suppliers of ES or EL services as minimum requirements in determining the calibration factor:

A) Detectors shall be exposed in a radon chamber at a minimum of 3 different radon concentrations, such as approximately 4.0, 10-30 and 30-100 pCi/L, or exposure levels similar to those found in the tested buildings.

B) Expose a minimum of 10 detectors at each radon concentration of the chamber.

C) Ensure a period of exposure sufficient to allow the detector to achieve equilibrium with the radon chamber atmosphere.

4) Licensees providing measurement services with ES or EL devices shall perform known exposure measurements (spikes). The performance and analysis of spikes shall be completed in accordance with subsection (a)(2)(B).

5) Licensees providing measurement services with ES or EL devices shall perform duplicate measurements. The performance and analysis of duplicates shall be completed in accordance with subsection (a)(2)(D).

6) Licensees providing measurement services with short-term or long-term electrets shall set aside a minimum of 5 percent of the electrets or 10, whichever number is smaller, from each shipment and evaluate them for voltage drift. The electrets shall be kept covered with protective caps in a low radon environment and analyzed for voltage drift over a time period similar to the time period used for those deployed in measurements. Any voltage loss found in the control electrets of more than one volt per week over a 3-week test period for short-term electrets, or one volt per month over a 3-month period for long-term electrets, shall be investigated.

7) Proper operation of the surface voltmeter shall be monitored following the manufacturer's procedures for zeroing the voltmeter and analyzing a reference electret. These checks shall be conducted at least once a week while the voltmeter is in use.

8) All Laboratory Analysis licensees providing recharging services of short-term or long-term electrets shall only provide those services for devices they manufacture or for devices for which they have written authorization from the manufacturer.

e) Protocol for using activated charcoal adsorption (AC) devices to measure indoor radon concentrations

1) Refer to Section 422.130 for a list of general conditions that shall be met and standard information that shall be documented.

2) Every activated charcoal adsorption system shall be calibrated in a radon chamber at least once every 12 months. Determination of calibration factors for ACs requires exposure of the detectors to known concentrations of radon-222 in a radon chamber. The calibration factors depend on the exposure time and may also depend on the amount of water adsorbed by the charcoal container during exposure. Calibration factors shall be determined for each AC measurement system (container type, amount of charcoal, gamma detector type, etc.).

3) Licensees providing measurement services with AC devices shall perform known exposure measurements (spikes). The performance and analysis of

spikes shall be completed in accordance with subsection (a)(2)(B).

4) Licensees providing measurement services with AC devices shall perform duplicate measurements. The performance and analysis of duplicates shall be completed in accordance with subsection (a)(2)(D).

5) Laboratory Control Detectors. The laboratory background level for each batch of ACs shall be established by each laboratory or supplier. Suppliers shall measure the background of a statistically significant number of unexposed detectors that have been processed according to their standard operating procedures (laboratory blanks). The analysis laboratory or supplier calculates the net readings, that are used to calculate the reported sample radon concentrations, by subtracting the laboratory blank values from the results obtained from the field detectors.

6) Licensees providing measurement services with AC devices shall perform background measurements. The performance of background measurements shall be completed in accordance with subsection (a)(2)(C).

A) One or a few of the field blanks have concentrations significantly greater than LLD established by the supplier may indicate defective devices or poor procedures and the licensee shall investigate the cause.

B) If most of the field blanks have concentrations significantly greater than the LLD, the average value of the field blanks shall be subtracted from the reported field detector concentrations and the supplier notified of a possible problem.

7) Counting equipment shall be subject to daily operability checks by counting an instrument check source and determining whether the reference source is constant to within established limits (2 standard deviations). Daily operability checks do not need to be performed on days the instrument is not used. The characteristics of the check source (geometry, type of radiation emitted, etc.) shall be similar to those of the samples analyzed. The count rate of the check sources shall be high enough to yield good counting statistics in a short time (for example, 1000 to 10,000 counts per minute) to provide a maximum random uncertainty of 5 percent.

f) Protocol for using charcoal liquid scintillation (LS) devices to measure indoor radon concentrations

1) Refer to Section 422.130 for a list of general conditions that shall be met and standard information that shall be documented.

2) Every LS laboratory system shall be calibrated in a radon chamber at least

once every 12 months. Determination of calibration factors for LS devices requires exposure of calibration devices to known concentrations of radon-222 in a radon chamber at carefully measured radon concentrations. The calibration factors depend on the exposure time and may also depend on the amount of water adsorbed by the device during exposure. Calibration factors shall be determined for a range of different exposure times and, as appropriate, humidities.

3) Licensees providing measurement services with LS devices shall perform known exposure measurements (spikes). The performance and analysis of spikes shall be completed in accordance with subsection (a)(2)(B).

4) Licensees providing measurements services with LS devices shall perform duplicate measurements. The performance and analysis of duplicates shall be completed in accordance with subsection (a)(2)(D).

5) Laboratory Control Devices. The laboratory background level for each batch of LS devices shall be established by each laboratory or supplier. Suppliers shall measure the background of a statistically significant number of unexposed LS devices that have been processed according to their standard operating procedures (laboratory blanks). The analysis laboratory or supplier calculates the net readings, that are used to calculate the reported sample radon concentrations, by subtracting the laboratory blank values from the results obtained from the field detectors.

6) Licensees providing measurement services with LS devices shall perform background measurements. The performance of background measurements shall be completed in accordance with subsection (a)(2)(C).

   A) One or a few of the field blanks have concentrations significantly greater than the LLD established by the supplier may indicate defective devices or poor procedures and the licensee shall investigate the cause.

   B) If most of the field blanks have concentrations significantly greater than the LLD, the average value of the field blanks shall be subtracted from the reported field detector concentrations and the supplier notified of a possible problem.

7) Counting equipment shall be subject to daily operability checks by counting an instrument check source and determining whether the reference source is constant to within established limits (2 standard deviations). Daily operability checks do not need to be performed on days the instrument is not used. The characteristics of the check source (geometry, type of radiation emitted, etc.) shall be similar to those of the samples analyzed. The count rate of the check sources shall be high enough to yield good counting

statistics in a short time (for example, 1000 to 10,000 counts per minute) to provide a maximum random uncertainty of 5 percent.

g) Protocol for using continuous working level (CW) monitors to measure indoor radon progeny concentrations

1) Radon Decay Product measurements may be appropriate under certain conditions in large buildings, but are not currently routinely performed by licensees or recommended by the American Association of Radon Scientists and Technologists. The Agency does not recommend their use for home environment or residential real estate measurements. Licensees interested in using CWs for measurement purposes shall submit Standard Operating Procedures, consistent with this Part, specific to the model and design of the CW instrument to the Agency for approval.

2) Conditions and information in Section 422.130 shall be met.

3) Any measurement result based on radon progeny shall be reported to no more than 3 decimal places, e.g., 0.033 working level (WL).

4) The integrated average WL over the measurement period shall be reported as the measurement result.

5) When performing a radon measurement, the CW shall be programmed to run continuously, recording the periodic WL and, when possible, the total integrated average WL. The longer the operating time, the smaller the uncertainty associated with using the measurement result to estimate a longer-term average concentration.

6) Working level values shall be converted to pCi/L and both shall be reported to the client. The conversions from WL to pCi/L shall be presented and explained clearly in the report to the client. A statement shall be included in the measurement report that this approximate conversion is based on a 40 percent equilibrium ratio. In addition, the report shall state that this equilibrium ratio is typical, but that any indoor environment may have a different and varying relationship between radon and radon progeny.

7) Every continuous WL monitor shall be calibrated in a radon chamber, approved by the Agency, before being placed into service and after any repairs or modifications that could affect the calibration. Subsequent recalibrations shall be performed at least once every 12 months.

8) Background measurements shall be performed after every 168 hours of operation and whenever the unit is calibrated. The CW shall be purged with clean, aged air or nitrogen in accordance with the manufacturer's

instructions. In addition, the background count rate may be monitored more frequently by operating the CW in a low radon concentration.

9) Measurement licensees providing measurement services with CW devices shall perform duplicate measurements. The performance and analysis of duplicates shall be completed in accordance with subsection (a)(2)(D).

10) Pumps and flow meters shall be checked before and after each measurement in accordance with the manufacturer's instruction to ensure accuracy of volume measurements. This may be performed using a dry-gas meter or other flow measurement device of traceable accuracy.

11) Licensees providing measurement services with CW devices shall perform cross-checks. The performance and analysis of cross-checks shall be completed in accordance with subsection (a)(2)(F).

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.150 Mitigation Standard for Existing Housing

a) The Mitigation Standard (MS) includes requirements for installation of radon remediation systems and provides a basis for evaluating the quality of such installations. It provides the basis against which in-progress or completed inspections will be evaluated.

b) Radon Mitigation Professional licensees shall be responsible for all radon mitigation systems installed by their firm or its subcontractors to ensure compliance with the requirements of this Mitigation Standard.

c) Limitations

1) Where discrepancies exist between provisions of the MS and municipal codes, the municipal codes shall take precedence, except that the municipal codes shall not take precedence with regard to alterations that may adversely impact the radon reduction functions for which such systems were originally designed and may adversely impact public health and safety regarding exposure to a radioactive element.

2) Compliance with the MS does not guarantee reduction of indoor radon concentrations to any specific level.

3) When altering a mitigation system, it shall be upgraded to the requirements of this Section. Altering radon mitigation systems does not include activities such as replacing worn out equipment or providing new filters, while leaving the remainder of the system unchanged. When maintenance is performed by a licensee on a mitigation system that does

not comply with this Part, the client shall be notified in writing that the mitigation system does not comply with the mitigation standards of this Part. In addition, the professional licensee shall provide a written estimate of the upgrades needed and the cost to bring the system into compliance.

d) Quality Assurance. Radon Mitigation licensees shall follow the procedures specified in the Quality Assurance Program as required by Section 422.60(c)(5)(D).

e) General Practices. The following general practices are required for all contacts between Radon Mitigation licensees and clients.

1) In the initial contact with a client, the licensee shall review any available results from previous radon measurements to assist in developing an appropriate mitigation strategy. If the radon measurement was not performed in accordance with this Part, the client shall be advised that a retest is recommended.

2) The licensee shall inform the client of or provide to the client, Illinois specific documents, approved by the Agency, that discuss interpretation of indoor radon test results and the health risk associated with the radon level found in the building. These documents are available from the Agency and are on the Agency web site.

3) The licensee shall inform the client in writing, at the time a proposal for the installation of a radon reduction system is offered, of any sealants, caulks, or bonding chemicals containing volatile solvents and of the need to ventilate work areas during and after the use of such materials. The licensee shall provide ventilation as recommended by the manufacturer of the material used if existing ventilation does not meet the recommendations of the manufacturer of the material used.

f) Building Investigation

1) The licensee shall conduct a thorough visual inspection of the building prior to initiating any radon mitigation work. The results of the inspection shall be recorded in detail on a drawing of the floor plan. The licensee shall identify and describe any specific building characteristics and configurations, such as large cracks in slabs, exposed earth in crawlspaces, open stairways to basements, or air ducts under the slab of any foundation, and operational conditions, such as continuously running HVAC systems, or operability of windows that may affect the design, installation, and effectiveness of radon mitigation systems.

A) As part of this inspection, the licensee shall request from the client any available information on the building, such as construction

specifications, pictures, drawings, etc., that might be valuable in determining the radon mitigation strategy.

B) A floor-plan drawing shall be finalized from preliminary inspection sketches and shall include illustration of the building foundation, the location of all walls, drain fixtures, HVAC systems and radon entry points, results of any diagnostic testing, the layout of any radon mitigation system piping, and the location of any vent fan and system warning devices.

C) The finalized drawing shall be an auditable part of the mitigation file and shall be available to the occupant, the owner of the building, his/her representatives or the client, upon request.

2) The licensee shall conduct diagnostic tests to assist in identifying and verifying radon entry points and shall document the results of these tests in writing. Such tests may include radon grab sampling, continuous radon monitoring, and the use of smoke sticks.

3) If a contractor has concerns about backdrafting potential at a particular site, the contractor shall recommend that a qualified person inspect the natural draft combustion appliances and venting systems for compliance with local codes and regulations. The contractor shall recommend that the building owner bring into compliance any combustion appliance or venting system found to be non-complying.

4) Licensees shall not install a fan-powered radon reduction system in any building wherein confirmed spillage from any natural combustion appliance occurs, until the licensee has confirmed that the problem has been corrected by the client.

5) Licensees shall conduct a communication test prior to completing a proposal for the installation of a radon reduction system in any building where the characteristics of the sub-slab material are unknown to the licensee. The results of the communication test shall be documented in writing or on a drawing of the building floor plan.

g) Systems Design

1) All radon mitigation systems shall be designed and installed as permanent, integral additions to a building, except in accordance with subsection (e)(3).

2) All radon mitigation systems shall be designed to avoid the creation of other health, safety, or environmental hazards to building occupants, such as backdrafting of natural draft combustion appliances.

3) The main run of vent pipe, from primary suction point to exhaust, shall be a minimum 3 inches in diameter to avoid excessive flow noise inside the pipe and noise when the exhaust jet is released.

4) All radon mitigation systems and their components shall be designed to comply with the laws, ordinances, codes, and regulations of relevant jurisdictional authorities, including applicable mechanical, electrical, building, plumbing, energy and fire prevention codes.

5) All radon mitigation systems shall be designed to reduce a radon concentration in each area within the footprint of the building as low as reasonably achievable (ALARA).

6) As installed, the mitigation system shall operate at a reasonable noise level.

h) Systems Installation

1) General Requirements

A) All components of radon mitigation systems shall also be in compliance with the applicable mechanical, electrical, building, plumbing, energy and fire prevention codes, standards, and regulations of local jurisdiction.

B) Where portions of structural framing material must be removed to accommodate radon vent pipes, material removed shall be no greater than that permitted for plumbing installations by applicable building or plumbing codes.

C) Where radon mitigation system installation requires pipes or ducts to penetrate a firewall or other fire resistance rated wall, floor or ceiling penetrations shall be protected in accordance with applicable building, mechanical, fire and electrical codes.

AGENCY NOTE: An example of a protected penetration would be the installation of a fire collar on a vent pipe penetrating a ceiling.

D) Sump pits shall not be used as the primary suction point for mitigation systems, unless in accordance with subsection (h)(7).

2) Radon resistant construction is required of new one- and two-family building construction. Active mitigation systems installed in new construction must be performed by a licensed mitigation professional or

technician.

3) Radon Vent Pipe Installation

A) All joints and connections in radon mitigation systems using plastic vent pipes shall be permanently sealed with adhesives as specified by the manufacturer of the pipe material used, with 2 exceptions:

i) If secondary suction points are installed in sump pits, the system shall be designed with removable or flexible couplings to facilitate removal of the sump pit cover and for sump pump maintenance; and

ii) To facilitate maintenance and future replacement, radon vent fans shall be installed in the vent pipe using removable couplings or flexible connections that can be tightly secured to both the fan and the vent pipe.

B) All joints and connections in radon mitigation systems using a 3-inch by 4-inch metal downspout on the exterior of a building shall be permanently sealed with appropriate sealants.

C) Vent stack discharge points shall be directed vertically with no obstruction in the discharge except for a rodent screen of wire mesh no smaller than ¼ inch. The rodent screen or wire mesh shall be installed in a manner that allows for easy removal for cleaning. Rain caps shall not be installed on the discharge.

D) Radon vent pipes shall be fastened to the structure of the building with hangers, strapping, or other supports that will permanently secure the vent material. Existing plumbing pipes, ducts, or mechanical equipment shall not be used to support or secure a radon vent pipe.

E) Radon vent pipes shall be supported as follows:

i) Supports for radon vent pipes shall be installed at least every 6 feet on non-vertical runs.

ii) Vertical runs shall be secured either above or below the points of penetration through floors, ceilings and roofs.

iii) Vertical runs shall be secured at least every 8 feet on runs that do not penetrate floors, ceilings or roofs.

F) To prevent blockage of air flow into the bottom of radon vent pipes, these pipes shall be supported or secured in a permanent manner that prevents their downward movement to the bottom of suction pits or sump pits, or into the soil beneath an aggregate layer under a slab.

G) Radon vent pipes shall be installed in a configuration that ensures that any rain water or condensation within the pipes drains downward into the ground beneath the slab or soil gas retarder membrane.

H) Radon vent pipes shall not block access to any areas requiring maintenance or inspection. Radon vents shall not be installed in front of or interfere with any light, opening, door, window or equipment access area required by code.

I) When a radon mitigation system is designed to draw soil gas from a perimeter drain tile loop (internal or external) that discharges water through a drain line to daylight or a soakaway, a one-way flow valve, water trap, or other control device shall be installed if diagnostic testing indicates that outside air is entering the system.

4) Vent Stack Discharge Point. The discharge from vent stack pipes of active soil depressurization systems shall prevent re-entrainment of radon, prevent vent stack blockage due to heavy snowfall and prevent the direct exposure of individuals outside of buildings to high levels of radon by meeting all the following requirements:

A) Above the highest eave of the roof and as close to the roof ridge line as possible, unless an attached garage may be used for vent stack pipe discharge and all the following additional conditions are met:

i) The vent stack point penetrates the highest point on the roof that maximizes distance from people using the house, yard, patio, deck, etc.;

ii) There are no windows in the direct line of sight from the vent stack point;

iii) The vent stack point penetrates the farthest point on the roof that maximizes distance from the nearest opening (such as windows, doors, etc.) into the house and garage that is less than 2 feet below the exhaust point; and

iv) The reason for routing through an attached garage shall be documented and maintained for inspection by the Agency;

B) 10 feet or more above ground level;

C) 10 feet or more from any window, door or other opening into conditioned spaces of the structure that is less than 2 feet below the exhaust point. The 10 feet may be measured either directly between the 2 points or be the sum of measurements made around intervening obstacles;

D) 10 feet or more from any opening into an adjacent building;

E) For vent stack pipes that penetrate the roof, at least 12 inches above the surface of the roof; and

F) For vent stack pipes attached to or penetrating the sides of buildings, vertical and at least 12 inches above the edge of the roof and in a position to prevent blockage from snow or other materials and from being filled with water from the roof or an overflowing gutter.

5) Radon Vent Fan Installation

A) Vent fans used in radon mitigation systems shall be designed or otherwise sealed to reduce the potential for leakage of soil gas from the fan housing.

B) Radon vent fans used in active soil depressurization systems shall be installed in attics, in garages that are not beneath conditioned spaces, or on the exterior of the building. Radon vent fans shall not be installed below ground nor in the conditioned (heated/cooled) space of a building, nor in any basement, crawlspace, or other interior location directly beneath the conditioned spaces of a building.

C) Radon vent fans shall be installed in a configuration that avoids condensation buildup in the fan housing. Fans shall be installed in vertical runs of the vent pipe.

D) Radon vent fans shall be mounted and secured in a manner that minimizes transfer of vibration to the structural framing of the building.

E) Radon vent fans shall be to mounted to the vent pipe with removable couplings or flexible connections to facilitate fan removal for repair or replacement.

F) The intakes of fans used in crawlspace pressurization, or in

pressurizing the building itself, shall be screened or filtered to prevent ingestion of debris or personal injury. Screens or filters shall be removable to permit cleaning or replacement and the building occupant and owner shall be informed of the need to periodically replace or clean such screens and filters. This information shall be included in documentation provided to the client.

G) Vent fans shall originate from a manufacturer that lists radon mitigation as one of the fan's intended uses.

6) Suction Pit Requirement for Sub-Slab Depressurization (SSD) Systems. Materials shall be excavated from the area immediately below the slab penetration point of SSD system vent pipes to provide optimum pressure field extension.

7) Sump Pit Requirements

A) Sump pits shall not be used as the primary suction point for mitigation systems except in accordance with subsection (h)(7)(J).

B) Sump pits that require a sump pump shall have a submersible sump pump installed, except in areas where the water table is near the surface causing flooding of the basement or interfering with the effectiveness of the mitigation system. (See subsection (h)(7)(D).)

C) When the sump pit is used as a secondary suction point, a submersible pump shall be installed in the sump pit.

D) In areas where the water table is near the surface, causing flooding of the basement or interfering with the effectiveness of the mitigation system, pedestal pumps with a higher pumping capacity may be installed in accordance with all the following conditions:

i) The pump is installed in accordance with the manufacturer's instructions.

ii) The sump lid can be sealed air tight with the exception of the tiny opening necessary to permit free operation of the pedestal pump's float.

iii) The design does not create noise, through the float opening, that is objectionable to the client.

E) Sump pits that permit entry of soil gas or that would allow conditioned air to be drawn into a mitigation system shall be covered and sealed to prevent such entry.

F) The covers on sumps that previously provided protection or relief from surface water collection shall be fitted with a water or mechanically trapped drain. Water traps shall be fitted with an automatic supply of priming water.

G) Sump pit covers shall be made of durable plastic or clear polycarbonate and be designed to permit air-tight sealing.

H) Sump pit covers shall be designed to support the weight of a 155-pound individual standing on the cover.

I) To permit easy removal for sump pump servicing, the sump pit cover shall be sealed using silicone or other non-permanent type caulking materials or an air-tight gasket.

J) When the basement of the home being mitigated has radiant heat lines installed in or below the floor, the sump pit may be used as the primary suction point. The radon vent shall include provisions for the removal of the sump lid for maintenance of the sump pump.

8) Sealing Requirements

A) Openings around radon vent pipe penetrations of the slab, the foundation walls, or the crawlspace soil gas retarder membrane shall be cleaned, prepared and sealed in a permanent, air-tight manner using compatible caulks or other sealants.

B) Openings around other utility penetrations of the slab, walls or soil gas retarder shall also be sealed. Cracks in slabs and other small openings around penetrations of the slab and foundation walls shall be cleaned, prepared and sealed in a permanent air-tight manner using caulks or other sealants designed for such application.

C) Where a Block Wall Depressurization (BWD) system is used to mitigate radon, openings in the tops of the block walls and all accessible openings or cracks in the interior surfaces of the block walls shall be cleaned, prepared and sealed with caulks or other sealants designed for such application.

D) When sealing holes for plumbing rough-in or other large openings in slabs and foundation walls that are below the ground surface, non-

shrink mortar, grouts, expanding foam, or other sealants designed for such application shall be used.

E) Openings or cracks that are determined to be inaccessible or beyond the ability of the licensee to seal shall be disclosed to the client and included in the documentation.

F) Openings, perimeter channel drains or cracks that exist where the slab meets the foundation wall (floor-wall joint), shall be sealed with urethane caulk or other sealants designed for such application. When the opening or channel is greater than ½ inch in width, a foam backer rod shall be inserted in the channel before application of the sealant. This sealing technique shall be done in a manner that retains the channel feature as a water control system. Other openings or cracks in slabs or at expansion or control joints should also be sealed.

G) When installing baseboard type suction systems, all seams and joints in the baseboard material shall be joined and sealed using materials recommended by the manufacturer of the baseboard system. Baseboards shall be secured to walls and floors with adhesives designed and recommended for such installations. If a baseboard system is installed on a block wall foundation, the tops of the block walls shall be closed and sealed.

9) Soil Gas Retarder Requirements

A) A soil gas retarder membrane shall be installed in basement or crawlspace areas without a concrete floor.

B) Plastic sheeting installed in crawlspaces or basements as soil gas retarders shall be a minimum of 6 mil (3 mil cross-laminated) polyethylene or equivalent flexible material. Heavier gauge sheeting shall be used when crawlspaces or basements are used for storage or frequent entry is required for maintenance of utilities.

C) Any seams in soil gas retarder membranes shall be overlapped at least 12 inches and sealed in a permanent air tight manner using compatible glues. The membrane shall also be sealed around interior piers and to the inside of exterior walls with furring strips and sealant or in accordance with specific procedures approved by the Agency.

D) Access doors required by local building codes shall be fitted with air tight gaskets and a means of positive closure, but shall not be permanently sealed. In cases where both the basement and the adjacent crawlspace areas are being mitigated with active SSD and

SMD systems, sealing of the openings between those areas is not required.

E) Crawlspace depressurization without the use of a soil gas retarder membrane shall only be used when the crawlspace is inaccessible. When crawlspace depressurization is used for radon mitigation, openings and cracks in floors above the crawlspace that would permit conditioned air to pass out of the living spaces of the building, shall be identified, closed and sealed. Sealing of openings around hydronic heat or steam pipe penetrations shall be done using non-combustible materials.

F) Drain tile depressurization in a crawlspace shall only be installed under the following conditions:

i) In conjunction with a sub-membrane depressurization system; or

ii) Suction can be obtained beneath the soil gas retarder.

10) Electrical Requirements

A) All electrical components of radon mitigation systems shall conform to provisions of the National Electrical Code and any additional local regulations.

B) Wiring shall not be located in or chased through the radon vent piping or any heating or cooling ductwork.

C) Any plugged cord used to supply power to a radon vent fan shall be no longer than 6 feet in length.

D) No plugged cord shall penetrate a wall or be concealed within a wall.

E) Radon mitigation fans installed on the exterior of buildings shall be hard-wired into an electrical circuit. Electrical disconnects shall be installed within line of sight and within 4 feet of the fan. Exteriorly, plugged fans shall be used only inside of weather-proofed fan housings or weather-proofed chases.

F) If the rated electricity requirements of a radon mitigation system fan exceeds 50 percent of the circuit capacity into which it will be connected, or if the total connected load on the circuit (including the radon vent fan) exceeds 80 percent of the circuit's rated capacity, a separate, dedicated circuit shall be installed to power

the fan.

G) An electrical disconnect switch or circuit breaker shall be installed in radon mitigation system fan circuits to permit deactivation of the fan for maintenance or repair. Disconnect switches are not required with plugged fans.

11) Drain Installation Requirements

A) If drains discharge directly into soil beneath the slab or through solid pipe to a soakaway, the licensee shall install a drain that meets local building codes.

B) If condensate drains from air conditioning units terminate beneath the floor slab, the licensee shall install a trap in the drain that provides a minimum 6-inch standing water seal depth, reroute the drain directly into a trapped floor drain, or reconnect the drain to a condensate pump.

C) Perimeter (channel or French) drains shall be sealed with backer rods and urethane or comparable sealants in a manner that will retain the channel feature as a water control system.

D) When a sump pit is the only system in a basement for protection or relief from excess surface water and a cover is installed on the sump for radon control, the cover shall be recessed and fitted with a trapped drain meeting the requirements of subsection (h)(7).

12) HVAC Installation Requirements

A) Modifications to an existing HVAC system that are proposed to mitigate elevated levels of radon should be reviewed and approved by the original designer of the installed HVAC system or by a licensed mechanical contractor.

B) Foundation vents, installed specifically to reduce indoor radon levels by increasing the natural ventilation of a crawlspace, shall be non-closeable. In areas subject to sub-freezing conditions, the existing location of water supply and distribution pipes in the crawlspace, and the need to insulate or apply heat tape to those pipes, shall be considered when selecting locations for installing foundation vents.

C) Heat Recovery Ventilation (HRV) systems shall not be installed in rooms that contain friable asbestos.

D) In HRV installations, supply and exhaust ports in the interior shall be located a minimum of 12 feet apart. The exterior supply and exhaust ports shall be positioned to avoid blockage by snow or leaves and be a minimum of 10 feet apart.

E) Contractors installing HRV systems shall verify that the incoming and outgoing airflow is balanced to ensure that the system does not create a negative pressure within the building. Contractors shall inform their client, the occupant and the owner that periodic filter replacement and inlet grill cleaning are necessary to maintain a balanced airflow. Information on filter replacement and inlet grill cleaning shall be provided to their client, the occupant and the owner and shall be included in the documentation.

F) Both internal and external intake and exhaust vents in HRV systems shall be covered with wire mesh or screening to prevent entry of animals or debris or injury to occupants.

13) Materials

A) As a minimum, all plastic vent pipes in mitigation systems shall be smooth-walled Schedule 40 PVC.

B) Piping routed exteriorly shall be rated against deterioration from ultra-violet radiation from the sun.

C) Exteriorly, Schedule 40 PVC or 3-inch by 4-inch metal downspout shall be used as the vent pipe.

D) Vent pipe fittings in a mitigation system shall be of the same material as the vent pipes except as noted in subsection (h)(3)(A).

E) Cleaning solvents and adhesives used to join plastic pipes and fittings shall be as recommended by manufacturers for use with the type of pipe material used in the mitigation system.

F) When sealing holes for plumbing rough-in or other large openings in slabs and foundation walls that are below the ground surface, non-shrink mortar, grouts, expanding foam or other sealants designed for such application shall be used.

G) Penetrations of sump covers to accommodate electrical wiring, water ejection pipes, or radon vent pipes shall be designed to permit air-tight sealing around penetrations, using caulk or grommets.

H) Plastic sheeting installed in crawlspaces or basements as soil gas retarders shall be a minimum of 6 mil (3 mil cross-laminated) polyethylene or equivalent flexible material. Heavier gauge sheeting shall be used when crawlspaces or basements are used for storage or frequent entry is required for maintenance of utilities.

I) Any wood that comes into direct contact with the soil or concrete and is used in attaching soil gas retarder membranes to crawlspace walls or piers shall be pressure treated or naturally resistant to decay and termites.

J) When transitioning from one material or shape to another, an adapter specifically designed for the transition shall be used.

K) Drain tile or perforated pipe may be installed under soil gas retarders for the purpose of depressurization and to allow condensation to drain back to the soil.

L) The juncture of each radon vent pipe with the roof line shall be made water tight by an approved flashing. Radon vent pipes discharge large quantities of water vapor that will freeze at the discharge point; therefore, lead vent flashings or any other flashing or cap that would impede the exhaust from the radon vent are prohibited from use.

14) Monitors and Labeling

A) All active soil depressurization systems shall include a mitigation system monitor to indicate fan operation system performance or warn of fan failure.

B) Electrical radon mitigation system monitors (whether visual or audible) shall be installed on non-switched circuits and be designed to reset automatically when power is restored after service or power supply failure. Battery operated monitoring devices shall not be used unless they are equipped with a low-power warning feature.

C) Mechanical radon mitigation system monitors, such as manometer type pressure gauges, shall be clearly marked to indicate the range or zone of pressure readings that existed when the system was initially activated.

D) An Illinois Mitigation System Tag shall be placed on the vent pipe next to the mitigation system monitor. This label shall be purchased from the Agency and include the following information:

"Radon Reduction System"; the installer's name, phone number and the Illinois license number; the date of installation; and an advisory that the building should be tested for radon at least every 2 years.

E) All exposed and visible interior radon mitigation system vent pipe sections shall be identified with at least one label on each floor level that reads "Radon Reduction System".

F) Fans mounted outdoors and exterior vent pipe shall be identified with a label that reads "Radon Reduction System" in a weatherproof manner.

G) Sump pits that are depressurized by the mitigation system or covered to minimize radon entry shall be identified with a label that reads "Radon Reduction System – Removal of this cover may result in failure of the Radon Reduction System. Consult (installer's name and phone number) before removing this cover and for instructions on the correct procedure for replacing it."

H) Circuit breakers controlling the circuits on which the radon vent fan and system failure warning devices operate shall be labeled "Radon Reduction System".

15) Post Installation Checklist

A) Upon completion of the installation of any radon mitigation system, the licensee shall complete the following steps, and document them on an installation check sheet that shall be signed and dated by a mitigation licensee and shall become auditable evidence.

i) Re-examine and verify the integrity of the fan mounting seals and all joints in the interior vent piping.

ii) Verify suctions or flows in the system piping or ducting to assure that the system is operating as designed.

iii) Advise the client that retesting the building at least every 2 years or if the building undergoes significant alteration is recommended.

iv) Request a copy of the report of any post-mitigation testing conducted by the client or by a Radon Measurement licensee.

B) Radon Mitigation licensees shall inform the client in writing that post-mitigation testing should be conducted no sooner than 24 hours nor later than 30 days following completion and activation of the mitigation system and that the test may be conducted by an independent Radon Measurement licensee or by the resident of the dwelling.

16) Post-Mitigation Testing

A) Evaluate the effectiveness of the mitigation system using an approved measurement device to assure the system is performing as designed.

B) Post-mitigation tests shall be performed in accordance with the applicable requirements of Section 422.130.

17) Contracts and Documentation

A) No mitigation activity shall be undertaken before a proposal for the work is accepted by the client, as evidenced by the client's signature and date on the proposal. A proposal for the installation of any radon mitigation system shall include as a minimum:

i) The Radon Mitigation Professional licensee's Illinois license number;

ii) A statement describing the planned scope of the work and an estimated completion date;

iii) A statement describing any known hazards associated with chemicals used in or as part of the installation;

iv) A statement indicating compliance with and implementation of the mitigation standards described in this Section;

v) A description of any system maintenance that the client, the occupant, or the building owner would be required to perform;

vi) A firm price of the installation cost and an estimate of the annual operating costs of the system; and

AGENCY NOTE: The firm price may include stepped approaches.

vii) A statement that the system is guaranteed to reduce and maintain the average radon concentration to less than 4.0 pCi/L and the conditions thereof; or a statement explaining that there is no guarantee and the reasons why there is no guarantee.

B) Licensees shall maintain the following records for 5 years or for the period of any warranty or guarantees, whichever is longer, and shall make the following records available to the homeowner upon request and documentation of home ownership:

i) Copies of the building investigation summary and floor plan sketch;

ii) The finalized drawing that includes illustration of the building foundation, the location of all walls, drain fixtures, HVAC systems and radon entry points, results of any diagnostic testing, the layout of any radon mitigation system piping, and the location of any vent fan and system warning devices;

iii) Pre- and post-mitigation radon test data;

iv) Copies of contracts and warranties;

v) A description of the mitigation system installed and its basic operating principles;

vi) A description of any deviations from the MS and applicable regulations of this Part;

vii) A description of the proper operating procedures of any mechanical or electrical systems installed, including manufacturer's operation and maintenance instructions and warranties;

viii) The proposal, contract, and warranties or guarantees made to the client, and any other documentation important to the mitigation system installed; and

ix) The address of the building mitigated, including the zip code, the mitigation system type, the mitigation date, whether radon resistant new construction techniques were used, and the Illinois Mitigation System Tag number.

C) Licensees shall, upon completion of the mitigation project, provide

clients with an information package that includes:

i) A list of appropriate actions for clients to take if the system failure warning device indicates system degradation or failure; and

ii) The name, telephone number, and license number of the professional licensee and the phone number of the Agency's Radon Program.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.160 Mitigation Standard for New Residential Construction

a) General Practices. This Section contains the requirements for new construction in Illinois in accordance with the Radon Resistant Construction Act [420 ILCS 52]. The following required construction methods are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary. These techniques are required in all areas of Illinois.

b) Subfloor Preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the buildings, to facilitate future installation of a sub-slab depressurization system, if needed. The gas permeable layer shall consist of one of the following:

1) A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2 inch (51 mm) sieve and be retained by a ¼ inch (6.4 mm) sieve; or

2) A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geo-textile drainage matting designed to allow the lateral flow of soil gases. The geotextile matting shall have a cross-sectional area of not less than 12 square inches (77 sq. cm) and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 to 18 inches (30 to 46 cm) distance from the foundation wall to the edge of the drainage matting. Deviation from the 12 to 18 inches (30 to 46 cm) distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities; or

3) Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.

c) Soil Gas Retarder. A minimum 6-mil (0.15 mm) (or 3-mil (0.075 mm) cross-laminate) polyethylene or equivalent flexible sheeting material shall be placed on top of the gas permeable layer prior to casting the slab or placing the

floor assembly to serve as a soil gas retarder by bridging any cracks that develop in the slab or floor assembly and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

d) Entry Routes. Potential radon entry routes shall be closed in accordance with the following:

1) Floor openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or equivalent sealant applied in accordance with the manufacturer's recommendations.

2) All concrete control joints, isolation joints, construction joints and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a polyurethane caulk. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk applied in accordance with the manufacturer's recommendations.

3) Condensate drains shall be trapped or routed through non-perforated pipe to daylight.

4) Sump pits open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sump pits shall not be used as a primary suction point in a sub-slab depressurization system. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

5) Hollow block masonry foundation walls shall be constructed with either a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of masonry block or wood foundation walls below the ground surface shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete walls shall be filled.

6) The exterior surfaces of concrete and masonry block walls below the ground surface shall be damp-proofed in accordance with Section R406 of the 2012 International Residential Code for One- and Two-Family

Dwellings (copyrighted 2011 by the International Code Council, Inc.; incorporated by reference in accordance with Section 422.15).

7) Air-handling units shall be sealed to prevent air from being drawn into the unit. Units with gasketed seams or units that are otherwise sealed by the manufacturer to prevent leakage are exempted from this requirement.

8) Underground and crawlspace duct systems shall be sealed in accordance with Section M1601.4 of the 2012 International Residential Code for One- and Two-Family Dwellings (copyrighted 2011 by the International Code Council, Inc.; incorporated by reference in accordance with Section 422.15).

9) Openings around all penetrations through floors above crawlspaces shall be caulked or otherwise filled to prevent air leakage.

10) Access doors and other openings or penetrations into crawlspaces shall be closed, gasketed or otherwise sealed to prevent air leakage.

e) Passive Sub-membrane Depressurization (SMD) System. In buildings with crawlspace foundations or earthen floors, the following components of a passive SMD system shall be installed during construction.

1) Crawlspaces shall be provided with vents to the exterior of the building in accordance with Section R408 of the 2012 International Residential Code for One- and Two-Family Dwellings.

2) The soil in crawlspaces shall be covered with a continuous layer of minimum 6-mil (0.15 mm) polyethylene soil gas retarder. The ground cover shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the crawlspace area.

3) Any seams in soil gas retarder membranes shall be overlapped at least 12 inches and sealed in a permanent air tight manner using compatible glues. The membrane shall also be sealed around interior piers and to the inside of exterior walls with furring strips and compatible glues or in accordance with specific procedures submitted by radon contractors as part of their license application and approved by the Agency.

4) A plumbing tee or other approved connection fitted with not less than 5 feet (105 m) of perforated pipe extending from each horizontal opening of the tee shall be inserted horizontally beneath the sheeting and connected to a 3- or 4-inch diameter (76 mm or 102 mm) fitting with a vertical vent pipe installed through the sheeting. The vent pipe shall be extended up through the building floors, terminate at least 12 inches (305 mm) above the penetration in the highest roof in a location at least 2 feet (609.6 mm)

above any window or other opening into the conditioned spaces of the building and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.

f) Passive Sub-Slab Depressurization (SSD) System. Buildings with a basement, crawlspace or slab-on grade concrete floor in contact with the earth or grade shall have the following components of a passive SSD system that shall be installed during construction.

1) A minimum 3-inch diameter (76 mm) Schedule 40 PVC shall be embedded vertically into the sub-slab aggregate or other permeable material before the slab is cased.

A) A plumbing tee or other approved connection fitted with not less than 5 feet (105 m) of perforated pipe extending from each horizontal opening of the tee shall be inserted horizontally within the sub-slab permeable material to ensure that the pipe opening remains within the sub-slab. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop. The vent pipe shall be extended up through the building floors, terminate at least 12 inches (305 mm) above the penetration in the highest roof in a location of at least 2 feet (609.6 mm) above any window or other opening into the conditioned spaces of the building and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings; or

B) A penetration into the sub-slab permeable material may be cored through sub-slab after the slab is cased. A minimum 3-inch diameter (76 mm) Schedule 40 PVD shall be embedded vertically into the sub-slab aggregate or other permeable material and extended up through the building floors, terminate at least 12 inches (305 mm) above the penetration in the highest roof in a location at least 2 feet (609.6 mm) above any window or other opening into the conditioned spaces of the building and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.

2) In buildings where interior footings or other barriers separate the sub-slab aggregate or other gas-permeable material, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that shall terminate at least 12 inches (305 mm) above the penetration in the highest roof in a location at least 2 feet (609.6 mm) above any window or other opening into the conditioned spaces of the building and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.

g) All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the slab or soil gas retarder.

h) Radon vent pipes shall be accessible for fan installation through an attic or other area outside and above the habitable space. The radon vent pipe need not be accessible in an attic space when an approved roof-top electrical supply is provided for future use.

i) All exposed and visible interior radon vent pipes shall be conspicuously identified with at least one label on each floor and in accessible attics. The label shall read "Radon Reduction System".

j) Combination basement/crawlspace or slab-on-grade/crawlspace foundations shall have separate radon vent pipes installed in each type of foundation area or be connected with a continuous drain tile loop. Vent pipes shall connect to a single vent that shall terminate at least 12 inches (305 mm) above the highest roof in a location at least 2 feet (609.6 mm) above any window or other opening into the conditioned spaces of the building and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.

k) Joints in air ducts and plenum spaces shall meet the requirements of Section M1601 of the 2012 International Residential Code for One- and Two-Family Dwellings (copyrighted 2011 by the International Code Council, Inc.; incorporated by reference pursuant to Section 422.15). Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in Chapter 11 of the 2012 International Residential Code for One- and Two-Family Dwellings (copyrighted 2011 by the International Code Council, Inc.; incorporated by reference pursuant to Section 422.15). Firestopping shall be in conformance with the most recent general building code enacted by the appropriate local government or meet the requirements contained in Section R302.11 of the 2012 International Residential Code for One- and Two-Family Dwellings (copyrighted 2011 by the International Code Council, Inc.; incorporated by reference in accordance with Section 422.15).

l) To provide for future installation of an active SMD or SSD system, an electrical circuit terminated to a single outlet in an accessible approved box shall be installed during construction in the attic in the anticipated location of vent pipe fans.

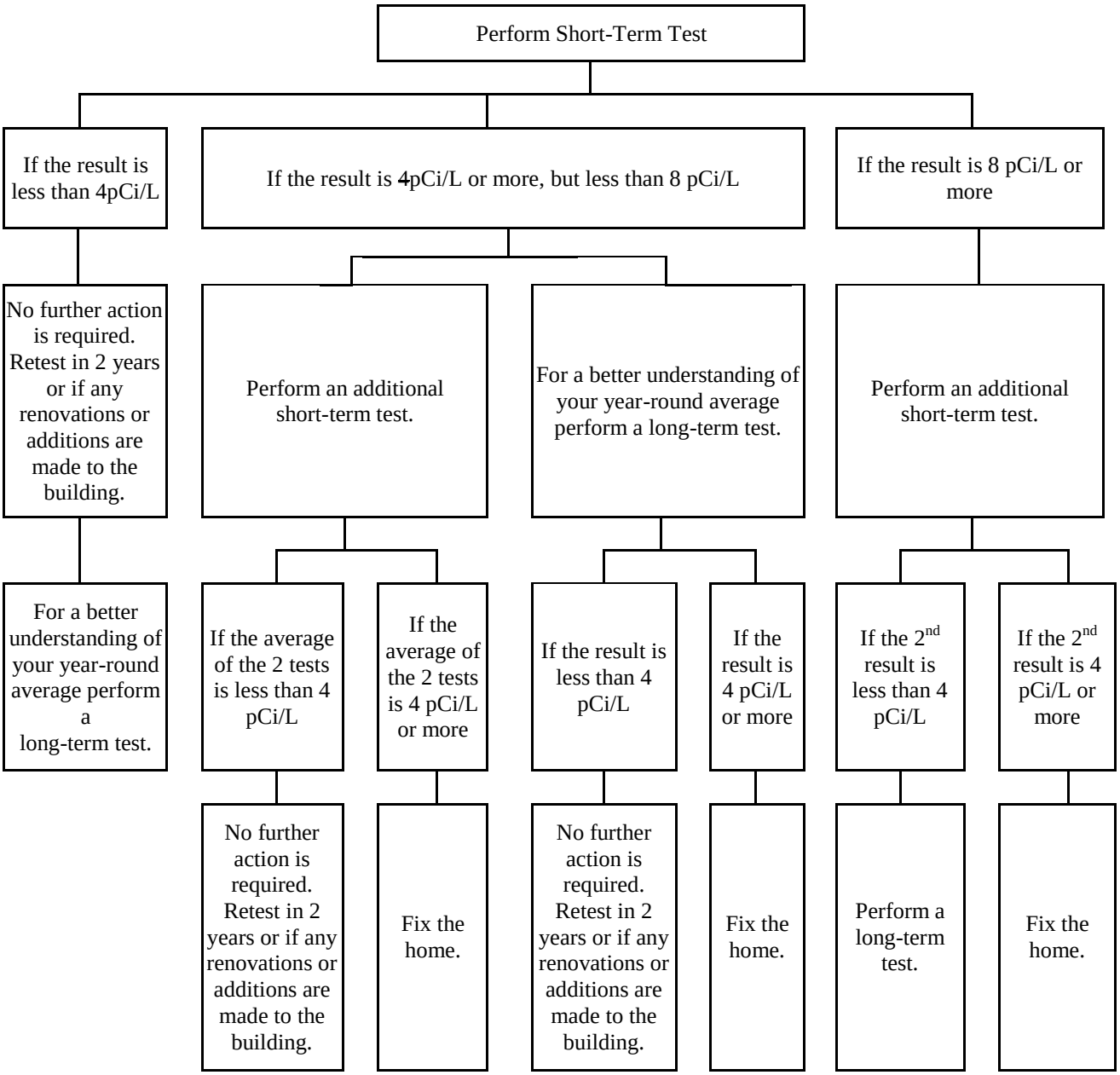
m) To provide for future installation of an active SSD, the piping length in the attic of the building shall have a minimum height of 3 feet to allow for the anticipated installation of a radon mitigation fan in the vent pipe.

n) The juncture of each radon vent pipe with the roof line shall be made water tight by an approved flashing. Lead vent flashings or any other flashing or cap that would impede the exhaust from the radon vent are prohibited from use.

(Source: Added at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.APPENDIX A Recommended Testing Strategy for Home Environment Measurements (Buildings Not Involved in a Real Estate Transaction)

The first step is to perform a short-term measurement* in the lowest structural areas**.



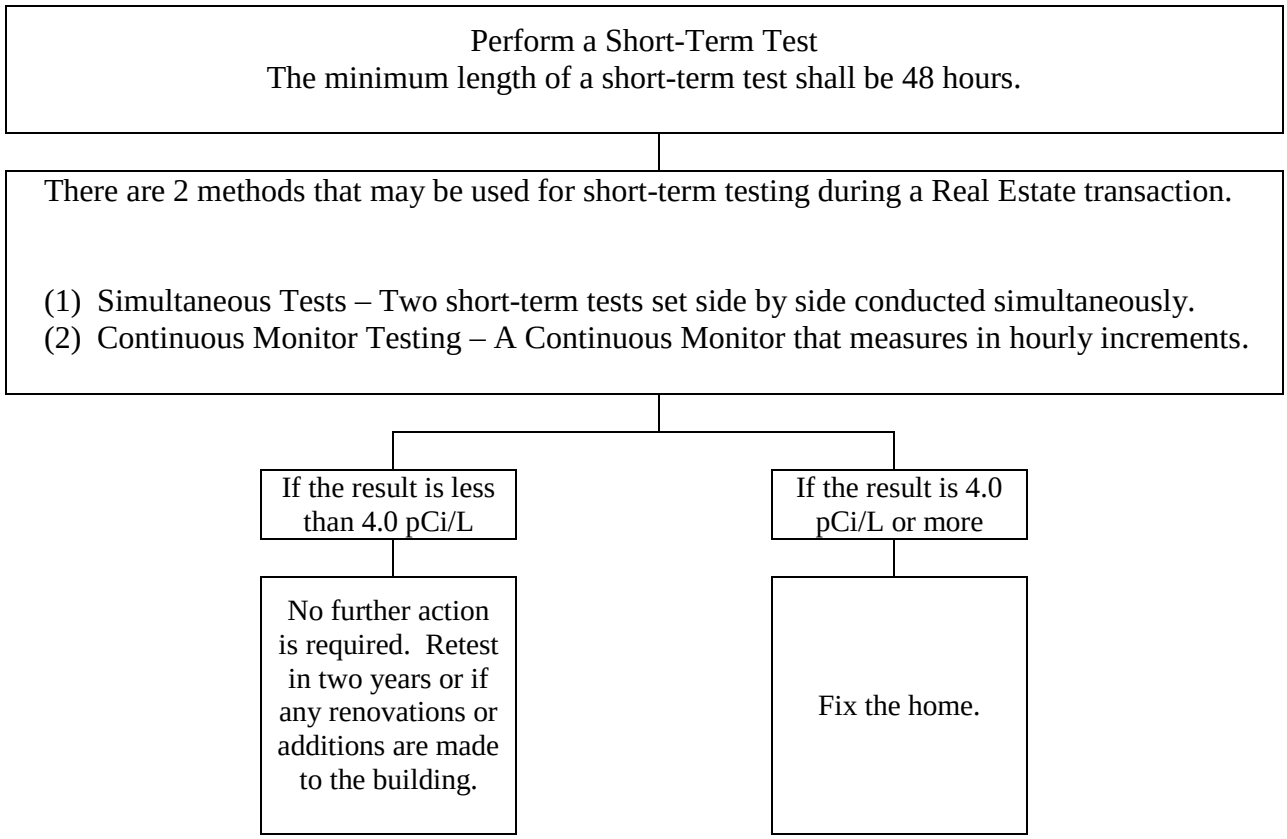
* Short-term tests may last between 2 and 90 days, most last between 2 and 7 days. Examples of short-term detectors used in home environment testing include: activated charcoal canisters, liquid scintillation vials, electret chambers and continuous monitors. Examples of long-term detectors used in home environment testing include: alpha track detectors and electret chambers.

** Conduct a short-term test in each of the lowest structural areas suitable for occupancy in the home. For example, if the home is a split-level building with one or more foundation types: test in the basement, in a room over the crawlspace and in a slab-on-grade room. In accordance with this protocol, measurement licensees are required to test in each of the foundation types.

(Source: Amended at 37 Ill. Reg. 20240, effective December 9, 2013)

Section 422.APPENDIX B Recommended Testing Strategy for Measurements in Buildings Involved in Real Estate Transactions

The first step is to perform a short-term measurement* in the lowest structural areas**.



* Short-term tests may last between 2 and 90 days, most last between 2 and 7 days. Tests between seven and 90 days are usually impractical for real estate transactions but are fine for homeowners assessing their own radon situation. Examples of short-term detectors used in home environment testing include: activated charcoal canisters, charcoal liquid scintillation vials, electret chambers and continuous monitors.

** Conduct a short-term test in each of the lowest structural areas suitable for occupancy in the home. For example, if the home is a split-level building with one or more foundation types: test in the basement, in a room over the crawlspace and in a slab-on-grade room. In accordance with this protocol, measurement professionals are required to test in each of the foundation types.

(Source: Amended at 33 Ill. Reg. 14479, effective October 9, 2009)

Section 422.APPENDIX C Radon and Radon Decay Product Measurement Method Categories

A	(pCi/L)	B	(WL)
AC	Activated charcoal adsorption integrating		
AT	Alpha track detection	CW	Continuous working level monitor
LS	Charcoal liquid scintillation		
CR	Continuous radon monitor		
EL	Electret ion chamber; long-term		
ES	Electret ion chamber; short-term		

(Source: Amended at 33 Ill. Reg. 14479, effective October 9, 2009)

Section 422.APPENDIX D Sample Notice

Radon Measurement in Progress

THIS NOTICE IS POSTED IN ACCORDANCE WITH TITLE 32, CHAPTER II, SUBCHAPTER b: RADIATION PROTECTION, MEASUREMENT PROTOCOL, SECTION 422.130(e).

Tampering with a radon or radon progeny measurement is prohibited by law and may result in civil penalties.

Removal of this Notice, except by the Radon Measurement Professional licensee named below, is considered tampering.

Radon Measurement Professional licensee: _____

License No.: _____

Company: _____

Telephone No(s).: _____

(Source: Amended at 29 Ill. Reg. 3212, effective February 22, 2005)

Section 422.APPENDIX E Diagram of Room Worksheet for Radon Measurements

This worksheet may be used in accordance with Section 422.130(o)(1)(L)(ii). Complete all areas of the worksheet and include a separate worksheet for each foundation type measured. A copy of each worksheet shall be retained as a permanent record and included as part of a measurement report in accordance with Section 422.130(o).

Placement of Measurement Devices
Short-term or long-term measurements shall be made in each lowest structural area suitable for occupancy. For example, a split-level building with a basement, a slab-on-grade room and a room over crawlspace shall have measurements made in each of the foundation types: the basement, a slab-on-grade room and a room over the crawlspace.
Measurement devices shall (check all that apply):

☐ Be made in rooms that can be regularly occupied, such as family rooms, living rooms, dens, playrooms and bedrooms.

☐ If charcoal canisters, not be placed in bathrooms, kitchens, laundry rooms, spa rooms or other areas of high humidity.

☐ Be undisturbed during the measurement period.

☐ Be at least 3 feet from doors, windows to the outside, or ventilation ducts and out of the direct flow of air from the ventilation duct.

☐ Be at least 1 foot from exterior walls.

☐ Be 20 inches to 6 feet from the floor.

☐ Be at least 4 inches away from other objects horizontally or vertically above the detector.

☐ Be at least 4 feet from heat, fireplaces and furnaces, out of direct sunlight, etc.

Diagram of Room Measured The following information shall be included:

1) All windows and doors. Annotate exterior walls and the direction of north or the front of the building.

2) Factors that may affect the measurement, including but not limited to crawlspace vents, fireplaces, combustive appliances, floor drains, furnaces, dryers, water heaters and mitigation systems.

3) Include measurements (to the nearest inch) from the testing device to two separate walls.

4) Current room use (ex.: family room, bedroom, unfinished basement, playroom).

5) Address:

6) Device Serial Number

(Source: Added at 33 Ill. Reg. 14479, effective October 9, 2009)