AARST
RADON PROFESSIONALS SAVING LIVES

October 2020

THE RADON REPORTER™

Practical Information for Your Success

Radon Industry Business Recovery

Are We There Yet?

plus

THE PURSUIT OF 17024 | COVID-19 INDUSTRY IMPACT
SALES IN THE NEW WORLD | FEDERAL RADON POLICY

TABLE of CONTENTS

AD INDEX

Please submit content, comments, or questions to editor@aarst.org

AARST™, the American Association of Radon Scientists and Technologists, is a nonprofit, professional organization dedicated to the highest standard of excellence and ethical performance of radon measurement, mitigation, and transfer of information for the benefit of members, consumers, and the public at large. AARST's leadership is democratically elected by the members.

AARST represents your voice as we meet the wide range of challenges facing radon professionals and the community. Your membership and participation provide you a voice in the changes to come, and allows you to gain updated information, discover new techniques, learn about new problems before they occur, and hone your professional skills.

New NRPP Certification Opportunity – Coming Soon

Dallas Jones, AARST-NRPP Executive Director

In July, members of a newly formed committee began the Job Task Analysis for a certified Radon Mitigation Compliance Inspector (RMCI). Meeting every other week, the committee has since defined the Domains, Sub-domains, and Knowledge Statements necessary for the creation of a certification exam and developed a Mitigation System Inspection Checklist that reflects recent Consortium work to harmonize the three different mitigation standards.

The committee also has developed a set of potential certification exam questions to be distributed for beta testing in October 2020. In the meantime, the NRPP Certification Council will be defining the prerequisite qualifications for the RMCI certification.

A targeted pilot of the new checklist will occur in the fall, with the expectation that the new credential will be available in the spring of 2021.

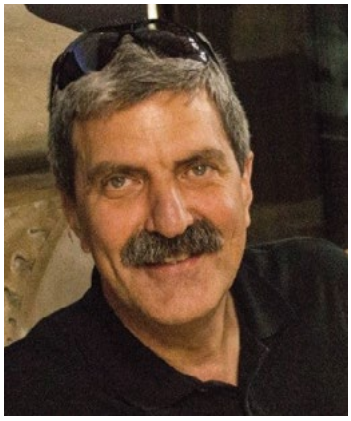
The new certification category is intended to address one of the most common complaints we hear from conscientious radon professionals – lack of compliance oversight.

First, many of the mitigation-related complaints received by both NRPP and radon licensing programs could have been addressed soon after installation if the system had been inspected. For example, systems installed during real estate transactions are typically paid for by a seller who has no vested interest in whether current standards were followed. There is an opportunity to educate homebuyers about not only the importance of having an independent post-mitigation test by a certified or licensed Radon Measurement Professional but also obtaining a compliance inspection. Buyers who receive an inspection report from a Radon Mitigation Compliance Inspector indicating standards violations can forward them to NRPP (and if applicable, the licensing state) for immediate follow-up.

Second, some states with licensing programs frequently have difficulty performing random compliance audits because they lack the personnel or face other logistical challenges. AARST has developed a public-private partnership strategy to aid state radon programs with compliance. AARST is available to contract with any regulatory agency to deploy Certified Radon Mitigation Compliance Inspectors to perform compliance audits of licensees. By the time this article is published, AARST will likely be implementing a state contract to perform 60 random inspections of mitigations by state-licensed mitigators during the 4th quarter of 2020.

Third, it is important that inspection of mitigation systems be independent and fair. The new certification sets clear objective parameters for evaluating systems, with no secret buzzers or whistles, to confirm consistency with the standards and effective workmanship through an on-site inspection. Obviously, no compliance inspector should be paid to inspect the mitigation work of a coworker, nor ideally the work of a competitor. We especially encourage measurement professionals to get involved in this new discipline as it will enhance your inspection offerings.

Both the AARST Board and NRPP Certification Council have ambitious goals for 2021. Promoting the health and well-being of the radon industry is their number-one objective.



Residential Radon System Monitors

Dave Kapturowski, VP & Co-Founder, RadonAway

Radon Standards for residential radon systems have required a system monitor to notify occupants of a fan failure since the EPA RMS were published in 1991. This system monitor could be audible or visual. The most common type of system monitor used is the U-tube manometer. It is simple and inexpensive; however, it is not well understood by homeowners and is all too often silently ignored. For that reason, there are many thousands of systems no longer functioning, unbeknownst to the occupants.

The newest AARST/ANSI radon standards for existing and newly constructed homes now require both an active visual/audible AND a visible system pressure monitor. These standards have established a higher level of protection for occupants. The U-tube manometer will likely continue as the most common fan pressure gauge for visual indication of fan operation, but a new generation of active audible alarms is now available on the market. These active monitors must meet several new requirements including:

1. Fan monitors shall be durable.
2. Labeling is required.
3. Battery operated units must include a low battery warning.
4. AC powered units must automatically reset after a power outage.
5. AC powered units must not be powered from the same branch circuit as a fan.
6. Fan monitors should be able to operate on low pressure or low airflow systems.
7. Fan monitors should not be susceptible to false alarms caused by a power outage or seasonal high-water table.

The active monitors can detect either airflow or pressure and notify occupants of a fan failure. Active monitors may also include features to quiet the alarm without removing the battery to allow time for service and have a combination of an audible alarm and visual failure indicators.

The ANSI-AARST Soil Gas Mitigation Standard does have an exception from the new active monitor requirement for telemetrically monitored systems.

A telemetric monitor must include:

1. The system is inside the intended performance range, or the system is outside the intended performance range.
2. The system has no power.

Welcome to AARST!

New Members Since June 2020

Vance Walker,Jr
Clifford Sekel
Travis Siegfried
Michael Leggett
John Klika
Terra Wheeler
Harold Noble
Timothy Lehman
Roberto Zorzan
Dennis Bongiorno
Amy Mitchell
Paulina Carlberg
Steve Riggs

Jessica Bell
Daniel Cline
Doug Rode
Jay Lords
Brian Nichols
Glenn Muster
Tod Boss
Darren Corso
Kevin Scott Remaly
Michael Renaud
David DeVaughn
Brian Bailey
Bonnie Bak
Richard Katz

Abdu Naser Shhub
Robert Kulakowski
Thomas d'Arcy
Bradley Thompson
Christopher d'Arcy
Stacey Winkler
Melissa Price
Thomas Cerbarano
Ralph Price
David Kahan
Joshua Ashbaugh
Leah Mitchener
Tony Meredith

BECAUSE EVERY PARTNERSHIP DESERVES *ACCURACY*

Spruce™
RADON TESTING PRODUCTS
& LABORATORY SERVICES

WHY US?

- INNOVATIVE PRODUCTS
- INDUSTRY SUPPORT
- QUALITY ENGINEERING
- SUPERIOR SERVICE

RADON.COM/PRODUCTS

AIR CHEK™ 800-247-2435 AccuStar 888-480-8812

Nationally Accredited & Certified / Licensed in States Where Required

Selling in the "New World"

Curt Drew, Founder of National Radon Defense

INDOOR AIR QUALITY SALES IN THE NEW WORLD

Let me start by stating the obvious- the world has changed! We all know that people are spending more time at home (working from home and homeschooling). Not only are we at home more, but we are also trying to protect ourselves and loved ones from Covid-19. Covid-19 is not radon, but it is an airborne indoor air quality issue, just like radon.

COMMERCIAL BUILDING OWNERS ARE INVESTING IN IAQ UPGRADES

Companies are investing big money in getting people back to work in a safe environment. Building owners and corporations are investing millions of dollars on indoor air quality systems in their buildings. The primary solutions they are purchasing are high-end filtration systems, improved ventilation/air changes of fresh air, and bacteria and virus-killing ultraviolet lights. Do you install or sell these items for residences?

HOME IMPROVEMENTS ARE UP

National economic reports are showing that consumers are investing big time in their homes. I have a friend who owns a landscaping business here in Omaha. He has been in business for 17 years. Last year was a record sales year for him, and his company sales are up 35% on top of that this year.

Consumers are spending less on travel and less on dining out. They are spending more money on local recreational activities (bikes, boats, fitness equipment) and home improvements. The homeowners who are testing and fixing their homes for radon are highly attuned to overall indoor air quality. I'm not talking about real estate transaction radon sales - I'm referring to concerned homeowners who aren't moving soon and want to invest in maintaining and upgrading their homes. These folks are learning about radon and want it fixed. They are GREAT prospects for other Indoor Air Quality solutions. This is an excellent opportunity for you!

HOW DO I CAPITALIZE ON THIS? WHAT NEXT?

First step, add other IAQ products to your solutions offerings. There is a variety of products on the market that work. CAUTION: there are also several "snake oil" type products on the market too. Be careful and do your due diligence on the products you consider selling. My advice is to add products similar to those being used in commercial buildings (filtration, ventilation, and UVC).

Second step, develop a sales process to effectively educate your customers about these products. Just because you have a product, does not mean that people are going to buy it. This is sales. You must create/identify a need, get the homeowner to express they want to address that need, and then provide them the solutions (your products).

If you need help developing your product mix, feel free to contact us at National Radon Defense. We'd be happy to share some information with you. Good luck selling in the "New World!"

> **"Develop a sales process to effectively educate your customers."**

Radon Supplies™

We have joined forces with CERTI to provide you with the best online training experience!

Visit our website or contact customer service to learn how you can receive the best radon training from CERTI, the largest provider of online training.

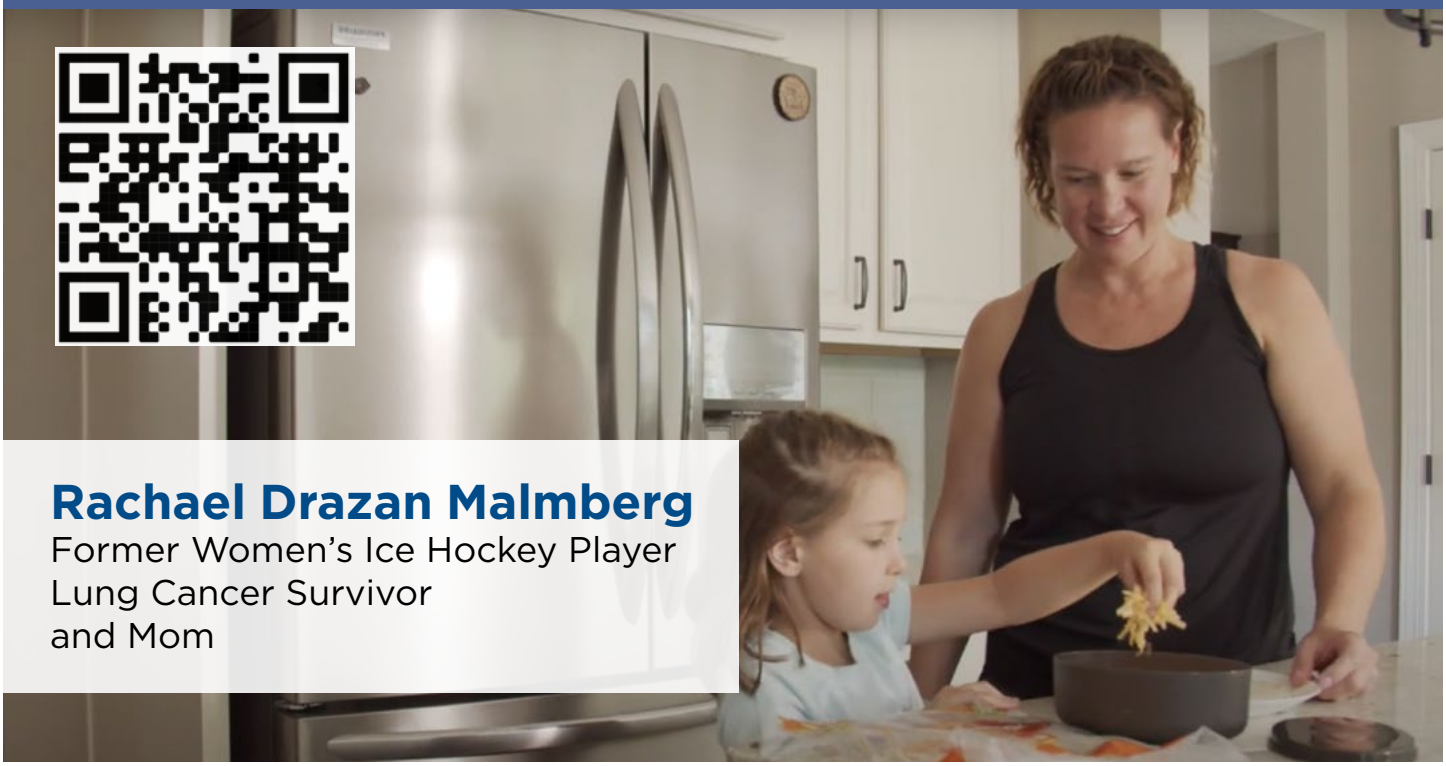
CERTI™

Online Education for Radon Professionals
Premier Radon Training Since 1986

- **Entry Level Courses**
- **CE Courses - Over 25 to choose from!**
- **Courses from 4 cr. to 32 cr.**
- **NRPP/NRSB Approved Courses**

Over 10,000 Satisfied Customers and Growing!

www.radonsupplies.com | www.certi.us



Rachael Drazan Malmberg

Former Women's Ice Hockey Player
Lung Cancer Survivor
and Mom

fantech®
a systemair company

Young or old, Radon should be considered by families all over.
Scan the QR code to hear Rachael's story.

fantech.net • 800.747.1762

ANSI-ISO 17024 Pursuit – Progress Report

Dallas Jones, AARST-NRPP Executive Director

Last year, AARST announced NRPP's planned transition to four initial certifications, two for residential radon measurement and two for residential mitigation. They are:

- Radon Measurement Field Technician
- Radon Measurement Professional
- Radon Mitigation Installer
- Radon Mitigation Specialist

The Measurement Field Technician and Mitigation Installer are entry-level or employee certifications, specifically designed to assess the competency of persons doing specific onsite tasks and who must work under the general supervision of a Measurement Professional or a Mitigation Specialist. In addition to oversight, the Professional and Specialist would be responsible for implementing and documenting direction, quality assurance procedures, system design, and final reports.

Once implemented, those already certified as measurement or mitigation providers will automatically migrate to the Measurement Professional and/or Mitigation Specialist upon renewal. However, they should be on the lookout for a new CE obligation to take an approved course detailing specific requirements of the ANSI-AARST Measurement of Radon in Homes and Soil Gas Mitigation Standards as appropriate.

The transition to the four initial certification categories and exams is part of ongoing efforts to prepare for and achieve ANSI-ISO 17024 Accreditation for the National Radon Proficiency Program.

contiued on page 20

17024 ANSI-ISO Accreditation Milestones

OBJECTIVES AND TASKS	PURPOSE/NOTES	COMPLETION
Job Task Analysis (JTA)		
JTA Survey Creation	Develop/distribute survey to weigh tasks and knowledge.	✓
Survey Analysis, Blueprint Creation	Analysis of survey results; create exam blueprint.	✓
Certification Scheme	Specify scope, job, and task description; required competence, abilities, and prerequisites, code of conduct.	✓
JTA Process Documentation	Detailed report of JTA process for ANSI submission.	✓
Test Content Development for New Certification Exams		
Item Writing Workshops	Write and refine exam question items.	✓
Item Assignment Review	Review items and provide feedback.	✓
Item QA & Finalization	Manage content from item-writing; edit content.	✓
New Item Integration	Improve beta exam content.	✓
Beta Testing of Exam Questions	Distribute and gather results of test question surveys.	✓
Beta-Test Data Analysis	Perform item-level analysis including item performance.	October 15
Exam Form Finalization	QA process with text revision as needed.	October31
Scoring Finalization	Ensure pass/fail demarcation is fair and reasonable.	November 30
Implement new scheme and exams	Transition current certifications and migrate certification database, applications, website, exam administration.	1st quarter 2021
NRPP Policy Manual Rewrite		
Update and rewrite	Finalize sections and forms necessary for ANSI application	December 31
ANSI Application		
Preliminary Application to ANSI	Demonstrate conformity per ANSI/ISO 17024 regarding certification body, legal entity, certification scope.	March 2021
Submit final application to ANSI	All required documents complete.	May 2021
ANSI Review	Document review/assessment with onsite review.	Fall 2021
Receive ANSI accreditation		1st quarter 2022

fantech®
a systemair company

Set it and forget it.

Radon mitigation has never been this precise. The **Rn4EC** and **Rn2EC** have the ability to be set at almost any variable performance between **0 and 100%**. This allows for maximum efficiency for your mitigation solution.

Fantech is helping you have the confidence to do an amazing job and never look back so you can truly *set it and forget it.*

20-60%
Energy
Savings

Scan and learn more about the Rn4EC Radon solution.

fantech.net • 800.747.1762

fantech

Delivering Successful Presentations

Douglas L. Kladder, President
Colorado Vintage Companies, Inc.

Are you thinking about hitting the road and giving presentations about radon? Perhaps you will be speaking to real estate offices, builders, county commissioners, or the general public. That's great, and why not? It is an excellent way to help spread the message while at the same time marketing your professional services -- provided you do it right!

Knowing how to speak effectively to your audience regarding radon is a necessary skill in becoming a successful presenter. Some helpful insights may support your growth as a valued presentation professional.

At the top of the list, have a mindset of being a "problem solver" rather than a "problem maker." There is a natural tendency of many radon pros to want to scare people into action. They often start their program with less than happy facts like "there are 21,000 deaths each year due to radon" or "radon Kills." Most audiences would prefer a more positive message and are unable to conceptualize the significance of 21,000 deaths per year. Furthermore, if you lead with this, you are likely to be perceived as a "problem maker."

Instead, use the "problem solver" approach, especially when talking to real estate professionals. A more positive perspective would be to say, "Hundreds of thousands of people across the nation have taken the US Surgeon General's recommendation to test their homes, or homes they are purchasing. And where elevated radon levels are confirmed, they have taken decisive steps to reduce their exposure by employing cost-effective and proven techniques. The purpose of my talk today is to share those approaches and discuss how this can be done in a manner that does not delay or jeopardize a sale."

Another solution-oriented message is that lots of folks are paying attention to radon, and both measurement and mitigation can be done right following American National Standards. This is a more constructive message and portrays you as a "problem solver." Where many people are familiar with radon, you do not have to get into health risks and mechanisms. Instead, focus on proper testing and mitigation with a catchphrase like "All homes can be fixed - and I am going to share how that can be done in a timely manner." Boom -- Put on your Captain America suit and get 'er done.

You want to engage the audience, and to do so, you need to empathize with the audience. In other words, step back and be the audience. You need to do this when you prepare the program as well as when you deliver the program. So, when rearranging or creating your slides, ask yourself what you, as an audience member, would want to learn? Remember, this is about them - not you.

There is no reason to be nervous if you have prepared yourself well enough and have anticipated questions that may arise. Ask yourself what gripes or objections they might have and be prepared to speak to them. The key is to realize that you know a lot about the topic and are honest enough to admit it when you don't know something. Honesty is better than making something up, which an audience can spot in a heartbeat and cause you to lose all credibility.

Make sure to speak to the capability of the radon industry, rather than just what you or your company does. If you show your audience how testing is conducted correctly, and photos of proper mitigation systems, while pointing out elements of the EPA-recommended ANSI-AARST standards, they are smart enough to recognize or recall non-compliance. Put yourself out there as a knowledgeable person, not a whiner, and never slam your competition. If you gain the respect of the audience by the objectivity you display as well as your command of the technology, they will find you or refer business to you when the need arises. In other words, let your professionalism be your business card.

Finally, when you open it up for questions, train yourself to repeat each question. This not only allows the audience to understand the context in which you are providing an answer but, more importantly, gives you a moment to think before you put your mouth in gear and say something wrong. Repeating the question can also allow you to rephrase the question to where you can provide a much more appropriate answer.

These are just some of the highlights of conveying the radon message effectively. Doing so can be enjoyable and help the larger outreach effort, and while marketing yourself as a radon professional helping to solve a serious problem.

YOUR ONE-STOP SHOP FOR *SOLUTIONS*

RP145

RadonAway®

WHY US?

- INNOVATIVE PRODUCTS
- INDUSTRY SUPPORT
- QUALITY ENGINEERING
- SUPERIOR SERVICE

MA (800) 767-3703 | IN (800) 523-2084 RADONAWAY.COM/PRODUCTS

AARST™
RADON PROFESSIONALS SAVING LIVES

2020 Virtual INTERNATIONAL RADON SYMPOSIUM AND TRADE SHOW

November 9-13, 2020

Attend the VIRTUAL symposium and trade show this year, and ENGAGE like never before!

"Virtual conferences are the new normal for 2020, but the AARST Virtual Symposium is not just another virtual conference. It will bring you an exciting array of activities, networking opportunities, and learning experiences LIVE and in your own home, office or anywhere on a smart device!"
- Dawn Oggier, Committee Chair

BUY YOUR TICKET TODAY!

ONLY $120.00

Includes full access to; all sessions, live streaming or recorded, exhibit hall, all Vendor Learning Labs, continuing education credits (online quiz,) Q&A and chat features, social breakouts and meetups, new networking connections, keynote sessions, technical mitigation and measurement sessions, radon policy, testing updates, business, science & research and poster sessions.

Download the WHOVA app and take the symposium with you!

Whova

Complete details at **www.aarst.org/symposium**

Plug in to Recharge

5 Full days of Sessions, C.E., and Networking

KEYNOTE
R. William Field, PhD
Iowa

KEYNOTE
Jon Petz
Ohio

"Jon Petz, you have WOWED our clients and have inspired them to be the best that they can be! Thank you for being a part of our convention."
Vice President, Marketing & Program Development, Aramark

KEYNOTE
Aaron Goodarzi, PhD
Calgary

Melinda Ronca Battista
Arizona

Rebecca Turek
Ohio

The 34th Annual AARST International Radon Symposium and Trade Show would like to thank our Diamond Sponsors:

RadonAway®

fantech®
a systemair company

Current Trends in New Homes

Tommy Bowles, Office of Radiation and Indoor Air, US EPA

Every year Home Innovation Research Labs (HIRL) performs the Annual Builder Practices Survey (ABPS), a nationally disseminated building practices survey. The survey is mailed to over 53,000 active U.S. home building companies, of various size and capacity, nationwide to gather data on new home construction practices and materials selection. HIRL then provides a comprehensive breakdown based on the data obtained from the ABPS in what they call Builder Practice Reports. One of those reports, The Radon-Resistant Construction Practices in New US Homes Report, is prepared for the U.S. Environmental Protection Agency (EPA) by HIRL. In order to obtain radon specific data, the EPA purchased questions to insert into the ABPS and learn what builders are doing about radon.

The report provides an accurate depiction of the new construction housing stock built during a specific calendar year. The data and analysis in this article pertain only to 2018 single family-detached (SFD) and multifamily dwellings. (The 2019 report will be available in fall 2020)

In 2018, an estimated 750,625 single-family detached and 498,708 multifamily dwellings were built in the United States.

Summary of Radon in New Construction in 2018

To be considered a radon-reduction system for this study, a house must have either a passive stack ventilation pipe or an active (fan-driven) system. In 2018, the percentage of all new SFD homes – excluding those on piers – with a radon-reduction system was 20.2%. This is slightly down from 21.7% in 2017 but still higher than 2016's 18.7%, consistent with the overall upward trend of increased usage of radon-resistant practices. Passive stack depressurization systems were reported for 16.9% of SFD, while active systems accounted for 3.2%. Some 39.5% of SFD homes with basements had radon-reducing features, which compares to 21.7% for crawlspace foundations and 5.6% slab on grade.

Some builders are opting to perform lower cost rough-ins which only involve sub-slab preparation and installation of a stubbed vent pipe above the slab to allow for low-cost venting of the sub-slab area if post-construction testing finds a radon problem. In 2018, rough-ins for radon reducing systems were found in 7.3% of the SFD homes, compared to 5.0% in 2017 and 5.6% in 2016.

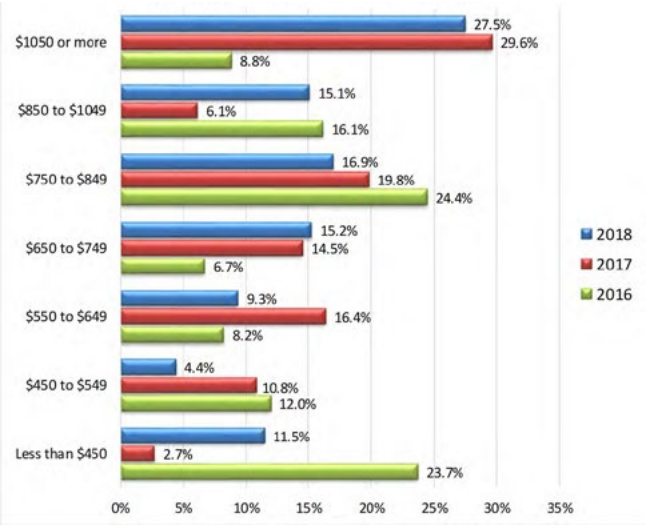
In multifamily dwellings, 33.8% of all new dwellings installed radon-reducing features, up from 26.6% in 2017 and 19% in 2016. Overall, thanks in large part to multifamily, there was an upward trend of new U.S. homes with radon-reducing features. The breakdown of radon-reducing features by Radon Potential Zones determined in EPA's 1993 Map of Radon Zones by U.S County was also considered. SFD homes with radon-reducing features increased in both Zones 1 and 2 but decreased in Zone 3. In 2018, the number of new SFD homes built with radon-reducing features was 77,300 (or 45.1% of all SFD) in Zone 1, 76,300 (or 31.7 %) in Zone 2, and 10,500 (or 3.2%) in Zone 3. This is comparable to the 2017 results where shares of SFD homes with radon-reducing features in Zones 1, 2, and 3 were 44.9%, 26%, and 9.2% respectively.

For multifamily, the share of units in 2018, with radon reducing features in Zone 1 was 112,900 (or 92.5%); 41,500 (or 27.2%) in Zone 2; and 89,900 in Zone 3. This represents an increase in Zones 1 and 3 and a decrease in Zone 2 from 2017's numbers, where the shares of units for Zones 1,2, and 3 were 77.9%, 76.3%, and 1.2% respectively.

Cost

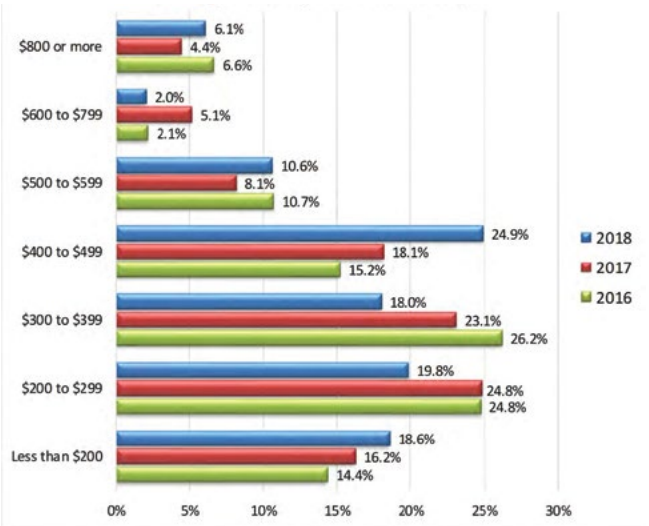
The cost of installing radon-reducing systems has been on the rise in recent years. In 2018, the average installation cost for a passive system in a single-family detached home was approximately $377, up slightly from the $367 reported for 2017 and $374 reported for 2016.

Figure 1. Cost of Active Sub-Slab Ventilation in Single-Family Detached Homes, 2016 to 2018



The average cost of an active (fan-driven) radon-reduction system in new single-family detached homes in 2018 was $812, higher than the $808 reported for 2017 and $697 for 2016.

Figure 2. Cost of Passive Sub-Slab Ventilation in Single-Family Detached Homes, 2016 to 2018



In 2018, the average reported installation cost per unit for a passive system in a multifamily dwelling was approximately $393, down from the $461 in 2017 and $417 in 2016.

The average per-unit cost of an active radon-reduction system reported in new multifamily dwellings in 2018 was $845, lower than $865 in 2017, but higher than $757 in 2016.

The study also provides other key indices of radon reduction that can be more closely examined, such as radon-related building practices like sub-slab preparation and foundation sealing methods, and installation costs.

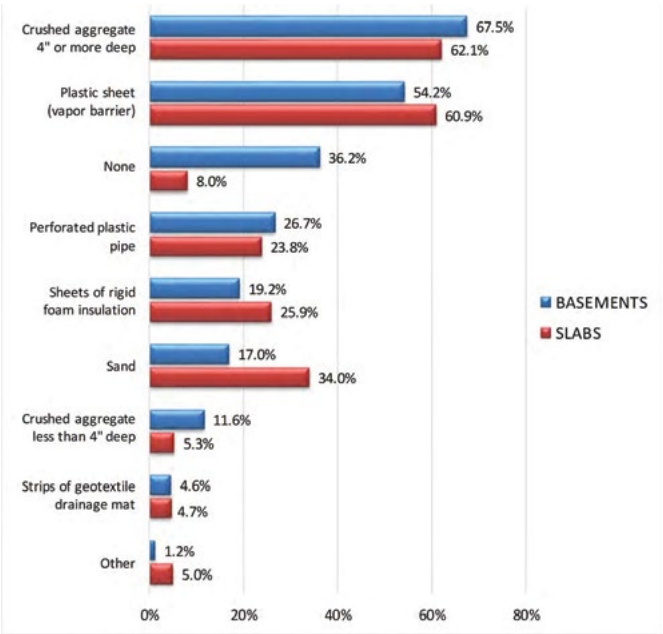
Sealing Methods

Builders are reporting using a plastic or other vapor barrier in applications not necessarily related to radon gas reduction in 60.9 % of homes in 2018, 72.4 % in 2017, and 70.6 % in 2016.

Sub-slab Preparation

Four or more inches of gravel or stone base is standard construction practice for drainage purposes in many areas of the country, making the incremental cost of a full radon-resistant system significantly lower. In the figure below, you can see the different methods utilized or not utilized for prepping underneath the slab or basement.

Figure 3. Sub-slab Preparation: Basements or Slabs, 2018



Radon in the United Kingdom

Nicole Chazaud, International Symposium Manager

Rebecca Coates, PropertECO, Head of Radon Projects, has recently been voted in as the new Chair to the UK Radon Association, founded in 2014. She spent some time with AARST to share insights about our counterpart across the Atlantic.

You have attended past International Radon Symposiums as an attendee and speaker. Tell us a about your radon industry work in the UK. PropertECO carries out radon testing, mitigation installations, and design consultancy for both residential and commercial clients across the UK. We are the UK and Ireland distributor of RadonAway fans and retail testing equipment. As Head of Radon Projects, I look after key clients' accounts and am responsible for putting together business proposals, be that for a sizeable one-off mitigation job or a rolling programme of testing for a FTSE100 company with several hundred branches nationwide.

As the new Chair, what do you bring to the table for your association's community? Do you have personal goals as a chair; what you would like to see? In November 2015, UKRA led the first UK Radon Awareness Week, which has now become an annual campaign. In 2019, we secured a well-known TV property expert as a campaign ambassador, which resulted in several interviews by media, including a very popular BBC Radio talk show. Whilst on-air, so many listeners tried to visit the Public Health England website for information on radon that it crashed, and UKRA's website received unprecedented traffic. I have been the driving force behind Radon Awareness Week. I am hoping to build on the success of last year's efforts and to engage with the health community, even more, having witnessed the excellent relationship that AARST has with the American Lung Association. Such a relationship does not currently exist in the UK between any lung-health organisations and the radon industry.

What types of meetings does the UKRA hold? We have an annual members' meeting, but sadly, this year's meeting is postponed due to COVID-19. We have held three successful one-day Symposiums and are looking forward to the next one in June 2021. We are always interested in having international speakers, so would encourage any AARST members to get in touch if they would like an excuse to visit the UK!

Can you describe the UK radon policy and its impact policy – employer compliance, keeping up with demand? Any data on the number or proportion of buildings impacted? In the UK, all employers are legally obliged to carry out a radon risk assessment as part of their overall duty of care to employees. Employers are required to check the indicative maps to assess whether their workplace is located in a designated radon 'affected area' (locations where it is estimated that more than 1% of properties will contain elevated radon levels). If the property is in an affected area, or if it has a basement that is occupied for more than 50 hours per year, testing is required to measure the radon level and assess the hazard. If high levels are found, the employer is required to take action to reduce staff exposure, either by limiting access or carrying out mitigation work to reduce the radon level.

> **"I am hoping to build on the success of last year's efforts and to engage with the health community even more."**

Employer compliance remains low in the UK; however, in most cases, this is due to employer ignorance of the requirement to test for radon (or often, of radon altogether!). Unless the employer works in a field that requires them to consult a Radiation Protection Adviser (RPA), radon is rarely brought to their attention. That's something I dedicate a lot of time addressing, both in my role at PropertECO and at UKRA.

I feel that compliance would be much higher if radon testing was a universal requirement for employers. Having them check maps or postcode databases is a barrier to action. If it were simply a routine action that all employers had to do for the wellbeing of their staff, like having electrical appliances inspected, many more employers would become aware of the legislation and complete testing.

What developing radon policy or research initiatives are you most excited about? I sit on the Executive Committee of ERA, which was recently invited to participate in a European-wide Radon Risk Communication Workshop in Potsdam, Germany. New EU legislation requires member states to prepare communication strategies to "...increase public awareness and inform local decision-makers, employers, and employees of the risks of radon..." The workshop, which included input from radon experts and social scientists, led to a manifesto posted at www.radoneurope.org, detailing key elements to be included in radon communication strategies.

Congress and HUD Respond to Radon Risk in Public Housing

Jane Malone and Kyle Hoylman, AARST Government Affairs

The devastating report by the Oregonian last November https://projects.oregonlive.com/radon/ documented HUD's failure to require protection from radon in public housing - despite a 1988 law - instructing HUD to come up with a plan to test and mitigate public and assisted housing.

> *The Secretary of Housing and Urban Development shall develop an effective departmental policy for dealing with radon contamination that utilizes any EPA guidelines and standards to ensure that occupants of housing covered by this section are not exposed to hazardous levels of radon.*
>
> - P.L. 100-628, Section 1091(a).

In February, **HUD proposed** for its 2021 budget (for the year beginning October 1, 2020) a $5 million radon testing and mitigation resident safety demonstration program for public housing.

In August, the **House of Representatives' Transportation-HUD Appropriations bill proposed:**

- Increasing the amount for the HUD radon testing and mitigation resident safety demonstration program in public housing to $8 million.
- Allocating another $2.75 billion in competitive funds for public housing to mitigate threats to the health and safety of residents and reduce lead-based paint hazards and other housing related hazards, including carbon monoxide, **radon,** or mold.
- Allocating $250 million in grants for assisted housing to mitigate threats to the health and safety of residents and reduce lead-based paint hazards, and other housing related hazards including carbon monoxide, **radon,** or mold; improve water and energy efficiency; or reduce the risk of harm to occupants or property from natural hazards.

As goes to press, the Senate is preparing its Transportation-HUD Appropriations bill, which should then be subject to negotiation in comparison to the House T-HUD Appropriations bill in a joint House-Senate Conference Committee. Earlier this year, four Senators proposed directing HUD to (1) spend $75 million in the 2021 budget to test for radon in federally-assisted housing and (2) develop an interagency action plan for testing federally-assisted housing units - and report this plan to Congress.

AARST has been in touch with multiple Congressional offices about further HUD action, including authorization bills. Ultimately, HUD should be required to address radon in every HUD-involved property, whether through an Appropriations bill, authorizing language, or HUD guidance. The policy for testing and mitigation should, at minimum, match the Office of Housing's Multifamily Accelerated Processing guide.

Estimated Cost to Reduce Radon Risk in US Public Housing

The estimated annual cost of measuring and mitigating radon in US public housing ranges from $49 million to $78 million, assuming 20% of the units tested require mitigation, and the work is implemented over a five-year period. The total cost to measure and mitigate radon in public housing ranges from $245 million to $392 million.

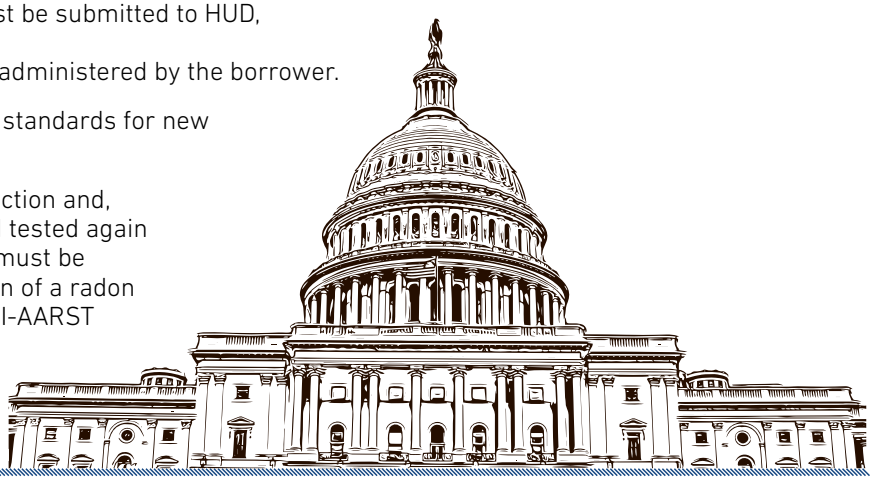
Initial 5-Year Period	Low	High
Radon Testing Cost - Per Unit	$50	$80
# Units	680,754	680,754
Radon Testing - Initial	$34,037,710	$54,460,336
Radon Testing - Follow-up	$6,807,542	$10,892,067
Radon Mitigation Cost - Per Unit	$2,500	$4,000
# Units	81,691	81,691
Radon Mitigation*	$204,226,260	$326,762,016
Total Cost	$245,071,512	$392,114,419
Annual Average Cost Over Five Years	$49,014,302	$78,422,884

* *Collateral mitigation is possible where one mitigation system can serve multiple units above the same foundation or area, saving materials and costs.*

HUD's Multifamily Loan Program Update

HUD published the notice of changes to the Multifamily Accelerated Processing (MAP) guidance for FHA multifamily loans in July. The key changes to the Radon Report requirements this year include:

- Elimination of partial sampling: 100% of ground contact units must be tested unless all units are mitigated according to the standard.
- Elimination of EPA zone three exemption: all properties must be tested.
- Any other exemptions must be standard-based and signed off by a radon professional.
- Copies of appropriate certifications/licenses shall be included in the report.
- A copy of the signed certificate of completion shall be uploaded into HUD's records.
- Operation and maintenance plans must be submitted to HUD, attached to the loan documents, and, for the duration of the mortgage, administered by the borrower.
- Compliance with current ANSI-AARST standards for new construction is mandatory.
- Buildings must be tested post-construction and, if above the action level, mitigated and tested again to below the threshold; all such work must be performed under the direct supervision of a radon professional according to current ANSI-AARST standards.



ANSI-ISO 17024 Pursuit – Progress Report

contiued from page 8

The COVID-19 slowdown, staff furloughs, and spending freeze delayed our 17024 progress somewhat, but now that the full staff complement is back, we have resumed work with our psychometrician consultants. The table o n page 3 presents milestones toward the achievement of 17024.

AARST has also resumed work on conforming the NRPP Policy Manual to ANSI, including the creation of necessary forms and procedures documenting impartiality. By the time this article is printed, we should be on track to submit our preliminary application for ANSI Accreditation during the first quarter of 2021. Note we also anticipate that NRPP will go live with the new certification scheme in early 2021 while the ANSI process advances.

The ANSI accreditation mark is a symbol of excellence, recognized worldwide by employers, industry leaders, hiring managers, and credential holders. ANSI's personnel certification accreditation program based on the international standard ANSI/ISO/IEC 17024:2012, Conformity assessment – General requirements for bodies operating certification of persons which has helped certification programs make the journey from good to great. Over 5.2 million people worldwide and counting hold a certification from an ANSI-accredited organization.

The Value of ANSI/ISO/IEC 17024 Accreditation

- The ANSI mark signals to an employer that the credential holder has undergone a valid, fair, and reliable assessment to verify that s/he has the necessary competencies to practice.
- ANSI accreditation provides an added layer of legal defensibility against invalid claims.
- Government agencies such as the U.S. Department of Defense, Department of Energy, Federal and State OSHA, and the FDA, rely on ANSI accreditation as it assures the competency of the certification program.
- The accountability and transparency built into the ANSI process, support conformity assessment attestations, and can result in reduced liability insurance.

FESTA

RADON TECHNOLOGIES CO.

New and Improved **Low Voltage** Fans!

- New UL approved configuration with power supply independent from the fan.
- New UL approved cord lengths with no limitation on the voltage side.
- New military spec noise and vibration reduction technology making them as quiet as a standard radon fan.

www.festaradontech.com // 1 (800) 806-7866 // admin@festaradon.com

How Many Atoms of ^{222}Rn Are in a picocurie?

Phillip H. Jenkins, PhD, CHP, Senior Health Physicist, Bowser-Morner, Inc.

Have you ever wondered how many atoms of radon are in a picocurie? Well, I have, and found the calculation to be instructional. It is also illustrative of the importance of using a proper unit with every number and carrying the units forward. Before plunging into the derivation that answers the above question, I want to take advantage of some teaching moments the question itself provides.

Notice how radon is abbreviated, capital R, little n, with 222 in the upper left. We have all seen radon abbreviated in several ways, but this is one correct way. "Rn^{222}" and "Rn_{222}" are incorrect. The 222 is the atomic mass or the number of protons and neutrons in the nucleus. If we were to include the atomic number (just the number of protons in the nucleus) it would be in the lower left, like this $_{86}Rn$. However, since the number of protons defines which element it is, putting both 86 and Rn in the abbreviation is unnecessary. To complete the conventions, the upper right position is used to describe an electrical charge, such as He^{+2}, which is the same as an alpha particle, and the lower right position is used for the number of atoms in a molecule, such as H_2O. And please realize that throughout this article by "radon," I mean only the isotope radon-222.

Further, notice that I used "radon-222" above. This too is correct, with a little "r" unless it happens to be the first work in a sentence. It is also correct to use "Rn-222" as an abbreviation for radon. And note that there is no capital C in "picocurie." And by the way, there was a time when "C" was used as the abbreviation for curie, but "C" was also the abbreviation for coulombs so to avoid confusion the abbreviation for curie was changed to "Ci."

So back to the original question, how do we calculate the number of atoms in a picocurie of radon? First, I need to define some terms. A = activity, which is a quantity of a radionuclide expressed as a rate of decay using such units as disintegrations per unit time (for example, dis/min), picocurie or becquerel. The letter N is used to express the number of atoms of the radionuclide. The Greek letter λ (lambda) denotes the decay constant, which expresses the fraction of atoms that decay per unit time.

This leads us to the following equation:

$$A = \lambda N \quad (1)$$

We should always carry the unit associated with each term in an equation, so inserting the units leads to the following:

$$A\ (dis/min) = \lambda\ (min^{-1})\ N\ (atoms) \quad (2)$$

In this equation I've expressed the activity, A, as disintegrations per minute, which can be abbreviated as dis/min or dpm. To be consistent, λ is also expressed in minutes, but with a "-1" as the exponent. If you're not familiar with seeing negative exponents, this simply means that the unit is in the denominator, such as "1/min" or "per minute."

Here is where I must point out that we use terms like "disintegrations" and "atoms" only for convenience so that we can better keep straight what we are talking about, but these are not true units; I call them "artificial units" because they do not follow the rules of math. In the above equation, the sides are balanced because we have the activity expressed as "per minute" on both the left side and the right side of the equation, ignoring the artificial units.

So how do we find lambda? It is equal to the natural logarithm of 2 divided by the half-life. In case you are not familiar with natural logarithms, merely enter "=ln(2)" in a cell in Excel and you will see that the value is approximately 0.693.

$$\lambda\ (min^{-1}) = \ln(2) / t_{½}\ (min) \quad (3)$$

There are several values for the half-life of radon in the literature that vary in the 3rd or 4th significant figure; the value I like to use is 3.825 days. But I need to express that in minutes so, carrying all the units:

$$3.825\ days \times 24\ hr/day \times 60\ min/hr = 5508\ min \quad (4)$$

Plugging this value for the half-life of radon into equation 3:

$$\lambda\ (min^{-1}) = \ln(2) / 5508\ (min) = 0.00012584\ min^{-1} = 1.2584 \times 10^{-4}\ min^{-1} \quad (5)$$

Now if we rearrange equation 2 to solve for N we get:

$$N\ (atoms) = A\ (dis/min) / \lambda\ (min^{-1}) \quad (6)$$

We have the value of λ from equation 5, so what is the value of A? In other words, what is one picocurie in the unit of disintegrations per minute? You may know this off the top of your head, but in case you don't, how do we solve for that?

At one time, the curie was defined as the activity of one gram of radium-226. Eventually, the definition was changed so that a curie is defined as 3.7 x 1010 disintegrations per second (dps). This is approximately the activity of one gram of radium-226, but not exactly. So, taking the definition, we can convert that to the number of disintegrations per minute (dpm) for one picocurie, again carrying the units:

3.7×10^{10} dps/Ci x 1 Ci/(10^{12} pCi) = 0.037 dps x 60 sec/min = 2.22 dpm (7)

Plugging the values of λ and A into equation 6:

N (atoms) = 2.22 dpm / 1.2584×10^{-4} min^{-1} = 17,641 atoms (8)

Note in equation 8 that the unit "per minute" cancels out, and disintegrations is an "artificial unit," so we are left with the number of atoms in one picocurie.

At the guideline concentration of 4 pCi/L, there are 4 x 17,641 = 70,564 atoms of radon in a liter of air. If that sounds like a lot of atoms, consider that there are about 2.5 x 1022 molecules of other gases in a liter of air. So, at the guideline concentration, what fraction of molecules in air is radon?

$70{,}564 / 2.5 \times 10^{22} = 2.8 \times 10^{-18}$ (9)

That is a very small fraction. Considering that one in a billion is 10-9 this is roughly 3 in a billionth of a billion. It's remarkable that we can easily, and relatively cheaply, detect and measure it. But that's because it is radioactive and can be measured by the radiation that it and/or its decay products emit.

What I most hope you take away from this article is the importance of using a proper unit with every number and carrying the units through any calculation.

Impact on Radon Levels of Decreasing Natural Ventilation in Homes

David L. Wilson, Retired Research Staff, Oak Ridge National Laboratory

Empirically speaking, if you reduce the net ventilation rate of a home by 50%, you double the indoor radon levels. Therefore, predicting the radon levels in a home after a change in ventilation should be straightforward. However, in practice, no studies have documented this consistently in a diverse population of homes. The primary reason for this is that radon flux from the soil is not constant, and there is usually more than one pathway or mechanism for radon entry into the living space. Variation in housing style and construction techniques may create unique pathways for radon entry into a home. In addition, most studies to date have looked at similar styles of homes (not identical) that were separated by some distance, bringing into question localized weather patterns and micro-geology as well.

To some extent, all homes in soil contact have a radon flux into the living area. The question is how much radon is retained in the living area per unit of time. Although building leakage is a good indicator of envelope tightness, it is difficult to convert 500 in2 of equivalent leakage area (EQLA) into air-exchange per hour (ACH) with the required certainty. However, the ACH for a home can be measured directly by monitoring the decay of a tracer over time, and this data can be used to make predictions about indoor radon levels.

To remove a significant number of variables for this type of study, a neighborhood with 100 single-story, detached slab-on-grade units on a 25-acre site located in EPA Zone 1 was selected. These 1300 ft2 units, built during 1973-1975 by the same contractor, have identical floor plans and are cooled by centrally ducted forced-air systems. All units have a monolithic foundation with exterior walls made of solid concrete block laid directly on top of the slab foundation with minimal soil contact and a flat solid roof made of poured concrete.

From 1990 through 2015, these homes were part of a long-term study to monitor radon levels as a function of time. The original premise was that over time, as homes settle, radon levels would increase. However, the reduction in indoor ventilation caused by renovations over time had a much greater impact on the indoor radon levels than structural aging.

This paper intends to estimate the impact on indoor radon levels of decreasing ventilation rates after a series of renovations. All units with radon levels ≥4 pCi/L in this study were mitigated using a single-penetration sub-slab depressurization (SSD) system.

Each survey, to the greatest extent possible, was collected during the same seasonal time. All accepted radon tests were short term (5–7 days) with a maximum relative percent difference (RPD) for all results of ≥2 pCi/L set at ±15%. Air exchange studies were performed over several days in both occupied and unoccupied homes. For each study, 6 to 10 homes were selected at random. Tracer concentrations were integrated at 2-minute intervals. Table 1 summarizes the radon and ACH data for the 1990-2015 sample periods.

TABLE 1: Radon testing summary 1990 through 2015

	1990	1995	2000	2005	2011	2015
Radon levels (pCi/L)	0.1 to 210.8	0.1 to 108.7	0.1 to 3.9	0.5 to 19.8	0.5 to 3.5	1.5 to 19.4
Average pCi/L	3.8	4.1	1.8	6.7	1.9	10.1
Unmitigated units sampled	100	72	46	46	11	11
Units ≥ 4 pCi/L	28	26	0	35	0	10
Percent ≥ 4 pCi/L	28	36	0	76	0	91
Average air exchange rate	0.5	0.3	0.3	0.2	0.2	0.03
Comment – changed conditions prior to testing		Double-pane window inserts, sliding door replaced with a solid door.	No change from 1995	Passive sealing of windows and doors. One window replaced with solid glass blocks.	No change from 2005	New double-pane windows with exterior flanges, new exterior doors

As was mentioned previously, empirically speaking, if you reduced the ACH by 50%, the radon levels would, in theory, double. So, a home tested at 2 pCi/L at 1 ACH would be 4 pCi/L if the ACH was 0.5. Using this ratio, a line of comparison between the pre-renovation and post-renovation radon level was generated in the figures below.

The 1995 survey found 26 homes with radon levels ≥4 pCi/L with a maximum of 108.7 pCi/L. Eight of the 26 homes (31%) were significantly above the theoretical maximum radon level based on the decrease in air exchange.

With no intervening changes to the building envelopes between 1995 and 2000, Figure 1 shows a reasonable agreement in radon tests results in unmitigated units five years apart with no new units found with radon levels ≥ 4 pCi/L.

The 2005 survey found 35 homes with radon levels ≥4 pCi/L with a maximum of 19.8 pCi/L. Fourteen of the 35 homes (40%) were significantly above the theoretical maximum radon level based on the decrease in air exchange. Correlation for the 46 homes in which the 2000 result was within the theoretical range was not good (Figure 2).

With no changes to the building envelope between 2005 and 2011, again there was reasonable agreement in radon tests results in unmitigated units six years apart with no new units found with radon levels ≥ 4 pCi/L. In 2015, further tightening of the building envelope resulted in an estimated ventilation rate of 0.03 ACH, and radon sampling found 10 of the remaining units with radon levels ≥ 4 pCi/L.

In summary, the original hypothesis that radon levels would increase over time as homes settle was not proven, but the association of net ventilation rate reduction with increased radon was confirmed.

Further, it was found that unpredictable increases in radon levels following a reduction in ventilation rate were caused by pronounced rain spikes (Figure 3), which could take days to dissipate at lower ventilation rates (Table 2). In one of the 0.03 ACH homes, it took over two weeks for the moisture level to drop sufficiently to perform the post-mitigation test. It is important to note that these identical homes were at the extreme end of natural ventilation scale. However, the envelope energy-related improvements that were made were not that unusual. Therefore, the ability to predict radon levels in advance of a weatherization project is not all that certain.

TABLE 2: Time in hours for a radon spike to dissipate at various ventilation rates

ACH	0.5	0.3	0.2	0.03
Hours to dissipate	6	10	15	100

FIGURE 1:
1995 (0.3 ACH) vs. 2000 radon survey (0.3 ACH).

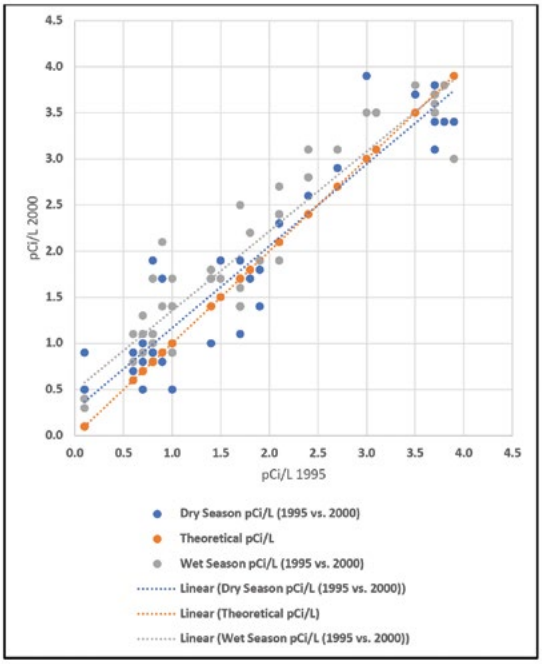


FIGURE 2:
2000 (0.3 ACH) vs. 2005 (0.2 ACH) radon survey.

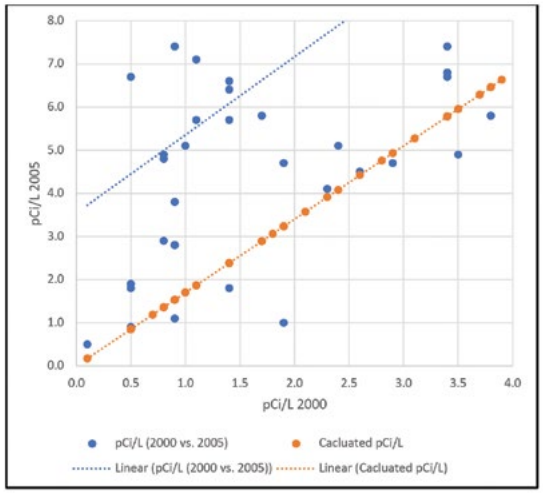
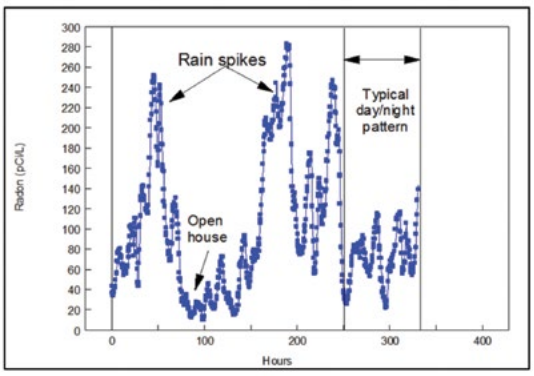
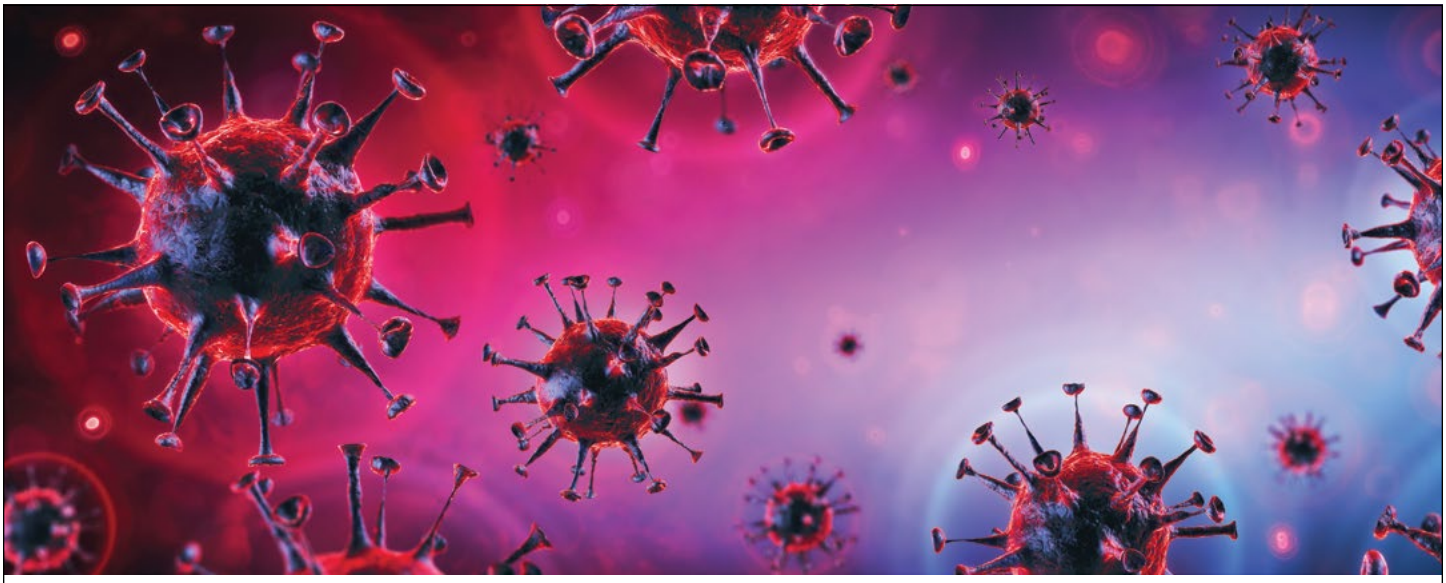


FIGURE 3:
Continuous radon monitor data.





THE COVID-19 INDUSTRY IMPACT SURVEY: RESULTS

In addition to causing more than 100,000 deaths and sickening millions of persons in the US alone, the COVID-19 pandemic has disrupted many others' lives, livelihoods, academic progress, and access to many services and goods - well beyond the radon industry. With National Radon Program Services (NRPS), AARST conducted a survey in late July to learn, to the extent possible, how your radon businesses were faring in the face of changes caused by the pandemic - and the resultant widespread uncertainty.

The survey results below reflect the continuum of its effects, ranging from fewer requests for services, due to shutdowns or other issues, to significantly increased demand, typically triggered by booming home sales in some markets. Thanks to the 360 radon professionals who contributed their experiences.

Impacts on Business Operations: By the end of July, **nearly one-half (47%) of radon professionals experienced interruptions in their business operations** due to COVID, while another **one-third (35%) reported no adverse impact from COVID.** Other negative effects of COVID on radon businesses included **needing a loan** to make payroll (31%), **losing personnel due to furlough** (12%), **losing personnel due to other COVID issues such as illness and family needs** (11%), and not being able to enter a job site (4%).

Change in Demand for Radon Services: As compared to the prior year, since March, **41% of radon professionals had received fewer requests for services,** while another **30% had received more requests** and the remaining 29% experienced level demand (Figure 1).

Relative Size of Radon Business Capacity: By the end of July, **77% of businesses were at their normal staff capacity,** 18% were at reduced staff levels, and 5% had expanded staff capacity.

Number of Employees: The survey respondents reported on the size of their workforce, including themselves, as of the end of July. **Nearly 2/3 (63%) of the businesses have one to three employees** (Figure 2).

Figure 1. Change in Demand

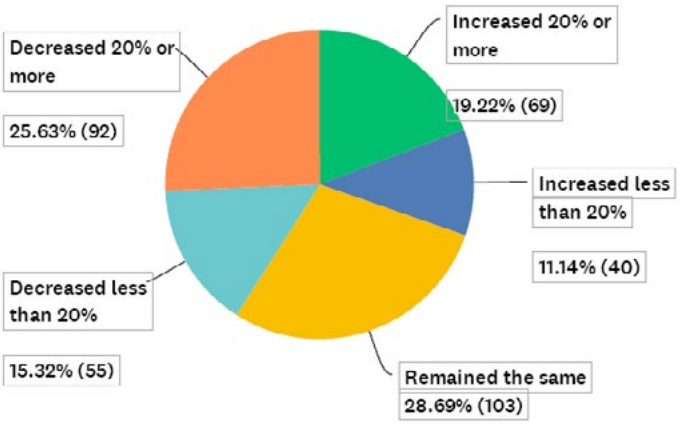
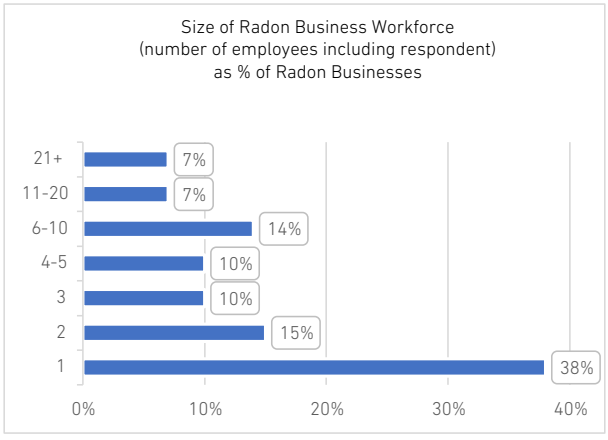


Figure 2. Number of Employees



fantech®

LOOKING FOR A WHOLESALE DISTRIBUTOR STOCKING FANTECH RADON PRODUCTS NEAR YOU?

We got you covered.

Give us a call to find out the location of your nearest wholesale stocking distributor.

By popular demand, we are pleased to announce that along with our existing Radon specific distribution partners, Fantech products are currently stocked in a variety of wholesale distribution locations around the country. Chances are, we already have fans stocked nearby you.

Benefits of local distribution:

- Free local delivery
- Locally stocked
- Local sales support
- App/web based ordering
- Credit Terms*
- Tools, Piping and Accessories stocked locally

*subject to approval through local distributor branches

fantech®

www.fantech.net • 800.747.1762

AARST™
RADON PROFESSIONALS
SAVING LIVES

527 N Justice Street
Hendersonville, NC 28739

Keeping you updated on issues
and events in your industry.

aarst.org

https://aarst.org/courses

MEMBERS ONLY

Course listings at https://aarst.org/courses

AARST Solutions for Your Business

Earn Cat-I CE credits with AARST-hosted online courses.
The course cost is completely covered by your membership fee.
In addition to your other discounts and benefits,
FREE CE makes your AARST membership ROI UNBEATABLE!