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plus

RADON REPORT CARDS | VI TRANSACTIONAL CONSIDERATIONS
NATIONAL RADON ACTION PLAN | INFLATIONARY TIMES



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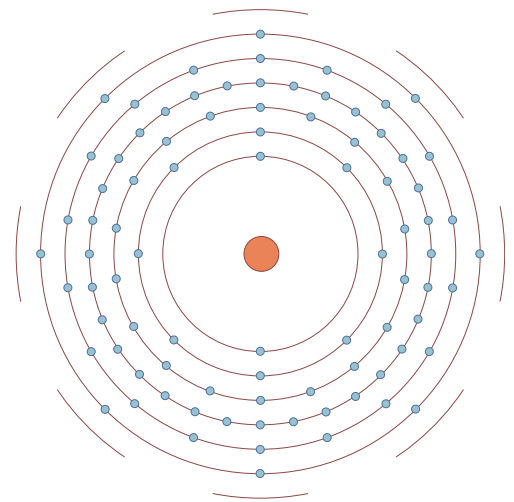


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Please submit content, comments, or questions to editor@aarst.org.

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 allow you to gain updated information, discover new techniques, learn about new problems before they occur, and hone your professional skills.



Dallas Jones, AARST-NRPP Executive Director

ANSI/ISO 17024 Accreditation Update

The NRPP's final application for ANSI/ISO 17024 Accreditation for Personnel Certification Bodies, including all the support documentation, has been submitted and reviewed by ANSI for completeness. Within a few weeks, ANSI will assign two assessors to review our documentation in detail. The review process takes 4-6 weeks and may include questions from the assessors.

Following the detailed review, the assessors will schedule a 2-day virtual site visit with the NRPP staff. Afterward, there will be a closing meeting during which the assessors will issue any non-conformities; we will have 90 days to complete any corrective actions. While the entire process for closing any citations may take as long as six months, our objective is to have as few non-conformities as possible and have them corrected in short order.

Once any corrective actions have been completed, the assessors will meet with the Evaluation Task Group (ETG), a subcommittee of the Personnel Certification Accreditation Committee (PCAC). Based on the recommendation from the ETG, the PCAC will vote on whether to award our accreditation.

The next two PCAC meetings are scheduled for April 12th and June 21st. While it is ambitious to think our hoop-jumping will be completed in time for an April approval, we look forward to accreditation by no later than June 21st.

Vapor Intrusion Inclusion

The AARST Bylaws have been updated to include a Vapor Intrusion Council, consisting of AARST Board-appointed Vapor Intrusion professionals committed to advancing the growth, development, and sustainability of the chemical vapor intrusion inside AARST. Council members must be members in good standing with the AARST national organization and will elect two Council Directors to serve on the AARST Board with full voting privileges.

The NRPP Certification Council has assembled a workgroup of experienced VI mitigation professionals to perform a Job Task Analysis for an eventual VI Mitigation certification exam and credential. The committee chair is Chris Lutes, a principal technologist with Jacobs and a nationally recognized expert in the study of the intrusion of contaminated vapors into buildings.

SGM-Compliance Inspector Certification

The new NRPP Soil Gas Mitigation Compliance Inspector (SGM-CI) Exam and Certification is targeted at those who want to inspect ASD systems to verify if the installation complies with the ANSI-AARST Soil-Gas Mitigation Standard.

Certified SGM Compliance Inspectors have free access to the AARST SGM Inspection App used to perform a visual assessment and generate an attractive mitigation inspection report PDF. If you perform radon measurements for real estate transactions, you know that the seller is usually tasked with hiring a mitigator if the result is at or above the Action Level. We all know sellers are only interested in the cheapest proposal. As the buyer's advocate, let your client know it's important for you to return after the installation to perform the post-mitigation clearance test and inspect the system to ensure it complies with the ANSI-AARST Mitigation Standard. If you find any non-compliant items, the buyer now has leverage to require corrections before closing. Certified inspectors may also contract with AARST to perform compliance inspections for state radon programs.

The Kansas State University Radon Training Center regularly offers the SGM-Compliance Inspector Exam-Prep Course. We expect other providers to submit courses for approval as the year progresses.



Evaluate Radon-Related Lung Cancer Risk and Policy Responses by State

American Association of Radon Scientists and Technologists, 2021

[STATE NAME]

The AARST Radon Report Card: Risk and Response

Population and Lung Cancer

Total Population: ?



Lung Cancer Cases: ?



Age-Adjusted Lung Cancer Incidence Rate (per 100,000): ?

Lung Cancer Incidence

?

Estimated Radon-Induced Lung Cancer Incidence

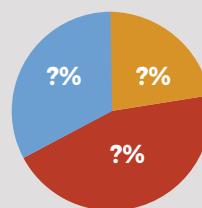
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Statewide Radon Policies

Credential Required	?	State License
Radon Standards in Effect	?	ANSI-AARST
Homebuyer Protection Required	?	Notification & Disclosure
Radon System Requirement for New Homes	?	All Counties
Type of New Home Where Required	?	All Residential Buildings
Standard/Code for Radon System in New Homes	?	IRC Appendix F
School Testing Required	?	YES
Radon System Requirement for New Schools	?	YES

Buildings and Exposure Potential

Pre-Mitigation Radon Test Reports:



Percent by Radon Level

< 2 pCi/L

≥ 2 to 4 pCi/L

≥ 4 pCi/L



Housing Units by Structure Type

	1 to 4 Units	5 or More Units	Total
Existing	?	?	?
New	?	?	?



Total Public Schools: ?

AARST has launched the Radon Report Card, a tool for viewing, by state, the latest available data on radon-induced lung cancer risk and current state policies that help reduce risk.

The Radon Report Card delivers an estimate of the radon-induced lung cancer cases for each state, along with total lung cancer incidence and mortality, as well as the rate of lung cancer cases per 100,000 persons. Potential radon exposure locations are presented through the number of existing homes and additional homes built annually and the number of public schools.

The percentages of radon tests above EPA's action level of four picocuries (pCi/L), obtained through the Environmental Public Health Tracking Data Explorer, illustrate the extent of radon's burden in each state's buildings. Nationally, 36% of the radon test results in the Data Explorer are above the action level.

To enable user verification of risk data and consistency in measurement across states, the Radon Report Card relies on national data reported by the Centers for Disease Control and Prevention, Census Bureau, and National Center for Educational Statistics. The Radon Report Card also indicates which public policies to reduce radon risk are in effect in each state.



Check out AARST's first-ever Radon Report Card and find out how states measure up in lung cancer risk.
<https://aarst.org/report-card/>



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National Radon Action Plan

The 2021-2025 National Radon Action Plan (NRAP), which is the second such plan, was developed by the NRAP Leadership Council and released on January 31. NRAP has brought together leaders from AARST, American Lung Association, CanSAR, CDC, CR3, Conference of Radiation Control Program Directors, Environmental Law Institute, EPA, HUD, and the National Center for Healthy Housing to plan, guide, and sustain nationwide radon action in the effort to protect all building occupants from radon. With the costs of radon so great, the benefits of investment so clear, and the technical solutions to improve health so straightforward and available—it has never been more important to continue to drive action.

The 2021-2025 plan lays out four goal areas - Build In Risk Reduction, Support Radon Risk Reduction, Build Capacity to Test and Mitigate Using Professional Radon Services, and Increase Awareness of Radon Risk and Control Strategies. Within each goal area, there are specific, actionable ideas. The final page of the plan provides a table (see page 7) *Strategies for Expanding Protections for All Buildings* that lists these strategies and desired outcomes.

“The key steps to reduce radon-induced deaths from lung cancer are to increase public awareness of the threat, test all types of buildings for elevated radon levels, build a workforce of credentialed radon professionals who can fix radon problems following proven-effective standards, and ensure the availability of adequate funding to pay for testing and repairs.”

Excerpt from The National Radon Action Plan 2021-2025

Thank You 2021 ARPC Advertisers!

Without ARPC Advertising Contributions:

\$72 MILLION in State Indoor Radon Grants
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To read **The National Radon Action Plan 2021–2025: Eliminating Preventable Lung Cancer From Radon in the United States by Expanding Protections for All Communities and Buildings**, visit <https://aarst.org/wp-content/uploads/2022/02/NRAP-2021-2025-Action-Plan-508.pdf>.

TABLE 1. NRAP | 2021–25: STRATEGIES FOR EXPANDING PROTECTIONS FOR ALL BUILDINGS

GOAL AREA	NRAP STRATEGIES, 2021–25	OUTCOMES WE SEEK
Build In Radon Risk Reduction	1.1 Embed comprehensive radon notification and health risk warning statements, and radon test result disclosure, in real estate sales and rental transactions.	Prospective buyers, tenants and loan borrowers receive and acknowledge receipt of information that equips them to take self-protective actions, including obtaining radon testing and mitigation.
	1.2 Work with government, quasi-governmental and private sector lending entities to adopt radon testing and mitigation requirements.	Lending entities require radon testing and mitigation in all residential, educational and commercial buildings.
	1.3 Promote radon control requirements for new construction within building codes and standards.	State and local building codes require that buildings be built to allow for radon control.
	1.4 Seek local, state and federal policies and codes that require all existing buildings to be tested for radon and mitigated as needed.	Building owners and managers, employers, and school districts ensure that the radon levels in their buildings are protective of occupant health.
Support Radon Risk Reduction	2.1 Increase access to government-backed and other sources of housing financing for property owners of low-income housing to cover radon testing and mitigation.	Property owners are able to obtain financing for radon testing and mitigation in low-income housing from new and existing funding sources.
	2.2 Support establishment of tax incentives to cover radon mitigation costs.	Tax incentives exist that increase voluntary radon testing and mitigation.
	2.3 Increase radon testing and as needed mitigation by local, state and tribal programs that conduct physical upgrades of existing housing.	Radon testing and mitigation is routinely addressed by housing rehabilitation, home repair, energy upgrade, weatherization and similar programs.
	2.4 Support state cancer control programs to include radon indicators and interventions.	All state cancer control programs include radon risk-reduction interventions in their primary prevention strategies for lung cancer.
Build Capacity to Test and Mitigate Using Professional Radon Services	3.1 Expand the scope and usability of radon testing data in the National Environmental Public Health Tracking Network by increasing the number of participating states and laboratories.	Decision-makers nationwide have access to a robust national data set for use in characterizing radon exposures, quantifying risk reduction actions and informing a research agenda.
	3.2 Continue to promote adherence to consensus standards for testing, mitigating and measurement device accuracy.	Quality professional standards to support the effectiveness of radon services are widely recognized, disseminated and adopted.
	3.3 Support issuance and implementation of a federal framework to align private and state radon credentialing programs.	A clear standard of quality for assessing radon service provider competencies and skills is widely recognized and adopted, and credentialing programs are more consistent in standards and practices used to license and certify service providers.
	3.4 Promote the adoption of radon credentialing by states that do not currently regulate radon service providers.	Radon testing, mitigation and laboratory services nationwide are provided by credentialed professionals.
	3.5 Expand the availability of credentialed radon practitioners through the training and certification of qualified professionals.	Credentialed radon professionals are available nationwide to meet increasing demand.
Increase Awareness of Radon Risk and Control Strategies	4.1 Promote integration of radon into coordinated messaging to decision-makers about health risks in housing, schools and workplaces.	Decision-makers with responsibility for occupant health in housing, schools and workplaces include radon risk reduction in their policies and practices.
	4.2 Promote radon awareness through nontraditional radon stakeholders—including clinical, health equity, social service and faith-based organizations—through consistent outreach using targeted materials.	Nontraditional radon stakeholders educate and equip their constituents to take radon risk-reduction action.
	4.3 Tailor effective radon messaging to underserved racial, ethnic and low-income populations.	Culturally competent information about radon risk reduction is available to underserved racial, ethnic and low-income groups.



Five Strategies to be Proactive in Inflationary Times

Robin Royals, President, RC Royals & Associates, LLC

As a young commercial loan officer at Michigan National Bank of Detroit, I lived through a highly inflationary period during the Carter administration. The prime rate of interest was 11%. Prime rate is the lending rate for the best borrowing customers of a bank. Businesses

suffered, and the overall economy came to a standstill.

In banking, business management capabilities are measured by how a business performs in good and bad times. It is much harder to sustain consistent performance in challenging economic situations. We would analyze a spread of financial statements spanning a five- to six-year period to find the operating performance trend over an extended period. The hope was to see how management reacted to deliver consistent results under both circumstances. Can the company manage the expense line as well as the top line when revenue falls during more challenging economic times?

We have experienced an unprecedented period of growth in the United States economy. Many legendary leaders have ridden on coattails of this positive wave and built a reputation for exceptional leadership. But many have never been tested by the challenges of an inflationary or down economy.

The model used at the bank to analyze the capabilities of a management team does not work well in today's world. The actions necessary for success during current inflationary times are not even in the playbook of today's managers. The thought of focusing on operations and the expenses associated with winning in tough times is beyond the pale for many of these small businesses.

The challenge is to complete all of the basic activities associated with running a successful business. Everyone likes to work on the company's front end- interface with customers and bring in new sales. In times like these, the focus shifts to the expense side of the income statement. Review five of the most effective strategies to get through difficult times:

Control Spending. The company needs to create transparency and visibility into the business's operating expenses. This enables the business owner to see high areas of spending and determine what might be done to curtail and control these expenses.

Strategic Spending. Determine what expenses are necessary. Are all expenses incurred essential for the business's success during these challenging times? The realization is that inflation will not last forever, and it is a matter of tightening your belt to get through these difficult times to get on the other side of this inflationary period. There should be scrutiny placed on every dollar spent in the company.

Understand The Expense Drivers. The amount on the expense line is the result of activity within your company. It is essential to understand what drives that expense total. Are you doing things within your business that were necessary in better times that could now be adjusted or dramatically changed during the current challenging times to help improve the company's profitability?

Eliminate Work. Now is an excellent time to take a hard look at your staffing and the activities associated with running your business. Are you running your business processes in the most efficient manner to meet customer expectations and deliver profitability?

Automate. Now that you have streamlined your processes and taken out as much redundancy and waste as you can, look at ways to leverage technology and bring automated efficiencies to your business. Use this strategy as the final step because it is difficult to automate a process before fully understanding how it works manually. Without understanding the underlying manual process, beginning an automated solution will create more mistakes.

For further information on strategies to overcome inflationary challenges, reach out to Robin Royals at (913-963-3848) or info@robinroyals.com. Excerpts from this article were taken from the "ROYAL Methodology for Strategic Success" found in Robin's upcoming book, *"A Safe Pair of Hands."*



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ARPC, Keeping Radon in the Forefront

What is the ARPC? The **American Radon Policy Campaign** is **AARST's** program to raise funds to support federal and state policy that advances radon risk reduction.

Why does AARST need to raise ARPC funds every year? So many reasons:

- Efforts have been made to eliminate federal funding for the EPA radon program.
- Efforts have been made to eliminate federal funding for state radon programs – State Indoor Radon Grant (SIRG).
- 30 states do not regulate radon work.
- 41 states do not require warning buyers about radon.
- 39 states do not require radon systems in new homes.
- Most states have no radon testing requirements for schools, childcare, or workplaces.

Ensuring continuity of federal funding and enacting protective state policy requires that someone lobby legislators to introduce and pass legislation. Often, this requires the services of a professional lobbyist who represents the radon industry.

Is ARPC new? No. ARPC Advertisers have supported lobbying work on Capitol Hill in Washington DC for almost a decade. These efforts helped open doors to new federal policy while delivering \$70 million for SIRG. Now and in the future, ARPC funds will also support AARST Chapter lobbying work at the state level after the chapter's strategy, lobbyist, and request for support have been vetted by AARST.

How does ARPC work? Companies and individuals pay an annual advertiser fee or a monthly sustaining advertiser fee to support lobbyists working for AARST and chapters. Payment can be made by credit card or check. Each year, ARPC Advertisers are recognized for their support through advertisements in the Symposium Program, The Radon Reporter, and Rn Biz.

How can you become an ARPC Advertiser in 2022? Help us achieve our fundraising goal of \$45,000 in 2022. Visit the ARPC page for more information and to become a 2022 Advertiser. With your help, this good work will continue.
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THE VAPOR INTRUSION PATHWAY MINI-SERIES

Transactional Considerations

David R. Gillay, Barnes & Thornburg LLP¹

This is the first in a series of three articles focusing on an unseen villain known as vapor intrusion to provide a look into key transactional considerations related to this environmental health hazard. Vapor intrusion (VI) is the migration of volatile chemicals from subsurface soil and groundwater into buildings. It shares many common characteristics with the intrusion of naturally occurring radon gas into buildings. This emerging contamination “pathway” presents significant challenges, complicates property transactions and securing and maintaining regulatory closure of contaminated sites, and increases litigation and legal risks. VI issues are far-reaching and have affected thousands of sites across the country. Successfully dealing with VI issues requires a basic understanding of the complex science, rapidly changing regulatory landscapes at the state and federal levels, and evolving legal doctrines that may increase your liabilities.

¹ David leads Barnes & Thornburg LLP’s Environmental department’s remediation, redevelopment, and environmental transactions practices. He has focused on the legal, regulatory, and technical impact and implications related to the vapor intrusion pathway, chlorinated VOCs (with an emphasis on TCE), and potential long-term stewardship obligations related to environmentally challenged properties for nearly two decades. David is a frequent writer and speaker, having participated in a variety of private association, client, and continuing legal and business education seminars with a special focus on vapor intrusion, TCE, and developing cost-effective solutions to manage residual contamination as part of redevelopment projects and the sale of contaminated property. David was recently elected to join the American Association of Radon Scientists and Technologists (AARST) Board of Directors and continues to serve as counsel of record for the Midwestern States Environmental Consultants Association (MSECA). Prior to joining Barnes & Thornburg, he obtained an advanced environmental engineering degree and practiced as an environmental consultant on various projects across the country.

When buying, selling, or securing financing on real property in today's market, there is a heightened focus on potential environmental issues. This heightened focus flows from, among other factors, draconian liability schemes under state and federal environmental statutes, the revelation that risk-based cleanups may have left residual contaminants that now present 'new' risks, and media attention to emerging contaminants such as PFAS, the so-called forever chemicals.

While there are many ways to identify potential environmental issues, a common national practice is to follow ASTM International's *Standard Practice for Environmental Site Assessment: Phase I Environmental Site Assessment Process, E1527*. The Phase I ESA Standard was first published in 1993, and is periodically updated, with its most recent update released in late 2021. The stated purpose of this process is to define good commercial and customary practice in the United States for conducting an environmental site assessment on a parcel of commercial real estate with respect to the range of contaminants within the scope of the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund). CERCLA is the principal statute imposing strict, joint, and retroactive liability on the unwary.

The Environmental Protection Agency (EPA) currently recognizes that a certain version of the Phase I ESA Standard can be used to conduct "all appropriate inquiries," or AAI, into the previous ownership and uses of the property consistent with good commercial and customary practices. Performing AAI is an important step in order to qualify for various state and federal liability defenses to CERCLA liability. (We will cover AAI and these affirmative defenses later in this series). As relevant here, EPA made it crystal clear when it promulgated the AAI Rule in November 2006 that the VI pathway was always and currently is part of conducting due diligence under the Phase I ESA Standard. EPA made, among others, the following relevant statements on vapor releases and migration of vapors:

"EPA notes that both the AAI Rule and the ASTM E1527-05 standard already call for the identification of potential vapor releases or vapor migration at a property." (78 FR 79319)

"EPA wishes to be clear that, in its view, vapor migration has always been a relevant potential source of release or threatened release that, depending on site-specific conditions, may warrant identification when conducting AAI." *Id.*

"The scope of the AAI Rule and ASTM E1527-05 standard always included the requirement to identify all indications of releases and threatened releases of hazardous substances or 'recognized environmental conditions (RECs),' including indications of vapor migration or vapor releases." (79 FR 60088).

To further "assist" environmental practitioners, ASTM published a separate *"Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions"*; EPA has published federal guidance on VI; and the majority of states have now released divergent guidance on the VI pathway.

So, given these complexities, what does this really mean when you are involved in a transaction and the VI pathway is identified in a Phase I ESA? **You need a plan.** This plan should consist of several key components, such as:

First, you need to do some work upfront. It can be helpful to develop a stakeholder-approved VI Decision Matrix with screening levels based on risk tolerance and land use. Given the confusion regarding the use and meaning of screening levels, along with divergent guidance, it is important to develop risk communication talking points. These talking points can help alleviate confusion and increase the chances of gaining access to sample structures where VI may be occurring. This will also allow you to react quickly and take appropriate actions as the data are evaluated.

Second, you should consider developing a VI Sampling and Analysis Plan (SAP) and tailor it for each project. There can be numerous issues and errors introduced by inexperienced contractors when collecting VI data (e.g., soil gas, indoor air, sub-slab soil gas). The SAP will ensure a consistent approach to collecting each sample. A false positive (or negative) could create substantial concerns and delays. To get it right the first time means vetting and hiring experienced contractors. In the transactional setting where there can be unique time pressure, consider innovative technologies and new tools, like mobile labs and other portable instruments, to expedite assessing the VI pathway.

Third, build and continue to refine a VI Conceptual Site Model (CSM). The CSM is arguably the most important component of a plan. If you don't adequately identify the source(s) of the vapors, you will be challenged to find a cost-effective and permanent solution. The CSM will have many aspects and is best established by a multidisciplinary team of experts, starting with the geologists in the field. As more data and information are obtained, the CSM should be routinely updated and refined to identify potential source areas, preferential pathways (like sewers), and soil gas movement.

Fourth, carefully consider and evaluate mitigation measures. Be cautious about anyone who wants to preemptively solve the problem with no or limited data. This leads many to jump to the end – installing a sub-slab depressurization system or radon mitigation system. These types of systems, when properly designed and installed, can be very effective solutions and often have long-term operational, maintenance, and monitoring expenses. If this type of system is preemptively



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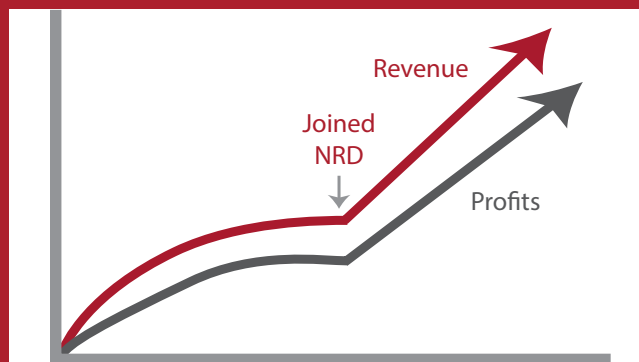
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deployed, it may miss a preferential pathway (sewer) and/or indoor air source. The CSM will help you avoid these pitfalls and help ensure that the pathway is addressed and ensure, with confidence, that there are no unacceptable exposures to human health.

If appropriately managed, **the VI pathway will not kill your deal or chill your redevelopment project.** The VI pathway can be complex, and the science continues to evolve at a rapid pace, but with proper counsel from legal and environmental professionals and a plan, you can successfully navigate to a closing or refinancing with cost-effective and practical approaches.

This article should not be construed as legal advice or legal opinion on any specific facts or circumstances. The contents are intended for general informational purposes only, and you are urged to consult your lawyer on any specific legal questions you may have concerning your situation. David R. Gillay, Esq., is a Partner in the Environmental Department of Barnes & Thornburg LLP's Indianapolis Office and may be reached at 317.946.9267 or david.gillay@btlaw.com.

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Where is the Radon Coming From?

Bill Brodhead, President of WPB Enterprises, Inc.

The initial radon level of a single-family one-story 1800 ft² newly constructed home near the coastline of Massachusetts was 6.5 pCi/l in May 2016. It has a poured concrete wall basement with sand gravel mix under the slab, and an adjoining two-car garage slab. The HVAC system in the mostly unfinished 1653 ft² basement is gas-fired hot air with central air conditioning. The 1653 ft² basement is unfinished except for a 200 ft² finished workroom.

In June 2016, a certified company installed a single suction point into the basement slab with a GP501 fan. The post-mitigation test in August 2016 was 4.9 pCi/l. After four additional tests ranging from 3.9 to 5.7 pCi/l, the contractor installed another basement sub-slab suction and sealed the perimeter. A long-term follow-up test in 2017 was 4.2 pCi/l. In March 2021, the mitigator changed the fan to a high-capacity RN4EC3 and added a third basement suction. The radon levels came back at 7.8 pCi/l.

The owner then purchased a Radon Eye monitor and observed radon levels averaging around 11 pCi/l. Increasing fan speed did not lower radon levels. The

homeowner then contacted the radon hotline, which connected him to Fantech engineer Hamid Massali, who suggested concrete or the garage sub-slab may be the source. In May 2021, the mitigator installed a garage suction, but it produced no additional radon reduction. At this point, the mitigation contractor gave up on the house and returned the money he had charged for the additional work.

With help from hotline advisors and a borrowed micro-monometer, the homeowner measured the basement sub-slab as negative 25 to 50 pascals (- 0.100" to - 0.200"). Thirty charcoal test kits were spread around the basement and first floor. The basement detectors read between 9.8 and 11.6 pCi/l.

I was contacted about flux testing the slab and foundation wall.

Radon flux coming through or out of concrete is best measured with a small CRM and a 3- or 5-liter stainless steel mixing bowl. The Radon Eye (or newer Eco-Tracker) works well for this test because of its small size and high sensitivity to changing radon levels, although it requires an external charger unless a small battery is used. The

FIGURE 1

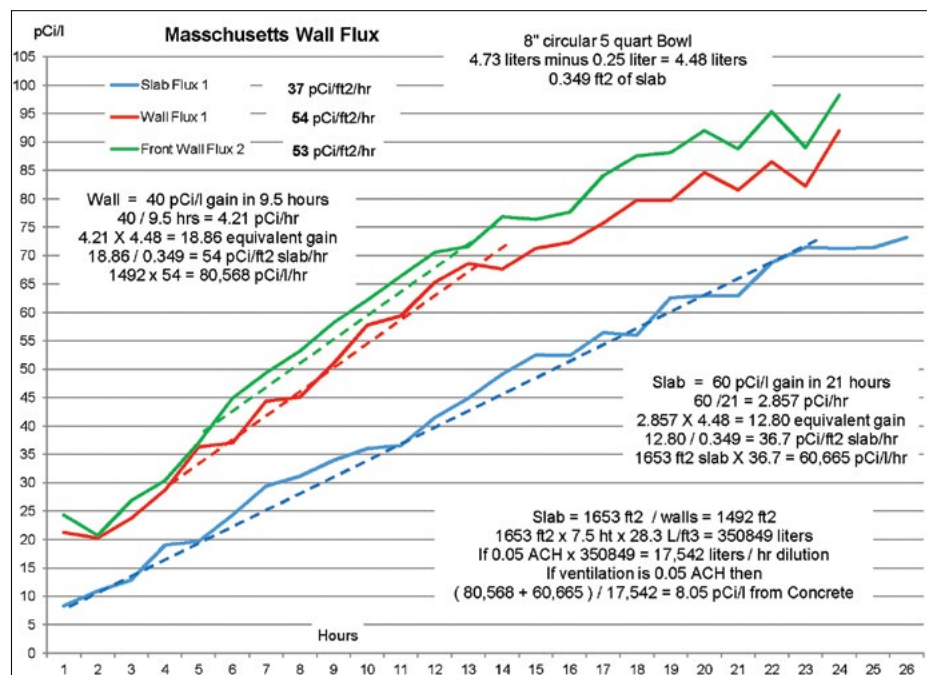
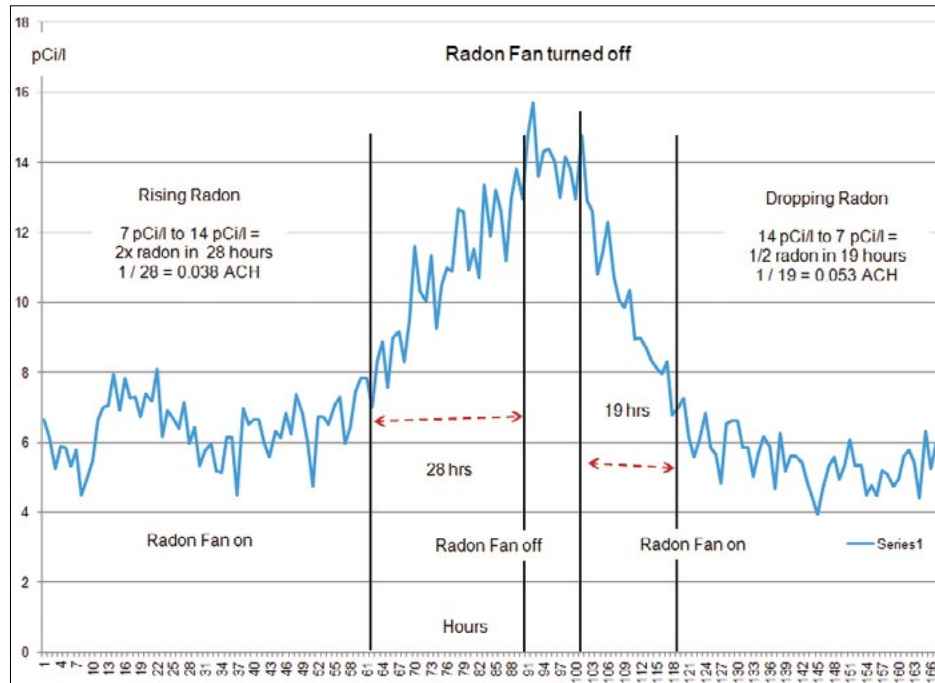


FIGURE 2



owner placed a Radon Eye under a 5-liter bowl sealed against the slab or foundation wall using plumber putty (Figure 1). Note that the oil in plumber putty will stain concrete. Exposure during the first 12 hours usually provides the best straight line of increasing radon; longer exposures have a flattening radon curve. It is helpful to plot the results on a spreadsheet to identify the most consistent rise of radon levels.

Flux bucket radon level change is divided by hours of the change to calculate pCi ingrowth per hour. Ingrowth per hour is multiplied by the bowl volume in liters minus the volume of the CRM. This result is divided by the slab ft² area the bowl covers to obtain the pCi/ft²/Hr result. If the flux is assumed to be the same across the slab, the result is then multiplied by the area of the basement slab and the same for the foundation wall area. The sum of these is the total amount of radon entering the basement per hour from concrete, which is then divided by the number of liters of ventilation entering the basement per hour.

Unless the basement ventilation rate is measured, an assumed air change per hour (ACH) must be used. Current ventilation standards recommend about 0.35 air changes ACH. Basements tend to have much less, especially in new, well-insulated homes. The owner also reported lower basement radon levels in the winter than in the summer, which happens if the radon source is steady, but ventilation increases. Winter stack effect tends to increase basement ventilation (ACH) and cause lower radon levels if the radon source is steady. A variable is the run time of a basement-located air handler which may run more in the winter than summer and raise or

lower radon levels. In this house, the HVAC running continuously reduced the radon levels by about 40%. The concrete total radon contribution is divided by the volume of 0.05 ACH to indicate an 8.05 pCi/l contribution of basement radon from concrete flux (Figure 2). Two tests were used to determine the basement natural ventilation rate to size a Heat Recovery Ventilator (HRV). One test requires turning off the radon system, and after the new radon level is reached, turn the system on and measure the time it takes to return to the radon system running. The other more definitive test is to introduce a measured amount of air from the outside into the basement and measure the new radon level. In both tests, it is necessary to establish a steady baseline radon level and a steady modified radon level.

For this simple ventilation test, the radon fan was turned off until radon levels plateaued, and then the fan was turned back on. It is best to keep HVAC off for this test. Determine the ventilation rate by counting the number of hours it takes to double or halve the radon levels. The rough ACH estimate is 1 divided by the number of hours it took to halve the radon levels.

This test indicated 0.05 ACH (Figure 2). The rising radon level may take longer because the system depleted the ground source.

For the next test, a basement window was replaced with cardboard and a radon fan was connected to a flexible duct routed through the window cardboard. The fan airflow measured 100 CFM with the flex duct wide open and 50 CFM with a restricting cap (Figure 3). The natural

MITIGATION

ventilation rate of the basement can be determined by dividing the additional CFM by the total of the initial radon divided by the final radon minus 1. The natural ventilation plus the added ventilation is the total ventilation that produces the lower radon levels. All of this assumes the total radon is coming from the concrete. The test indicates a 100 CFM HRV would induce a 1.2 pCi/l basement. Over eight days of testing, it is possible the basement ACH varied from 0.13 to 0.085.

After this testing, the owner installed a Fantech VHR150 HRV that produced an additional 90 CFM of outdoor air and a steady basement radon level of 1.27 pCi/l (Figure 4).

Unfortunately, we do not have much data on radon flux from concrete in different areas of the country or know its frequency or significance. What is given is new homes are being built tighter and often without any additional mechanically provided outdoor air.

FIGURE 3

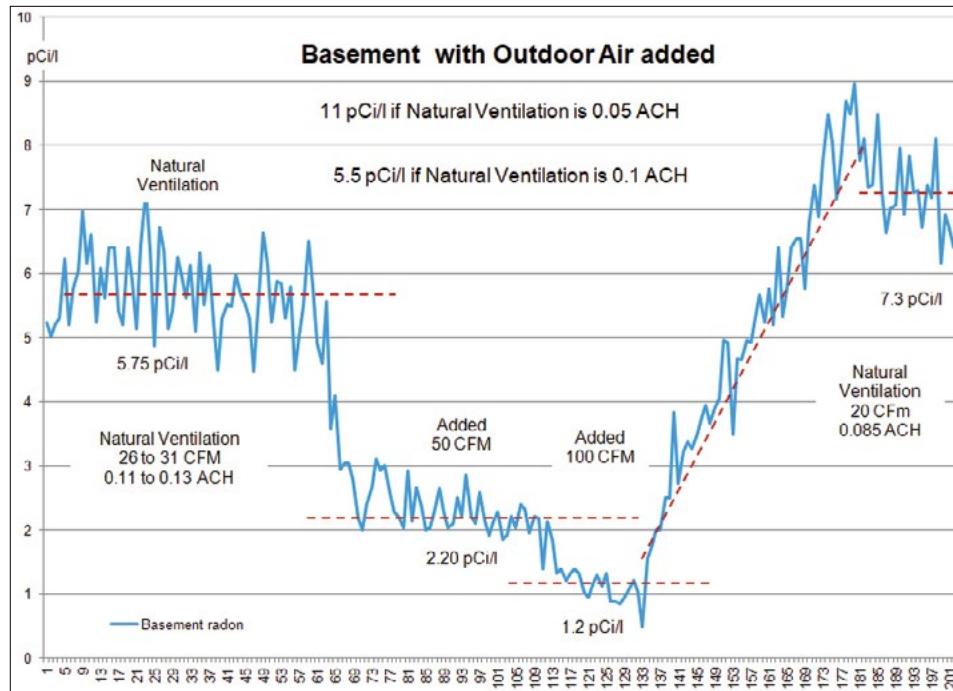
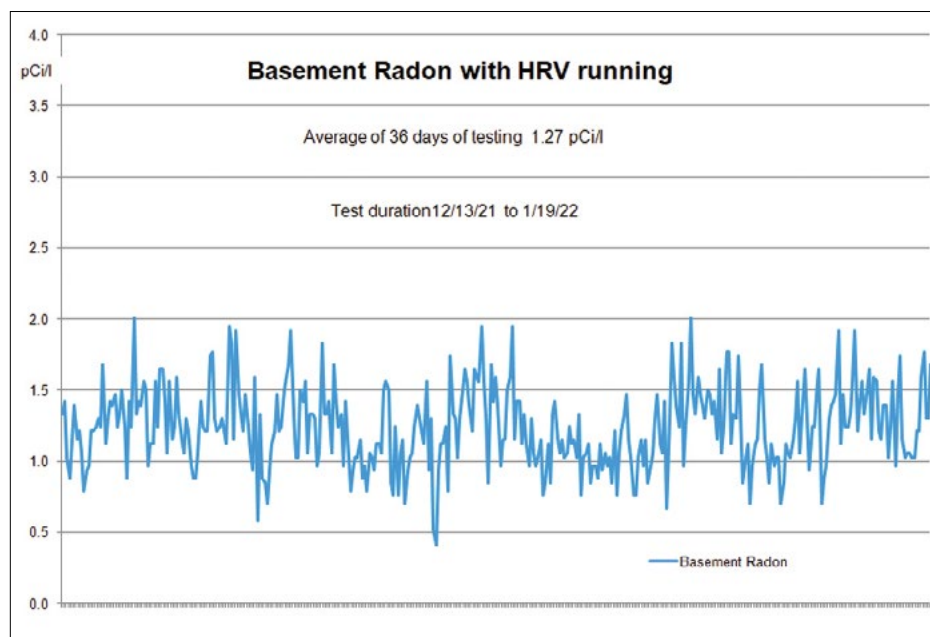


FIGURE 4



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Beautiful Bellevue, WA to Host the 2022 Annual AARST Symposium

Nicole Chazaud, Symposium Manager, and visitbellevuewa.com

The 2022 International Radon and Vapor Intrusion Symposium will take place in Bellevue, Washington, October 24 – 26 at the Hyatt Regency Bellevue on Seattle's eastside. Reputed as the go-to educational event in radon and soil gas technology, new research, best practices, and national advancements in risk reduction policy, the Symposium attracts hundreds of participants annually, including State Partners and agencies working toward a single goal - saving lives.

Dozens of industry experts are featured as speakers and poster presenters with peer-reviewed topics. Ample social and networking events are scheduled each day, including the largest trade show for the radon and soil gas industries. Exhibits open to attendees Sunday, October 23rd, followed by the Opening Reception at 6 p.m. Several pre-symposium training opportunities will be available to registrants.

About Bellevue

Bellevue is home to a diverse selection of fun and exciting year-round events. Safe, walkable, and easily accessible from anywhere in the Pacific Northwest, downtown Bellevue is a vibrant fusion of welcoming hotels, restaurants, nightclubs, arts & culture, and outdoor recreation. Surrounded by pristine natural beauty with big-city amenities, Bellevue offers a world-class shopping and entertainment experience and is home to innovative global corporations.

Across Lake Washington from Seattle, Downtown Park has a large lawn, gardens, and a waterfall. Nearby, the Bellevue Arts Museum features craft and design exhibitions, plus a sculpture garden. The Bellevue Botanical Garden highlights Pacific Northwest plants and includes woodlands and wetlands. With nearly 100 parks, Bellevue is known as "a city in a park."

Shopping

Bellevue is the Pacific Northwest's premier resort shopping destination with hundreds of well-known department stores, specialty retailers, and unique boutiques. Explore local retail legends such as Nordstrom and Eddie Bauer at The Bellevue Collection, boasting more than 200 stores including Crate & Barrel, Macy's, and Tiffany & Co. and dozens of unique shops not found anywhere else. The Shops at the Bravern, a vibrant outdoor village featuring the region's only Neiman-Marcus, boasts luxury brands, such as Hermès, Tory Burch, and Jimmy Choo, along with celebrated restaurants. Just south of Downtown Bellevue Park, quaint Old Bellevue offers friendly shopping amongst upscale boutiques and gift shops, delis, and restaurants. The old-fashioned lampposts along Main Street between Bellevue Way and NE 100th street lend historical flavor.

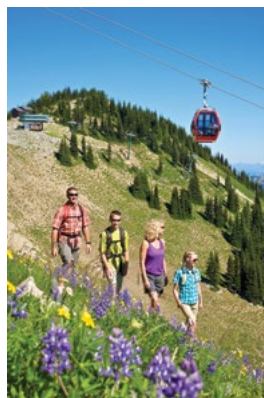
Dining & Nightlife

There are hundreds of restaurants in Bellevue, from casual sandwich spots and well-known national chains to 4-star gourmet, chef-driven restaurants. Downtown Bellevue is abuzz at night with dozens of pubs, clubs, and bars.

Arts & Culture

The Theatre at Meydenbauer Center hosts an array of productions by performing arts groups. It is the home stage for Bellevue Civic Theatre, Bellevue Philharmonic Orchestra, International Ballet, Bellevue Youth Theatre, Bellevue Chamber Chorus, and Ballet Bellevue. Bellevue Arts Museum is an innovative center for exploring art, craft, and design. The Eastside Heritage Center is committed to preserving the past as it builds community and connects people with their heritage by maintaining and preserving the most extensive collection of artifacts, photos, and archival material related to the area.

Bellevue is home to unique public art at the Bellevue City Hall. City Hall visitors will experience major works by Pacific Northwest artists, helping transform the building into a cultural legacy for the community.



Recreation

Miles of nature trails, public parks, and swim beaches are within walking distance from downtown Bellevue, along with numerous spas, museums, performing arts groups, and galleries. Bellevue Botanical Gardens comprises 53 acres of display gardens, woodlands, meadows, and wetlands. Beyond downtown, Bellevue is home to one of the best golf courses in the country at the Golf Club at Newcastle, offering panoramic views of Mt. Rainer, the Olympic and Cascade Mountains, and Lake Washington. Argosy offers a breathtaking Lake Washington Cruise. A 15-minute drive North, Woodinville Wine Country is home to more than 70 wineries. A short drive east to Snoqualmie Falls, one of Washington state's most popular scenic attractions with a famous 270-foot waterfall.

Location

Nestled between two mountain ranges, the city spans more than 31 square miles between Lake Washington and Lake Sammamish. Bellevue is just 17 miles from Seattle-Tacoma International Airport and 10 miles from Seattle, easily accessible via two floating bridges (Interstate 90 and State Route 520).

Call For Presentation Abstracts is now open for the 36th Annual AARST International Radon and VI Symposium

Your knowledge and experience are very important to us! For over three decades, radon professionals have been gathering annually to learn about radon risk, reduction, technology developments, and policymaking. Researchers and speakers are invited to submit papers for consideration to be included in the annual Proceedings, a peer-reviewed journal esteemed in the health, physics, and scientific communities. Archived Proceedings may be found at <https://aarst.org/symposium-proceedings/>.

The 2022 Call for Presentation Abstracts seeks abstracts to educate radon and chemical vapor intrusion professionals and other stakeholders. Presentations may be 20-40 minutes and be Poster Presentations. All submissions for consideration are peer-reviewed by the Symposium Planning Committee, AARST National ED and Policy Director, and the AARST Science Chair and committee.

Gatherings at symposia-past have been the impetus for many highly regarded radon industry leaders to continue research and lead the way for radon research in other countries. Canada, South Korea, the EU, Scandinavian and Eastern European countries, African nations, even Nepal all have institutions and innovators looking to AARST's 35 years of experience as the leader in radon risk reduction and policy-building to protect and save lives, modeling their conferences after the International Radon Symposium.

During the 2021 Symposium, AARST included the field of vapor intrusion (VI). VI and radon work often go hand in hand, radon is a soil gas, and the companies that mitigate for VI are knowledgeable in radon work and vice versa. Since VI is a growing field for radon professionals, the Symposium Planning Committee featured a full track for VI-specific themes.

AARST hosts private educators on the Sunday before the start of the Symposium. With a selection of 2- to 8-hour NRPP approved courses available for attendees to take before the symposium sessions. This Call also includes proposals for Continuing Education Courses offered on Sunday, October 23rd. The deadline for submissions is May 15th, 2022.

For instructions on submitting proposals: <https://aarst.org/symposium/speakers-guidelines/>

Elevated Radon at the AARST-NRPP Office

Christina Johnson, NRPP Credentialing Manager

The AARST-NRPP administrative office staff are no strangers to the danger of radon and what it takes to keep families and communities safe from the deadly gas. Their workdays involve helping radon contractors get certified to become qualified, knowledgeable professionals working to be a part of the solution. But as they always say, to give others the best quality care and assistance, one must also take care of themselves!

After the staff moved their offices into a remodeled 1920's bungalow-style house near downtown Hendersonville, North Carolina, it was obvious what they had to do – get their new office tested for radon. They hired a local expert, NRPP-certified radon measurement and mitigation professional, and owner of Radon Control Products, Henri Boyea, along with his team, to complete a 48-hour continuous radon test.

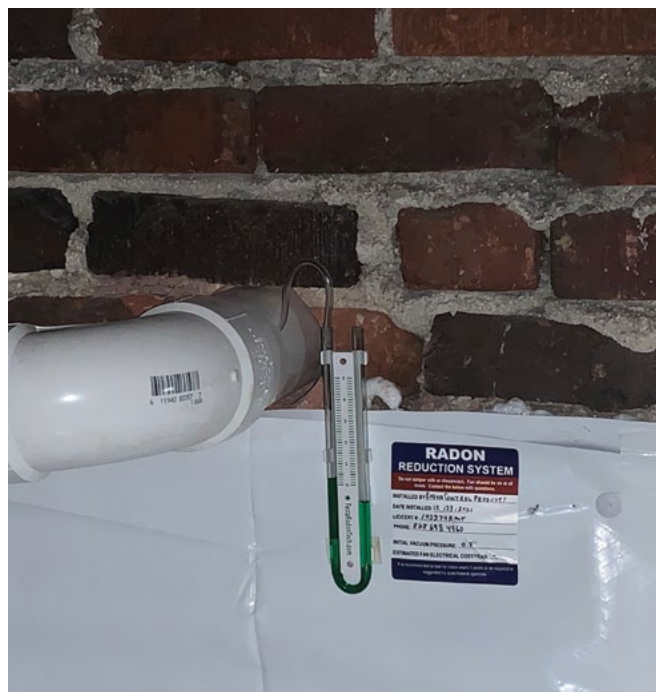
Henri found that the initial post-test results indicated elevated radon levels at 9.3 pCi/L. The results prompted staff to contact the office building landlord to inform them that a mitigation system was necessary.

Henri evaluated the basement for the system installation. He noticed that there was asbestos on an old, non-working furnace. At that point, he alerted the AARST-NRPP team, and an environmental specialist was brought in to safely remove the dangerous asbestos. Henri was then able to move forward with the mitigation install.

Diagnostics showed very tight clay beneath the slab, making an active soil depressurization radon reduction (ASD) system unlikely to be effective. This led Henri to believe the crawlspace area at the front and edges of the basement was the primary radon source. He proposed a two-step mitigation plan: ASD for the crawlspace and installation of a small Energy Recovery Ventilator if further radon reduction was needed.

Once the ASD system was installed, a continuous radon monitor was utilized to test and obtain the post-mitigation results. After 48 hours, the staff got great news – thanks to the new mitigation system, the radon levels had dropped to 2.8 pCi/L.

Thanks to Henri and his team for working hard to keep the office safe for AARST-NRPP staff and visitors. It is real proof that the work put in by the AARST-NRPP team to help others has come full circle- working together to STOP RADON every day.



Monitoring Indoor Air Quality: Where is Money Best Spent?

Peter C. Foller, Ecosense, Inc.

As a home inspector or radon professional, do you get questions on the value of indoor air quality (IAQ) monitoring devices? When it comes to monitoring the air in one's home, what priorities make the most sense? The story around IAQ devices can be compelling; however, let's dig a little deeper.

First in anyone's budget should be to keep smoke detectors and carbon monoxide detectors up to date. These devices protect life and property and should be placed appropriately for the fastest response-- on ceilings, not coffee tables.

Next, one might consider an IAQ device. There are numerous attractively designed devices on the market with differing levels of capabilities: particulates (PM2.5, PM10, or both), carbon dioxide (CO2), total volatile organic compounds (tVOCs), plus temperature and humidity, and, less commonly, the airborne oxidants NOx, SO2, and ozone. Particulates can certainly aggravate allergies and asthma, but aside from smoking and house dust, the issue is more outdoor than indoor. CO2 is now about 400 ppm in outdoor air. It most commonly varies between 400 and 1,000 ppm indoors, and as an indication of any issues it presents, OSHA allows an 8-hour workplace exposure of 5,000 ppm. When not painting, one's tVOC exposure is generally transient.

I would argue a higher priority should be to invest in a home continuous electronic radon monitor (hCRM). Though the risk of radon to one's health is not immediate, in the long run, the grim statistics catch up. The EPA's estimate of 21,000 U.S. lung cancer deaths per year attributable to radon continues to be widely cited. Firstly, such a monitor can identify hazardous situations requiring mitigation; but secondarily, there is value in following day-to-day variations well under the EPA's action level of 4.0 pCi/L.

Some recent electronic-based hCRMs are sensitive enough to reliably detect measurable radon levels in most any building. Electronic monitors readily pick up 0.5 pCi/L, a concentration of 3×10^{-12} mg Rn/L of air. Sensors for tVOC, formaldehyde, or airborne oxidants do not even come close to this sensitivity. Modern hCRMs can update every 10 minutes and produce graphic visualizations on smartphones that can be readily understood. If the slope of the radon trend line is rising, one can think of it as a proxy for other pollutants or pathogens possibly accumulating and ventilating accordingly. The effect of opening a window or turning on a ventilation fan will soon be reflected in the radon reading. If the guidance of a device is desired, why not drive such ventilation decisions based on the indoor radon concentration?

So, is a real-time, high sensitivity radon detector the single best option for an IAQ device after smoke and carbon monoxide detectors? Yes, from the standpoint of possibly identifying a statistically validated long-term health hazard. Yes, too, from the standpoint of providing prompts to drive ventilation actions. Reduce radon levels, and it is likely the action will simultaneously drive down CO2, tVOCs, formaldehyde, vapor intrusion from soil, viruses, mold spores, or anything else your customers may worry about.



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