

The following are written comments that the Federal Housing Finance Agency received in response to the public listening session on Fannie Mae and Freddie Mac's Radon Testing and Mitigation Standards hosted on July 20, 2021.

These comments express views of the individuals and entities who participated in the listening session. Posting of these comments by FHFA should not be considered an endorsement by FHFA, Fannie Mae, or Freddie Mac of any opinions expressed in the comments.

The Enterprises require lenders, servicers and borrowers to comply with all applicable laws and regulations. The purpose of the listening session and receipt of comments is to increase FHFA's understanding of the issues involved in radon testing and mitigation in multifamily properties.



August 6, 2021

Sandra Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

Dear Acting Director Thompson:

Earlier this year, the Bipartisan Policy Center established a Housing Advisory Council to identify and promote bipartisan housing policies that, among other priorities, work to preserve and build affordable housing and advance racial equity and opportunity. To that end, we are writing to encourage FHFA to adopt a radon testing policy for multifamily housing units that both (1) protects tenants from radon hazards by utilizing science and objective analysis, and (2) allows for an achievable implementation timeline that is not unduly disruptive to tenants, property owners, and the real estate finance industry.

We are concerned that a nationwide radon testing policy FHFA is considering—requiring 100 percent inspection of ground floor units, testing a smaller percentage of units on other floors, and additional quality control testing—is not based on science or objective analysis. If enacted, we fear this policy could unnecessarily increase the cost of rental housing and delay the production of much-needed stock at a time when many American households can least afford these disruptions. Furthermore, we are concerned that any such disruptions could disproportionately impact communities of color, as 58 percent of African American and 53 percent of Hispanic households are renters, whereas less than 31 percent of White households are renters.

First and foremost, we strongly support efforts to protect tenants from radon hazards where those efforts utilize science, objective analyses, and administrative data. For example, we would strongly support efforts to protect tenants from radon hazards that rely on the scientific expertise and objective analysis of the Environmental Protection Agency (EPA).

Since 1993, the EPA has published a *Map of Radon Zones* “to identify areas of the U.S. with the potential for elevated indoor radon levels,” that is “developed using data on indoor radon measurements, geology, aerial radioactivity, soil parameters, and foundation types.” The *Map of Radon Zones* assigns each county to one of three zones depending on these factors in order to predict indoor radon screening levels.

HUD’s implementation experience is also a useful resource. As such, in addition to leveraging the EPA’s longstanding work in this field, we would encourage the use of radon inspection administrative data from HUD to assess and predict the prevalence of radon in multifamily buildings. For example, we understand that, in the first six months since HUD implemented its new testing standards, there was no increase or significant findings of radon in any of the three EPA zones.

Beyond utilizing science, objective analysis, and administrative data to protect tenants, we encourage FHFA to be mindful of the disruptions that the implementation of a standard requiring 100 percent testing of ground floor units and 10 percent of upper floor units would have on renters, property



owners, and the real estate finance industry intime delays and increased costs. With only about 20% of agency business is located in high-radon areas, a one-size-fits-all approach is both impractical to implement and fails to recognize that most properties are in lower-risk areas.

We raise this issue because we understand that there are very few qualified or certified multifamily radon testers in America, particularly in communities with a historically low level of radon and associated health risks. Quotes to test for radon in line with a 100 percent ground floor standard plus 10 percent of upper floor units increase the cost of testing anywhere from \$5,000 to \$20,000 per property. One potential solution to alleviate the time delays would be to allow radon testing to occur post-closing, but this would not alleviate the additional projected cost burden.

We believe that by adopting radon testing standards that are based on science, objective analysis, and administrative data, FHFA can protect tenants and avoid undue disruptions to the housing market. In that way, FHFA can help further the affordable housing opportunities available to renters. Thank you for your attention to this matter.

Sincerely,

BPC's Housing Advisory Council



BPC Housing Advisory Council

Co-Chairs:

- **Henry Cisneros** – Board Member, BPC; Former HUD Secretary
- **Kevin Faulconer** – Former Mayor of San Diego
- **Michael Nutter** – Former Mayor of Philadelphia
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- **Seth Appleton** – President, MISMO; Former HUD Assistant Secretary, Policy Development and Research; Former Principal Executive Vice President, Ginnie Mae
- **Janelle Chan** – National Director of Housing, Ballmer Group
- **Alfonso Costa, Jr.** – Executive Vice President, Falcone Group; Former HUD Deputy Chief of Staff
- **J. Paul Compton, Jr.** – Founding Partner, Compton Jones Dresher; Former HUD General Counsel
- **Eileen Fitzgerald** – Head of Housing Affordability Philanthropy, Wells Fargo
- **Carol Galante** – Faculty Director, Turner Center for Housing Innovation, University of California-Berkeley; Former HUD Assistant Secretary for Housing/Federal Housing Commissioner
- **Bryan Greene** – Vice President, Policy Advocacy, National Association of REALTORS®; Former HUD General Deputy Assistant Secretary
- **Ismael Guerrero** – President and CEO, Mercy Housing; Former Executive Director, Housing Authority of the City and County of Denver
- **Gerald Hunter** – President and Executive Director, Idaho Housing and Finance Association
- **Maren Kasper** – Managing Director, Bayview Asset Management; Former Acting President, Executive Vice President and Chief Operations Officer, Ginnie Mae; Former HUD Senior Advisor
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- **Avik Roy** – Senior Advisor, BPC; President, Foundation for Research on Equal Opportunity
- **Dana Wade** – Chief Production Officer, Walker & Dunlop; Former HUD Assistant Secretary for Housing/Federal Housing Commissioner
- **Karen Freeman-Wilson** – President and CEO, Chicago Urban League; Former Mayor of Gary, Indiana



LOCAL KNOWLEDGE | GLOBAL PERSPECTIVE

GRS Group's response to FHFA listening session on radon

Global Realty Services Group (GRS Group) is a real estate due diligence firm providing an integrated suite of services associated with commercial real estate acquisition, finance, and servicing. GRS Group's clients include commercial mortgage bankers and services, special servicers, construction lenders, insurance companies, REITs, real estate investment funds, and private equity. Our multifamily practice is extensive, and we are one of the largest providers of environmental and property condition services to Fannie Mae and Freddie Mac seller servicers.

Three of our people attended the listening session. We offer the following comments based on our experience in the multifamily industry:

Multifamily challenges:

Many of the speakers attempted to translate their experience in single-family evaluations over to multifamily. They are not the same! Radon testing in multifamily is difficult due to scheduling, unit access, lack of tenant cooperation, and availability of qualified personnel for testing. It is rare that an AARST-compliant radon study is able to be completed in full compliance with the standards. It is typical for us to be denied access to units, find that tests kits have been destroyed by the tenants, and/or closed conditions not met. This results in incomplete and inaccurate information. Even if the results of the testing were 100% complete, weather factors can influence the results. A property that is tested to be radon-safe today may test with elevated levels next month. A 48-hour test is not statistically significant and will not be effective in identifying all radon hazards in a property, no matter how many units are tested.

Screening recommended:

Similar to other elements of safe housing, we feel a screening approach for radon is more appropriate, and appropriately addresses the risk to human health and safety within the financial bounds and time constraints of a real estate transaction. For instance, lenders typically do not require a comprehensive asbestos assessment of multifamily properties, even though studies have shown that a tenant who ingests one asbestos fiber can contract mesothelioma. Instead, properties are screened for the presence of suspect asbestos-containing materials. Limited sampling may be conducted, and measures are taken to manage the risks. For radon, sampling 20% of ground floor units in each building will provide a sampling of radon levels across the property at a specific moment in time. If one of the units measures above the EPA action level of 4.0 pCi/L, then a reasonable next step could be to test all ground floor units.

Cost concerns- and negative impact:

Full radon assessments at the origination of every GSE loan is cost-prohibitive and contrary to the GSE's mission of affordable housing. The cost of \$50/unit was cited several times. That is an incorrect cost. The true cost to the owner averages between \$75 and \$200 per test, depending upon the location and number of tests at a given property. There is a fixed labor component for mobilization at the time to set and retrieve the detectors, processing and write up.

For example, we recently were engaged on a 127 unit 3-story apartment project that required AARST guidelines for sampling. Deployment and retrieval of the 76 required canisters under AARST guidelines cost the owner a fee of \$4950. The subject property was located in an accessible metropolitan area with



many licensed providers. we worked onIn this example, that cost was for radon alone and does not include the other reports required for the due diligence.

Rural housing absorbs a greater burden, both in cost and timing. Any testing in a rural area can cost 2 to 3 times more than the local average due to the availability of licensed professionals and travel costs. Should Fannie Mae and Freddie Mac require this level of testing, owners will flee to lenders requiring no testing. This will result in more families living in housing that has had absolutely no screening for elevated radon levels.

Industry capacity:

Should GSE borrowers embrace the increased testing and continue financing through the GSEs, the consulting industry will not have the capacity to accommodate the increased demand. HUD's requirements alone have stressed the radon testing community. Those speaking from radon labs and on behalf of AARST do not have a grasp of the volume of properties and dwelling units financed by Fannie Mae and Freddie Mac. The state license websites often don't differentiate radon testing professionals who handle single-family testing versus those that are equipped and trained in multifamily properties. While areas with typically higher radon levels have radon professionals in most major metro areas, there are very few AARST-certified individuals in low radon areas like Oklahoma and Texas. Implementing a more rigorous screening approach (20% ground floor units) than the current protocols with more aggressive follow-up is likely to stress industry capacity, but will not break it.

Thank you for the opportunity to comment on this important topic.

August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Multifamily Radon Policy Listening Session

Dear Acting Director Thompson:

On behalf of Cancer Survivors Against Radon (CanSAR) and, as a member of Citizens for Radioactive Radon Reduction and a radon-related lung cancer survivor, I want to express my strong support for adoption of the EPA-recommended multifamily radon standards by the Government-Sponsored Enterprises (GSEs). Everyone living in multifamily buildings financed by the GSEs should be afforded the same opportunity to live in a healthy and safe indoor air environment free of unsafe levels of cancer-causing radon gas.

In response to the listening session hosted by your agency on July 20, we submit the following comments:

- The suggestion made by several commentators that properties located in geographical locations classified as 'low risk' on the US EPA radon zone map be exempted from the policy is problematic. The gentleman speaking on behalf of the US EPA clearly stated in his comments that the map should not be used to determine whether or not a property should be tested. The US EPA recommends that all buildings be tested, regardless of their geographical location. This type of exemption should not be considered, as it creates serious public protection and health equity concerns. All residents living in buildings financed by the GSEs should be treated equally, regardless of the location of the property.
- The suggestion made by several commentators that adherence to the EPA-recommended consensus standards requiring testing of all occupied ground-contact areas in each building be exempted from the policy is also problematic. Strong evidence from numerous research findings was presented that concludes that failing to test less than 100% of ground-contact areas in multifamily buildings will result in failing to identify areas containing unsafe levels of radon gas. This type of exemption should not be considered, as it creates serious public protection and health equity concerns. All residents living in buildings financed by the GSEs should be treated equally, regardless of where they reside in the building.

Our organization supports the full implementation of the EPA-recommended consensus multifamily radon standards by the GSEs. Every day that passes without addressing the radon problem in multifamily buildings financed by the GSEs is another day that residents are exposed to dangerous levels of cancer-causing radon gas. I stand ready to support this effort knowing that the cost of lung cancer far outweighs the cost of radon tests and mitigation.

Jacquelyn E. Nixon
Citizens for Radioactive Radon Reduction (CR3)
Lung Cancer Survivor and Radon Advocate

CRCPD's Committee on Radon (E-25)

Conference of Radiation Control Program Directors, Inc.

A Partnership Dedicated to Radiation Protection

112 E. Main Street, Suite 1

Frankfort, KY 40601

Phone: 502/227-4543

Fax: 502/227-7862

Web Site: www.crcpd.org

August 5, 2021

August 5, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Multifamily Radon Requirements

Dear Acting Director Thompson:

We appreciate FHFA's commitment to strengthening the radon policies of the Government-Sponsored Enterprises (GSEs) to protect residents of multifamily housing financed by the GSEs from the risk of developing radon-induced lung cancer.

After participating in the listening session and reviewing the transcript, we submit the following comments for your consideration:

- Full adoption of the EPA-recommended consensus standards for multifamily buildings will ensure confidence and consistency in testing and mitigation efforts. In addition, the requirement of the standards for performance by qualified professionals is an integral element of their effectiveness and reliability. In our opinion, the consensus standards represent the best methodology for protecting the residents of multifamily buildings from exposure to unsafe concentrations of radon.
- Full adoption of the EPA-recommended consensus standards for all multifamily buildings financed by the GSEs, regardless of the property location or type, will prevent the health equity gap that will be created if the exemption for rural and affordable housing suggested by several of the commenters during the listening session is permitted. Residents of these buildings have no control over their air quality and should be afforded the same protections as other residents living in multifamily housing financed by the GSEs.
- Lack of guidance and specificity in the GSEs existing radon policies, coupled with a lack of enforcement, facilitate the nullification of applicable state laws and regulations. In addition, lack of adherence by lenders to these policies without any type of enforcement by the GSEs

further results in the nullification of applicable state laws and regulations. We are prepared to provide numerous examples of this nullification, which include, but are not limited to: (1) failure to test the required number of areas in each building in compliance with state requirements; (2) failure to utilize qualified persons licensed and/or certified in compliance with state requirements; (3) failure to provide the necessary information needed by analytical laboratories to meet applicable state reporting requirements; and, (4) overall failure to report testing and mitigation activities in compliance with state requirements.

Our organization encourages the full adoption of the EPA-recommended consensus radon standards for multifamily buildings by the GSEs. We look forward to working with FHFA, the GSEs, and other related stakeholder groups to support the implementation of this important public protection and healthy equity policy.

If you have any questions, please contact Joshua Kerber, CRCPD member in Minnesota, by email at joshua.kerber@state.mn.us or by telephone at 651-201-5613.

Sincerely,

A handwritten signature in cursive script that reads "Chrystine Kelley".

Chrystine Kelley, E-25 Chairperson



August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219
FHFACommunications@fhfa.gov

RE: Listening Session on Freddie Mac and Fannie Mae Multifamily Radon Standards

Dear Acting Director Thompson:

The American Lung Association is the oldest voluntary public health association in the United States, representing the millions of individuals with or at risk of lung disease. The Lung Association is the leading organization working to save lives by improving lung health and preventing lung disease through research, education and advocacy.

The American Lung Association thanks the Federal Housing Finance Agency (FHFA) for convening on July 20 the Listening Session on Freddie Mac and Fannie Mae Multifamily Radon Standards. We appreciate FHFA's consideration of our comments offered then and of the [letter](#) of May 20 to the Director by the Lung Association's National President and CEO Harold P. Wimmer. We are also grateful for FHFA's process of careful review of the Environmental Protection Agency (EPA)-recommended consensus radon standards and of the impacts of requiring them in the multifamily programs of the Government-Sponsored Enterprises (GSEs).

From a national public health perspective, the Lung Association recognizes radon among the few most serious indoor air pollutants in the United States, as the second leading cause of lung cancer and as the leading cause of lung cancer among those who have never smoked. Regrettably, the great majority of lung cancer cases ultimately result in the death of the patient (77% within five years of diagnosis). Since we know that most cases of radon-induced lung cancer are preventable, this is all the more reason addressing the problem therefore demands prompt intervention.

The American Lung Association expresses strong support for the recent initiative by FHFA to strengthen the multifamily radon policies applied by the GSEs Fannie Mae and Freddie Mac by requiring full compliance with the appropriate EPA-recommended American National Standards Institute – American Association of Radon Scientists and Technologists (ANSI-AARST) consensus standards for radon measurement and mitigation

FHFA should require such adoption for the following reasons:

- Everyone living in multifamily buildings financed by the GSEs should be afforded the opportunity to live in a healthy and safe indoor air environment free of unsafe levels of cancer-causing radon gas. This opportunity should be equitable for all.
- There should be no delays or exemptions for testing any segments of the housing stock: Elevated levels of radon have been found in all areas of the country, and the only way to determine a resident's radon level is to test that person's dwelling.
- Consistent adherence to the EPA-recommended consensus in testing and mitigation standards for multifamily buildings will ensure reliability. These consensus standards represent the only proven methodology for protecting the residents of multifamily buildings from exposure to unsafe concentrations of radon.
- Our shared obligation to protect public health means we must not let the search for better knowledge become an excuse for a failure to act. A key principle of public health demands that we do the best we can to protect health and lives with the information we **do** have available.

The science demonstrating radon to be a significant cause of lung cancer has been strong and clear for decades. In short, we **know** that there is a cost to further delay. Every year that passes **without** taking the steps necessary to find high radon exposures in multifamily housing and to reduce them is a year in which occupants and workers in such housing continue to be exposed and put at needless avoidable risk, a year in which more people will be set on a course ultimately to get lung cancer and die from it than would otherwise if preventive action were taken sooner.

The American Lung Association strongly recommends that FHFA move swiftly forward to implement a solution that achieves the hazard reduction needed to accomplish the goal of providing the safe and healthy housing to which all residents are entitled.

Sincerely,



Kevin M. Stewart

Director of Environmental Health, Advocacy and Public Policy

August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219
FHFACommunications@fhfa.gov

Dear Acting Director Thompson:

The organizations listed below would like to express our strong support for full adoption of the EPA-recommended multifamily radon standards by the Government-Sponsored Enterprises (GSEs). We appreciate FHFA's convening of the listening session on Radon Standards on July 20 and its thoughtful review of the scientific evidence.

FHFA should require such adoption for the following reasons:

- Everyone living in multifamily buildings financed by the GSEs should be afforded the same opportunity to live in a healthy and safe indoor air environment free of unsafe levels of cancer-causing radon gas.
- All residents living in buildings financed by the GSEs should be treated equally, regardless of the location of the property or where they reside in the building.
- There should be no delays or exemptions for testing any segments of the housing stock: there is no way to determine the radon level in any building except by testing.
- Consistent adherence to the EPA-recommended consensus in testing and mitigation standards for multifamily buildings will ensure reliability. These consensus standards represent the only proven methodology for protecting the residents of multifamily buildings from exposure to unsafe concentrations of radon.
- Performance by qualified professionals is an integral element of the standards' effectiveness; the necessary training, private certification, and state licensing are available to measurement and mitigation personnel who are not now qualified.

Again, we support the full implementation of the EPA-recommended consensus multifamily radon standards by the GSEs. Every day that passes without addressing the radon problem in multifamily buildings financed by the GSEs is another day that residents are exposed to dangerous levels of cancer-causing radon gas. We stand ready to support this effort.

American Association of Radon Scientists and Technologists
Caring Ambassadors Program Inc.
Free ME from Lung Cancer
GO2 Foundation for Lung Cancer
Lung Cancer Connection
Lung Cancer Research Foundation
National Center for Healthy Housing



Citizens for Radioactive Radon Reduction

618 Evansville Ave.

Waterloo, IL 62298

618 830 4660

seascape@htc.net

www.CitizensforRadioactiveRadonReduction.org

August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219
FHFACommunications@fhfa.gov

RE: Multifamily Radon Policy

Dear Acting Director Thompson,

Please accept my comments from Citizens for Radioactive Radon Reduction regarding the protection of the tens of thousands of individuals living in multifamily structures financed through Government Sponsored Enterprises (GSE). Not knowing the importance of testing for unsafe levels of radioactive radon gas can come with drastic consequences as it did for my husband and me and many of my friends who have contracted lung cancer from this exposure. Living in a home for 18 years with high levels of radon without knowing about this killer can be like giving a death sentence to someone. Yet that is what happens in our nation today without the proper regulations and policies in place and it happened to my husband and me.

After my husband died, I asked my banker if he could please require all homes to be tested before occupancy in order for a home loan to be granted; he indicated that the bank follows the guidelines of Freddie Mac and Fannie Mae. Ms. Thompson, you, in your position, can help save lives with the compliance of the Government Sponsored Enterprises to USEPA radon standards for multifamily structures.

In 2005 the Surgeon General, Richard Carmona, indicated all homes should be tested for radon and issued the warning that radon exposure is the second leading cause of lung cancer, but it is preventable. https://www.adph.org/radon/assets/surgeon_general_radon.pdf He didn't discriminate between single family or multifamily homes. Almost 20 years later, there is still ignorance of the fact that exposure to radon for long periods of time and or at high levels increases the chance of lung cancer. Most people in our nation don't even know what radon is, needless to say, if it occupying their home.

Citizens for Radioactive Radon Reduction urges and supports the fulfillment of this initiative to test 100% of ground-contact areas in multifamily dwellings financed by the GSEs, testing all buildings, and providing a healthy indoor air quality environment for all residents by complying with the EPA-recommended consensus multifamily radon standards.

Sincerely,

Gloria Linnertz
President/Founder

Citizens for Radioactive Radon Reduction



August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Multifamily Radon Policy Listening Session

Dear Acting Director Thompson:

On behalf of Cancer Survivors Against Radon (CanSAR), I want to express our strong support for adoption of the EPA-recommended multifamily radon standards by the Government-Sponsored Enterprises (GSEs). Everyone living in multifamily buildings financed by the GSEs should be afforded the same opportunity to live in a healthy and safe indoor air environment free of unsafe levels of cancer-causing radon gas.

In response to the listening session hosted by your agency on July 20, we submit the following comments:

- The suggestion made by several commentators that properties located in geographical locations classified as 'low risk' on the US EPA radon zone map be exempted from the policy is problematic. The gentleman speaking on behalf of the US EPA clearly stated in his comments that the map should not be used to determine whether or not a property should be tested. The US EPA recommends that all buildings be tested, regardless of their geographical location. This type of exemption should not be considered, as it creates serious public protection and health equity concerns. All residents living in buildings financed by the GSEs should be treated equally, regardless of the location of the property.
- The suggestion made by several commentators that adherence to the EPA-recommended consensus standards requiring testing of all occupied ground-contact areas in each building be exempted from the policy is also problematic. Strong evidence from numerous research findings was presented that concludes that failing to test less than 100% of ground-contact areas in multifamily buildings will result in failing to identify areas containing unsafe levels of radon gas. This type of exemption should not be considered, as it creates serious public protection and health equity concerns. All residents living in buildings financed by the GSEs should be treated equally, regardless of where they reside in the building.

Our organization supports the full implementation of the EPA-recommended consensus multifamily radon standards by the GSEs. Every day that passes without addressing the radon problem in multifamily buildings financed by the GSEs is another day that residents are exposed to dangerous levels of cancer-causing radon gas. CanSAR stands ready to support this effort.

Thank you,

A handwritten signature in black ink, appearing to read 'W. J. Angell', written in a cursive style.

William J. Angell
Chair of the CanSAR Board



August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

I want to express my company's appreciation to the Federal Housing Finance Agency (FHFA) for hosting the Government Sponsored Enterprises (GSEs) Freddie Mac and Fannie Mae Multifamily Standards Radon Listening Session on July 20. We applaud your agency's commitment to ensuring the GSEs lending policies protect residents living in multifamily housing financed by the GSEs from the risk of developing radon-induced lung cancer.

I noted concerns expressed during the session regarding the radon industry's ability to meet the increased demand that will be created by the policy. As a company that conducts more than 100,000 radon measurements in multifamily buildings annually, we possess the resources to increase capacity quickly to meet increased demand. I know other companies in a similar position will also dedicate the necessary resources to meet this demand. I don't foresee ongoing capacity issues and I encourage FHFA and the GSEs to work closely with the radon industry to develop an implementation timeline for the policy that addresses the potential for capacity challenges.

I also noted concerns expressed during the listening session regarding the potential for multifamily lending transactions being delayed by the policy. I'll note that the GSEs existing policies require radon testing to be conducted pre-closing. I'm not aware of transactional delays being caused by these existing policies. To be clear, adoption of the updated policy will not increase the number of properties or buildings that require radon testing. Instead, the updated policy will simply increase the number of areas tested to properly characterize these properties for radon potential. This distinction is important to note – the number of test devices deployed at each property will increase under the updated policy, but the number of qualified persons needed to deploy the devices will not increase significantly.

After participating in the listening session, nothing presented causes concern that full adoption of the EPA-recommended consensus radon standards for multifamily buildings will negatively impact the safety and soundness of these loans. In fact, given the existing GSEs policies have been in effect for many years, the impact of this policy on the multifamily market will be minimal. However, the impact to the residents living in these communities is tremendous. If the intention of the GSEs radon policy is to protect residents from exposure to unsafe concentrations of cancer-causing, radioactive radon while providing for important risk and liability protections for its multifamily stakeholders, full adoption of the EPA-recommended consensus standards is the correct policy decision. My company stands ready to lend assistance in implementation of this important policy.

Healthy Regards,



Kyle Hoylman
Managing Partner



August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

Thank you for hosting the Multifamily Standards Radon Listening Session on July 20. Our company appreciates your commitment to the health and safety of the residents in the FHFA properties. As an attendee of the session, I was encouraged by your opening remarks that stated FHFA has acknowledged the growing body of research that points to the vulnerability of multifamily residents to the dangers of radon gas exposure. I applaud the agency for acknowledging this as it has been a long ignored dangerous hazard in multifamily housing.

I wanted to discuss a few concerns that I did have about some of the information presented in the session. A-Z Solutions is an environmental remediation company that has been conducting commercial radon assessments and mitigations for over 20 years. Our service area covers all 50 states and we have performed countless radon assessments for GSE loans over the years.

One of the first concerns that struck me was the thought that increasing the radon requirement would somehow increase dramatically the number of licensed/ certified technicians needed to fulfill this requirement. To be clear there has always been a testing requirement for FANNIE/Freddie loans so the number of projects wouldn't change. The increase would only be to the sample size of the project. This would still result in 2 days of onsite assessment time and therefore a huge increase of professionals would not be necessary. I will acknowledge that an incremental increase of additional staff would be advisable but as we have seen with the adoption of the HUD MAP Guidance, the sample increase and subsequent staffing increase was achievable by the industry. Our company alone has increased our technician resources and have been more than capable of keeping up with the additional sampling that the HUD MAP Guide has brought the industry.

Another concern was with the issue of radon sampling holding up the loan process. Again, I want to stress that we have been conducting these assessments for over two decades and in that time this issue has only come up when the parties involved failed to engage a radon professional until the last minute before closing. This is not a failure of the radon industry but rather the involved individual's ability to recognize the need for radon testing and plan accordingly as they do with their other due diligence

measures. By educating the lender and other relevant individuals that engaging a radon professional early in the transaction, you can eliminate this cause of delay.

Once again, thank you for reviewing this critical public health issue. Radon is known as the silent killer simply because of its nature of stealth invasion. Most people only find out they have elevated levels of radon after being diagnosed with lung cancer and for most that is way too late. By instituting a radon policy that puts public health first you will be protecting millions of residents who would normally have no way of testing and eliminating this toxic gas from their home. Full adoption of the EPA – recommended consensus standards is the right policy decision. Protecting millions of family's long term health is the right decision. A-Z Solutions supports this change in policy and is willing to provide whatever support necessary to ensure a its successful implementation.

Sincerely,

Jessica Karns
Radon Assessment Director
A-Z Solutions, Inc.
jessicakarns@vaporremoval.com



August 5, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson,

I wanted to take the time to thank you for organizing the listening session on July 20 regarding Freddie Mac and Fannie Mae Multifamily Radon Standards. It is very encouraging to see FHFA address such a serious health risk especially for a group of constituents that may not have the means of addressing it themselves, and subsequently lowering the liability risk to GSE's.

During the listening session I heard a lot of concerns and questions voiced about the Radon industry's capacity. Currently our company is capable of installing over a thousand Radon systems annually and we are already in the process of increasing capacity. There are many other companies in our region with similar or greater capacities.

Regarding the concern that the new standards will delay the closings on the properties, I have not seen that at all. Illinois has required that 100% ground contact units on multifamily properties be tested for as long as I can remember. I am not aware of any situation where this delayed a transaction.

In closing, I did not hear anything presented against adopting the new standards during the session that exceeds residents' safety, health, and wellness. The benefits of reducing exposure to radioactive Radon gas to unknowing people, and the reduction in liability to the lending institutions is the proper thing to do. I wholeheartedly recommend the full adoption of the EPA recommended consensus standards.

Kind Regards,



Shawn Swallow, VP
DuPage Radon Contractors



August 9, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

Radon Be Gone (RBG) wants to express our company's appreciation to the Federal Housing Finance Agency (FHFA) for hosting the Government Sponsored Enterprises (GSEs) Freddie Mac and Fannie Mae Multifamily Standards Radon Listening Session on July 20. RBG applauds your agency's commitment to ensuring the GSEs lending policies protect residents living in multifamily housing financed by the GSEs from the risk of developing radon-induced lung cancer.

I noted concerns expressed during the session regarding the radon industry's ability to meet the increased demand that will be created by the policy. As a company that conducts more than 5,000 radon measurements in multifamily buildings annually, RBG possess the resources to increase capacity quickly to meet increased demand. RBG encourages FHFA and the GSEs to work closely with the radon industry to develop an implementation timeline for the policy that addresses the potential for capacity challenges.

RBG also noted concerns expressed during the listening session regarding the potential for multifamily lending transactions being delayed by this policy. I'll note that the GSEs existing policies require radon testing to be conducted pre-closing and with many of our testing deployments, RBG is onsite either to place or retrieve the test devices on at least one of the days that the due diligence assessment is being conducted. With Ohio being a regulated state, this will also reduce the number of invalid "test screenings" that RBG sees that must be retested to meet Ohio's 100% ground floor testing requirements. These invalid test procedures are delaying the "transaction" vs. conducting testing per Ohio Multifamily Testing protocol at the initial onset of testing.

After participating in the listening session, nothing presented supports an explicit GSEs radon policy requiring full adherence to the standards creating any concerns with safety and soundness of the loan. In fact, given the existing GSEs policies have been in effect for many years, the impact of this policy on the multifamily market will be minimal. However, the impact



to the residents living in these communities is tremendous. If the intention of the GSEs radon policy is to protect residents from exposure to unsafe concentrations of cancer-causing, radioactive radon while providing for important risk and liability protections for its multifamily stakeholders, full adoption of the EPA-recommended consensus standards is the right policy decision. RBG stands ready to lend assistance in support of this important effort.

Sincerely, 

Shad M. Evans
V.P. of Ohio



Sandra L. Thompson

August 6, 2021

Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson,

First, I would like to thank FHFA for holding the recent listening session concerning the proposed radon measurement and mitigation MAPs for the GSE's. My staff and I found the session quite informative. We enthusiastically support FHFA's commitment to insuring the GSE's lending policies recognize the need to protect residents of multifamily housing from the dangers of radon gas exposure including lung cancer. To advance our shared agenda, there are several topics raised that we would like to comment on.

Regarding the topic of industry capacity, it is true the proposed changes will drive an increase in the number of housing units requiring radon measurement and subsequently, mitigated for radon. Any assertion that the industry is incapable or unwilling to support this need, however, fails to recognize some key factors.

Companies like ours and others have already begun planning to expand our capacity to meet the increased demand for testing and mitigation services, while capitalizing on the opportunity to grow local and state economies and increase our workforce. SWAT Environmental is the largest mitigation company in the US and remains highly focused on our core competency: the ability to scale high quality mitigation installation teams wherever mitigation services are needed. SWAT Environmental is a *national* mitigation company and is majority-owned by a well-capitalized institutional investor. We are building and growing relationships with many of the highest-volume HUD underwriters and development companies in the country. We understand the importance of delivering our services in a timely manner with full regulatory compliance and quality assurance in order to keep transactions on schedule and avoiding delays.

Our current ownership group identified a need in the marketplace for large building mitigation, specifically focused on multi-family properties. We have a strategic plan to continue to grow our Commercial Division which employs and mobilizes commercially certified teams in the Northeast, Mid-Atlantic, Southeast, Midwest, and Western regions of the US. We are prepared to opportunistically add capacity wherever those services are needed.



Next, training for radon measurement is widely accessible and can be completed in a matter of days. I am confident that should increase demand for testing and mitigation present itself, the ability to train a skilled workforce will level any perceived demand imbalances quickly.

Secondarily, consider the question of Measurement & Mitigation Standards. As a company that operates in over 30 states, every day we navigate the current variety of regulations that characterize residential test and mitigation. With respect to the multi-family standard, several states have already adopted the EPA-recommended consensus standard and therefore we have a great opportunity to avoid the nationwide confusion that a similar scenario would result in.

Lastly, the effectiveness of the program must be measured and compared across geographies and zones. Without a common set of standards, data collection will not be collated and compared. It is clearly in the public interest to define a common approach nationally.

To summarize, the radon measurement and mitigation industry stands ready to support this new policy. The current single-family residential market is characterized by the need for quick response radon measurement and mitigation in order to support timely closings and build healthier communities. The challenges and risks associated with this policy can be easily mitigated as companies like ours prepare to meet the demand to provide multifamily residents with the safest air quality possible.

Sincerely,

A handwritten signature in black ink that reads "Mark Burel".

Mark Burel
CEO
SWAT Group, Inc.



Spruce Environmental Technologies, Inc.

August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

I want to express my appreciation to the Federal Housing Finance Agency (FHFA) for hosting the July 20, 2021 Listening Session for the Government Sponsored Enterprises (GSEs) Freddie Mac and Fannie Mae Multifamily Radon Standards. I applaud FHFA's commitment to ensuring the GSEs lending policies protect residents living in multifamily housing from the risk of developing radon-induced lung cancer.

As a participant during the Listening Session, my talking points primarily spoke to the ANSI Consensus Process that is used to develop the ANSI/AARST standards. I finished my allotted time with a brief perspective from my laboratory management experience. As I continued to listen to the session, I was struck by some of the information that was relayed and would like to offer a few comments.

As the Director of Laboratory Operations for three national laboratories processing multifamily and residential care facility radon samples from all areas of the country, we have been anticipating additional volume through the HUD/FHA program as well as planning for the day that the GSEs would use the same standards due to the prevalence of radon, the human health implications, and the increasing number of regulated states adopting the ANSI/AARST standards. The impacts would ultimately increase the number of samples taken at properties going through the Freddie/Fannie lending programs. As a result, I am happy to say that our laboratories are well equipped for the FHFA multifamily policy changes and am confident that we are fully capable of handling the workload due to our recent capacity and facility upgrades. We are prepared to invest in additional capacity, including new locations, when necessary.

When the rumor initially hit the streets that FHFA was considering a policy change, several clients in the multifamily due diligence industry called to ask about our laboratory capacity because they were concerned. I ensured them that we had been working for several months

already and would be able to handle the sampling increases. I also asked them how they would respond to larger projects and utilizing trained professionals instead of utilizing untrained property managers. Most of them said they would send many of their staff through the certification training programs, but with the uncertainty whether the rumors were true and when a policy change would go into effect, they would wait for the final policy details before taking action. I would urge the GSEs to work toward the final announcement and timelines soon because there seem to be a lot of people waiting to know more before investing in the personnel training and credentialing of their staff.

One final observation that I would like to share is that the hesitancy of the lending and due diligence community to utilize the standards and its recommended sample procedures for properly characterizing multifamily and residential care facilities actually increases their project costs. While the ANSI/AARST measurement standards offer time sensitive options for making a timely mitigation decisions, the consulting industry takes steps to shortcut testing, apparently to save money, but often ends up with multiple testing events and sometimes trying to test the radon away to avoid mitigation. This significantly increases costs, stress levels, confusion, and drags project timelines out, which can jeopardize lending requirements. My staff communicates with field professionals on a daily basis and we try to bring them back to the standards and explain that the standards will actually help to streamline their processes if they can convince their clients to adhere to them.

From my perspective, the FHFA reference to the ANSI/AARST standards, properly credentialed professionals, and abiding by local and state regulations will alleviate confusion, frustrations, and lower the liability of all parties, but more importantly, the policy will protect the health and safety of the occupants of the tested and mitigated properties. My staff and I are ready and able to lend any assistance that FHFA or the GSEs needs to ensure a smooth rollout of the policy.

Healthy regards,



Shawn G Price
Director of Laboratory Operations



Air Chek
Mills River, NC
800-247-2435



AccuStar Labs
Ward Hill, MA
888-480-8812



AccuStar Labs
Harrisburg, PA
800-523-4964

ALPHA ENERGY LABORATORIES

2501 Mayes Road, Suite 100 | Carrollton, TX 75006 | (972) 242-2479 | aelabs.com

August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

I wish to thank the Federal Housing Finance Agency (FHFA) for hosting the Government Sponsored Enterprises (GSEs) Freddie Mac and Fannie Mae Multifamily Standards Radon Listening Session on July 20. We applaud your agency's commitment to ensuring the GSEs lending policies protect residents living in multifamily housing financed by the GSEs from the risk of developing radon-induced lung cancer.

I heard concerns expressed during the session regarding the radon industry's ability to meet the increased demand that will be created by the policy. Our company is both a manufacturer of radon test kits and an analytical lab. I wish to convey assurances that our company is prepared for this increased demand; we currently possess the capacity to manufacture and analyze an additional 800,000 test kits annually above our current volumes.

I currently serve on the National Radon Proficiency Program's Certification Council in the Radon Laboratory Representative position. In this role, I have spoken with other laboratories and manufacturers in the industry and have received a consensus response that these companies are prepared and able to operate at increased volumes. I encourage FHFA and the GSEs to work closely with the radon industry to develop an implementation timeline for the policy that addresses the potential for capacity challenges.

The GSEs radon policy is critical to protecting residents from exposure to unsafe concentrations of cancer-causing, radioactive radon and I thank the FHFA for their commitment to enacting these important, lifesaving regulations. To accomplish this goal, I strongly advocate for full adoption of the EPA-recommended consensus standards. My company stands ready to lend assistance in support of this important effort.

Sincerely,



Owen Reese
Vice President



RAdata, LLC
27 Ironia Road, Unit 2
Flanders, New Jersey 07836
973-927-7303
973-927-4980 fax
www.radata.com

August 6, 2021

Sandra L. Thompson, Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

I would like to thank you and the participants of the Listening Session, as well as extend my appreciation to the Federal Housing Finance Agency (FHFA) for hosting the Government Sponsored Enterprises (GSE) Freddie Mac and Fannie Mae Multifamily Standards Listening Session on July 20th, 2021, and for your agency's commitment to ensuring the GSE's lending policies offer residents living in multifamily housing a reduced risk of developing radon induced lung cancer. Housing financed by the GSE's, under the Radon Abatement Act of 1988, is required to accommodate radon testing, treatment, and education to the residents dwelling in these federally insured financed properties.

Throughout the listening session, speakers for private lending institutions, the National Association of Home Builders (NAHB) Multifamily Division, and Executives of large companies offering multifamily housing expressed a concern with the burden of offering safe living spaces. This group of speakers were more concerned about the inconvenience radon testing and treatment would exert on their industries. They claim implementing the ANSI/AARST standards would reduce their ability to build, refurbish, finance, and refinance the buildings. Please remember, these buildings are designed to house thousands of occupants. It was estimated that enforcing radon testing and radon treatment as outlined in the ANSI/AARST guidance would delay closings and add a financial burden to the properties. Repeatedly, each of the speakers suggested the radon industry would be unable to supply testing and treatment in their estimated 1.9 million properties each year. Using today's estimate of 1 in 15 homes having elevated radon levels (at or above the action guideline of 4.0 pCi/L), based on the above numbers, there would be an estimated 130,000 multifamily homes which would fail the standard and require treatment

This is clearly untrue; and I feel the true motivation of the group of speakers arguing to avoid the adoption of this standard from ANSI/AARST was simply to avoid the potential extra expense of approximately ~\$2000 per dwelling to test and mitigate. This small cost would assure the occupants have a safe place to live.

It is easy to understand that an owner-occupied property gives the opportunity for the occupant to control their own destiny, but that is not the case with multifamily housing. Residents of rental units

and multifamily housing have little opportunity to protect their health voluntarily, and instead must rely on the dignity and goodwill of the building owners.

Included on the call speaking negatively about this adoption (surprisingly) were due diligence companies. These are the companies that manage the inspections and environmental assessments of properties being financed. The due diligence inspection companies have succumbed to the pressure placed on them to complete the task of radon assessment as cheaply as possible, unfortunately this demonstrated a minimal number of dwellings being tested at each property.

In my time speaking at this meeting, I explained about a dwelling we worked on in upstate New York. The building complex had recently been refinanced and the due diligence company that did the inspection measured the radon in only 6 units out of the 150 ground floor units! Without knowledge of the underlying geology, they chose to place the radon tests in 6 unoccupied dwellings and all six test results came back below the guideline of 4.0 pCi/L. It was later discovered that a granite ridge divided the geology beneath the apartment site. On the north side of the ridge, the radon concentrations were found to be much higher. By not testing all ground floor units as outlined in the ANSI/AARST radon multifamily standards this went undiscovered until a resident of one of the units on the north side of the granite ridge passed away from lung cancer. This homeowner and his wife had lived in the same apartment for over 20 years, and when the unit was tested the radon was in excess of 150 picocuries per liter. This is the equivalent lung damage of smoking 300 cigarettes per day, and that's unacceptable.

One of the speakers testified that the average apartment dweller or multifamily resident only stayed in the property for 1.9 years, therefore the risk of being exposed to radon for that small portion of their life shouldn't be a burden or a liability to the industry at hand. In this case the homeowner had been in the apartment for over 20 years and where there may be an average of a two year dwelling occupancy expected there are those people that are not the norm, the people that live in these units long term. Even using the 1.9-year figure, 693.5 days at 150 pCi/L is the equivalent lung damage of smoking 208,050 cigarettes. The occupant is unaware of the gravity of the damage, and probably would not choose to smoke a staggering 285 cigarettes per day! Is that life threatening? I think the health risk is greater than the speakers on this call realize, and more importantly I think the liability is greater than they imagine.

Another example I discussed was a multifamily condominium and townhouse complex: consisting, of garden style condos, townhouses, and villa units. This builder (who won builder of the year in 2001, NAHB) went to great lengths to consult, design, develop and install radon systems, even including active radon fans on every unit to make sure that they were offering a safe product to their customers. Every unit had a radon system and every unit was tested for radon after treatment and proved to be passing.

Some of these systems were installed as part of the common element with a garden style facility or with a villa facility where you've got upstairs and downstairs neighbors that share a common ground contact. The association was required to support the electrical cost, the maintenance cost, and ongoing management. In the transfer of the homeowner's association from the builders group to the actual homeowners, there was no written OM&M plan. In the midst of all of the heavy burden of handoff, the builder failed to identify this responsibility to the homeowner's association. Ten years after construction, one of the homeowners (who was a heavy smoker) died of lung cancer. She lived in one of the villa units. The villas had a divided basement so each upstairs and downstairs homeowner had access to half of the basement as usable space. One system was installed with a connecting pipe

through the foundation wall to the under-slab area of each homeowner's basement using a collateral mitigation concept (one radon system and one fan controlled the radon in each basement, the electric and the radon system was part of the common element). During the closing of the real estate transaction of the estate, the closing attorney realized that no maintenance had been conducted for the ten years while the deceased client had lived in the building. Doing his homework and research he found enough evidence to file a class action suit against the homeowner's association, the builder, and multiple subcontractors (including our firm, RAdata). After five or six years of agonizing legal activity, our attorney was able to negotiate a settlement which cost RAdata \$750,000.00, and both the builder and the homeowners association \$1,000,000.00 each. Is this a small price for a life? By not following the ANSI/AARST standards and by not implementing controls on the properties that are being offered for rent and for multifamily dwelling, each property owner opens themselves to liability and potential class action activity.

On the brighter side, we recently worked with a national multifamily investment company located in New Jersey with properties across the United States. They inquired about the required radon testing for their purchase of 304 apartments in a multifamily facility in Monmouth County New Jersey. We explained the new ANSI/AARST standards and the original HUD guidelines of testing 25%, and the Client chose the least expensive approach.. We followed the HUD guidelines of testing 25% of the ground floor units, and found that 40% of these units failed. We quickly returned at the Client's behest and performed 100% ground floor testing, confirming 37% of the 304 units had unsafe radon levels at or above 4.0 pCi/L. This approach did not delay the sale or closing, and it was easy to understand and agree with the bank that an escrow would be established that was large enough to install radon treatment. The total cost for the project was roughly \$200,000 and included a well-written ongoing maintenance and management (OM&M) document that was easy to follow and gave the security to know that the hands-on management would continue to protect the occupants of these units long term.

What is the cost of a life? What is the cost to pay for a victim with lung cancer? What is the value of the lost income to the person affected and more importantly what is the value of the family's loss?

RAdata supports full adoption of the EPA-recommended consensus standards, and stands ready to lend assistance in support of this important effort.

Sincerely,

A handwritten signature in dark ink, appearing to be 'D Grammer', with a long horizontal line extending to the right.

David Grammer
President



Spruce Environmental Technologies, Inc.

August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

During the recent FHFA listening session, there were presentations that cast doubt on whether the radon industry has a sufficient number of professionals required for the additional work that would result from the new GSE radon testing requirements. We are pleased to have the opportunity to address any doubts and concerns by pointing out that radon training providers are well prepared to provide the professional education required when the need arises for additional qualified radon professionals.

For well over 20 years, the training division of Spruce Environmental Technologies, Inc., has been providing entry-level and advanced radon certification preparation courses to students. Since 2015 those courses have been presented in a virtual environment via live webinars as well as in traditional classroom locations. In the last year, we routinely have trained 50 to 100 entry-level and advanced students each month. Our virtual training platform provides for unlimited class sizes, although we prefer to limit the number of students per class in order to provide an interactive, personalized learning experience. When needed, we can add more classes.

In addition to recent increases in class sizes, the Spruce training division receives a large number of telephone and email inquiries regarding the need for multifamily testing and mitigation education. The interest in initial and advanced training classes exists, and it appears that both current and prospective radon industry professionals are waiting for the FHFA requirements to be put into effect. We anticipate larger numbers of students once that occurs, and we have the capability, infrastructure, and experience to provide the appropriate training to hundreds of students monthly, if needed.

Due to the COVID-19 pandemic, other radon training providers have also introduced virtual training classes, with many also prepared to increase their class number and sizes to meet the need when FHFA requirements are announced.

In summary, the Spruce training division is ready, along with other qualified radon training providers, to train large numbers of students monthly. We are confident that, when the potential students perceive the need for this training, we can easily accommodate their educational requirements.

Sincerely,

Matthew Hendrick, Senior Training Specialist
Patricia Everett, Training Coordinator



August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

RE: Radon Multifamily Standards Listening Session Comments

Dear Acting Director Thompson:

On behalf of Fantech, a Systemair Company, I would like to personally thank the Federal Housing Finance Agency (FHFA) for hosting the Government Sponsored Enterprises (GSEs) Freddie Mac and Fannie Mae Multifamily Standards Radon Listening Session on July 20. The acknowledgement and assurance in ensuring the GSEs lending policies protect residents living in multifamily housing financed by the GSEs from the risk of developing radon-induced lung cancer is commendable.

During the session, the concern for the radon industry's ability to meet the increased demand that will be created by the policy was conveyed. As a Global in-line fan manufacturer and a leader in radon fan manufacturing, we possess the resources to increase capacity quickly to meet increased demand. Our company manufactures products at 27 production facilities in North America, South America, Europe, Africa and Asia, with a total manufacturing floor space of over 3.2 million square feet. These modern plants are continuously updated and augmented to maintain the highest quality of machinery and equipment. In fact, the primary radon fan manufacturing plant is located in Lenexa, Kansas. With all of Fantech's capabilities, we are very confident that with the adoption of the policy, we will be able to supply radon professionals with the demand that follows. Fantech has a dedicated division with associated employees, specifically for radon fan manufacturing, and can be of any assistance you may need.

Fantech is just one of many manufacturing companies and suppliers associated with the industry that have necessary resources to meet increased demand. I encourage FHFA and the GSEs to have every confidence that the radon industry as a whole stands ready to meet any capacity challenges with swift and deliberate action.

Fantech does much more than make fans. We are committed to making products that support healthy and safe indoor environments for the multifamily residents. Please consider the obligation we have to these residents with the pending adoption.

Sincerely,

A handwritten signature in cursive script that reads "Crystal L. Lytle".

Crystal Lytle
Radon Sales Manager

Mobile: 913.309.3605
crystal.lytle@fantech.net
www.fantech.net

August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219
FHFACommunications@fhfa.gov

RE: Radon Listening Session

Dear Acting Director Thompson:

We appreciate the effort of FHFA to thoughtfully consider how to protect multifamily tenants from radon-induced lung cancer.

Radon Supplies would like to express our strong support for full adoption of the EPA-recommended multifamily radon standards by the Government-Sponsored Enterprises (GSEs).

We suggest that FHFA consider the following principles:

- Everyone living in multifamily buildings financed by the GSEs should be afforded the same opportunity to live in a healthy and safe indoor air environment free of unsafe levels of cancer-causing radon gas.
- All residents living in buildings financed by the GSEs should be treated equally, regardless of the location of the property or where they reside in the building.
- There should be no delays or exemptions for testing any segments of buildings financed by the GSEs: there is no way to determine the radon level except by testing.
- Consistent adherence to the EPA-recommended consensus in testing and mitigation standards for multifamily buildings ensures reliability. These consensus standards represent the only proven methodology for protecting the residents of multifamily buildings from exposure to unsafe concentrations of radon.
- Performance by qualified professionals is an integral element of the standards' effectiveness; the necessary training, private certification, and state licensing are available to measurement and mitigation personnel who are not now qualified.

We are acutely aware of questions about industry capacity to meet a significant increase in the number of housing units tested and, if necessary, subsequently mitigated. As a supplier at the crossroads between the country's radon contractors and manufacturers of fans and other materials, we can assert that the manufacturers upon which we rely have consistently demonstrated the agility to expand and turn around product in response to demand, planned and unplanned. They will not hesitate to step up. Given the significant amount of business this expansion represents, our company and others are already reviewing exactly how we might expand the flow of supplies. We stand ready to support this effort.

Thank you for your consideration. Please do not hesitate to reach out to me should you have any questions.

Warm Regards,

Jan Fisher
National Sales Manager
Radon Supplies
888.800.5955 x101
www.radonsupplies.com



August 6, 2021

RE: FHFA - Freddie Mac and Fannie Mae Multifamily Radon Standards Listening Session - 7-20-2021

To Whom It May Concern,

First I would like to thank FHFA, Freddie Mac and Fannie Mae for their leadership on the radon issue and for holding the above mentioned listening session. Far too often policies get written without experts being consulted and I found this session to be an import step in putting forward a sound radon policy. A radon policy that is greatly needed to protect multi-family residents.

I offer my response today to address the concerns many of the presenters voiced about industry capacity. This issue has been brought up several times in meetings and responses to the proposed radon testing rules that FHFA is considering. My comments will address specifically the capacity of manufacturing in the radon industry.

For background, I have been involved in the radon industry since 1988. I began as an owner of an environmental contracting company with real estate and relocation company clients covering the contiguous United States. I now serve as an executive at Spruce Environmental Technologies, Inc. Spruce is the largest manufacturer of radon fans, mitigation supplies, radon testing equipment, and laboratory services in the world. Our radon brands include RadonAway®, AccuStar®, Air Chek™, and RadStar™. Through the years I have witnessed and been involved in the growth of this unique and extremely important industry.

The comments regarding capacity are not founded in fact, but are concerns and opinions from individuals who do not have full knowledge of the industry capacity. Spruce, for example, has the ability to more than double its output of radon fans, supplies and test kits without any infrastructure changes. Other manufacturers have similar capabilities. Spruce has planned for and stayed ahead of industry growth for more than 30 years. During this time, we have experienced years with more than 30% growth. The growth that would come from a proper and much needed FHFA policy would be easily handled by the manufacturers and laboratories that currently exist. In fact, Spruce alone could meet the needs of the entirety of this growth.

Annually, there are over 1.2 million radon tests performed and there are over 260,000 radon fans installed. The additional test devices necessary to perform multi-family testing in Fannie Mae and Freddie Mac properties in accordance with the ANSI-AASRT MAMF Testing Standard would add approximately 750,000 test devices and 50,000 radon fans in year one. These production and laboratory device increases have been accounted for in our infrastructure planning. It is my position that the

manufacturing and laboratory companies that exist currently in the radon industry can easily handle the needs of a policy that follows proper consensus standards.

Sincerely,

David D. Hill

David D. Hill
Executive Vice President



**The AARST Consortium
on National Radon Standards**
standards@aarst.org Fax: 913-780-2090

An open letter,

RE: Comments on the FHFA Radon Listening Session

7/21/21

Having experienced more than a thousand hours of debate over the last 15 years of ANSI/AARST committee meetings, I provide brief comments on several assertions repeated by multiple individuals.

1) Risk based policy, protocols and science

I inferred that someone is supposed to figure out where there is no reason to test before spending money to test. Meanwhile: As with most minerals in soil, the distribution of radium in the earth varies across each parcel of land and at different depths below grade. The forces that distributed radium did so without respect for property lines, county lines or state lines. As witnessed by thousands of tests from areas labeled Zone 2 and 3, no parcel of land is immune to the possibility of radium in soil that is rich enough to cause an indoor radon problem.

2) Upper Floors

While it is certainly possible for radon to be drawn from soil to upper floor dwellings through plumbing and vent chases, the persuasive argument for “10% screening” upstairs centered around building materials as the source of a radon problem. Known to be common in parts of Florida where radium-rich sand mixed in concrete causes elevated concentrations on upper floors, incidents of building material sources have now been reported in most other regions of the country.

3) The science of 100% ground contact testing

Consortium committees have certainly debated the question. For those who suggest there are statistical calculations that could result in a legally defensible screening test (e.g., 25% or even 50% screening), they will find it a challenge due the following variables.

For radon to enter a dwelling there must be a) openings between soil and indoor air, b) air pressures that drive soil gas into the dwelling, and c) radon in the soil near the dwelling. Meanwhile, the total volume of constantly generated radon atoms that are readily susceptible to migration and thereby enter a dwelling or portion of a building is unknowable.

One idea was floated: The variables for differences between ground-contact dwellings in each building would have to be mapped for each of these variable qualities: openings between soil and indoor air; existing ventilation; air distribution systems; factors causing differing indoor air pressures; each different elevation of foundations; and spatial grid distances horizontally. Once mapped by each variable group, a representative number of test locations could be determined to quantify each of these variables relative to radium distribution and permeability of soils adjoining the foundation. Conclusion: It is far cheaper and more reliable to simply test.

EARTH study: I’m not sure what people expect from the EARTH study or any other study. But it certainly confirmed what EPA said in the late 1980s as verified by field experience and state databases across the following 30 years: You can’t know unless you test.



**The AARST Consortium
on National Radon Standards**
standards@aarst.org Fax: 913-780-2090

4) Adequate industry

If the proposed policies go into effect, I don't have to wonder if each company currently dealing with other environmental services will add staff to accommodate their client needs for trained individuals. I'm sorry, but I came from the inspection industry. That's simply how it works. And with only a two day class required, other existing and new local firms will quickly ramp up their supply to meet demand.

5) Competing lenders

Nothing was said today about lender liability. I suppose that is because it is hard to win lawsuits against the federal government on the basis of negligence. But watching 40 years of private banks in real estate transactions and where employers underwrite employee relocation and home purchase expenses: Private sector lenders learned to be very conservative about possible lawsuits. They are the people who institutionalized whole-building inspections in the late 1980s because of liability concerns. The first national radon testing requirements came from the relocation industry. And because of liability concerns, all of these folks follow your lead.

6) Lastly, improving consensus standards

ANSI/AARST standards are being improved under continuous maintenance procedures. There are four ways to participate in future improvements to these standards, per ANSI/AARST procedures:

- a) Stakeholder interest group representatives can request to join a committee;
- b) Public review. Anyone can submit public comments for content being publicly reviewed and committees must address and attempt to resolve those comments;
- c) Anyone can request an interpretation; and
- d) Anyone can make change requests.

Details on these procedures are found at www.standards.aarst.org/public-review

Gary Hodgden (Secretariat)

AARST Consortium on National Radon Standards



August 6, 2021

Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street SW
Washington, DC 20219

Dear Director Thompson,

The American Association of Radon Scientists and Technologists (AARST) appreciated the opportunity to participate in FHFA's Multifamily Radon Standards Listening Session on July 20th - and moreover applauds the agency's continuing commitment to ensure that the Enterprises establish appropriate standards related to radon in their multifamily seller and servicer guides.

Some of the information conveyed during the Listening Session was materially inaccurate. Multiple recommended approaches demonstrated disregard of both building science and the scientific evidence on risk of radon-induced lung cancer.

The attached copy of the transcript offers clarifying information in marginal comments to address these inaccuracies and recommendations.

We look forward to the finalization of an effective, evidence-based policy for implementing the ANSI-AARST standards, the only applicable national consensus standards, throughout the Enterprises' multifamily lending. AARST is eager to supporting implementation of such a policy.

Please don't hesitate to call upon us for additional information and other assistance.

Sincerely,

Jane Malone
National Policy Director

American Association of Radon Scientists and Technologists
www.aarst.org
527 N Justice Street, Hendersonville, NC 28739

FHFA - Freddie Mac and Fannie Mae Multifamily Radon Standards Listening Session - 7-20-2021

Siobhan Kelly:

Hello, good afternoon and welcome to Freddie Mac and Fannie Mae Multifamily Standards Radon Listening Session, hosted by the Federal Housing Finance Agency. My name is Siobhan Kelly and I'm the Associate Director of the Office of Multifamily Analytics and Policy in the Division of Housing Mission and Goals. And I will be introducing today's discussion along with several great speakers.

Over the past year FHFA and the Enterprises have been diligently working together to assess the Enterprises current Radon standards. Today, we are extremely interested to hear and learn from stakeholders on how the adoption of the Environmental Protection Agency's Voluntary Consensus Standard for Radon Testing and Mitigation could impact the multifamily housing and radon industries.

Our primary goals today are to, one, bring together diverse viewpoints in order to identify opportunities and challenges to address radon exposure in multifamily properties, and two, identify opportunities to improve radon data collection at Fannie Mae and Freddie Mac backed multifamily properties.

FHFA is committed to ensuring that the Enterprises provide safe and affordable housing. The Enterprises often set the standards for the industry and have a responsibility to ensure that what they are financing provides safe reliable housing for tenants across the United States.

On behalf of all of us at FHFA, I want to take a minute to express my gratitude for the distinguished speakers today and for the diversity of views represented. I have been told that this is actually a record breaking listening session, for we have the highest number of speakers and the highest number of attendees registered, which no doubt speaks to the importance of this topic.

FHFA will take all of the remarks that we hear today, as well as any written remarks, into account as we continue to work with the Enterprises to refine their radon policies.

Before we get started, it is my absolute pleasure today to introduce Acting Director Sandra Thompson, who will be providing opening remarks for today's session. President Biden appointed Sandra Thompson to be Acting Director of FHFA three weeks ago, on June 23rd. Prior to serving as FHFA's Acting Director, Director Thompson oversaw FHFA's Division of Housing Mission and Goals.

Director Thompson has a distinguished career in public service and is a champion of affordable housing, as well as focusing on health

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and safety issues impacting tenants in multifamily properties.
Please join me in welcoming Director Thompson.

Sandra Thompson:

Thank you, Siobhan. And let me thank all of our participants for joining today's virtual listening session. FHFA is committed to openness and transparency, especially when considering decisions around critically important issues, such as housing affordability and safety.

The purpose of today's session is to help us better understand the issues involved in radon testing and mitigation in multifamily properties. Today is an opportunity for you to be heard, as well as an opportunity for you to hear the full range of concerns that are being raised for consideration around this very important topic.

FHFA takes a holistic view when considering policy changes. We want to identify the foreseeable effects of any change on how our regulated entities manage and reduce risk on housing affordability, on fair lending and unquestionably on health and safety concerns.

A growing body of research has raised questions about the vulnerability of multifamily housing units to naturally occurring hazardous radon gas. The Enterprises are reviewing their radon underwriting standards to ensure they are comprehensive, data informed, fully understood by lenders and properly implemented and enforced.

Today's session will help inform this review. It is critical for the Enterprises to meet their mission obligations, and help ensure that financing is available for safe and affordable housing to reach underserved borrowers and renters.

Fannie Mae and Freddie Mac have a responsibility to identify the obstacles these communities face in accessing mortgage credit and accessing financing for affordable housing. As well as a duty to develop strategies for overcoming them safely and soundly.

All across the United States, Americans are struggling with the housing crisis. Each market and community faces its own mix of challenges. But a common theme can be found, and that is there's a widespread shortage of affordable housing.

FHFA's mission, through our regulated entities, is to responsibly foster a sustainable housing finance system that supports equitable access to affordable, decent and safe homeownership and rental housing. The information and perspectives you share with us today will help us carry out the very important mission. Thank you again

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for joining today's listening session. And I'll now turn the program back over to Shivani.

Siobhan Kelly:

Great, thank you Director Thompson. Now before we begin to hear from our guest speakers, Alex Chang from Freddie Mac will give a brief opening statement. And as we close, Charles Ostroff from Fannie Mae will give us the closing remarks. We have a lot to cover today, so again, we truly appreciate your participation. And I'll hand it over to Alex.

Alex Chang:

Thanks Siobhan, I'm seeing a little bit of delay. There we go. So good afternoon everyone. On behalf of both Freddie Mac and Fannie Mae, we are very pleased with the strong interest in turnout to discuss an important topic today. We are very much looking forward to this listening session.

So my name is Alex Chang, and I lead the Risk Distribution and Credit Team in the Multifamily Division here at Freddie Mac. As it relates to this session, I'm responsible for setting the credit policy for multifamily loans.

So what are multifamily loans? For Freddie Mac, these are loans on properties of five or more residential units, where we see tenants on average occupying units for approximately two years at a time. The multifamily divisions at Freddie Mac and Fannie Mae were asked to review our radon assessment approach, with an eye towards ensuring our policies are data informed, reasonably achievable for lenders and borrowers, and properly implemented and enforced.

These are important topics to both Fannie Mae and Freddie Mac. One we have taken very seriously and have spent considerable time researching, reviewing and discussing under the guidance of FHFA. I would like to stress that the health and safety of our tenants has always been a top priority for both Enterprises, which is why we continue to have among the strongest, most robust, due diligence requirements relating to health safety issues in the industry.

We feel strongly about this and are committed to using our positions as leading multifamily financiers to drive the industry forward thoughtfully on these issues.

Through our review process, we found ourselves looking for more multifamily focused data to inform our policies. While much of the data available pertains to single family spaces that we found, we hoped to hear from folks today who may be able to shed more light

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on available data and understanding of the impacts relative to the multifamily space.

We appreciate everyone's time today, and look forward to hearing the feedback on topics listed that will inform these policy change considerations going forward. Thank you very much.

Siobhan Kelly:

Great, thank you, Alex. And thank you Freddie Mac. And now some brief remarks from FHFA's Office of General Counsel, I'm going to go ahead and turn it over to FHFA's Assistant General Counsel, Sarah Todd.

Sarah Todd:

Thank you Shivani. Just a few housekeeping items to cover before we get started. We've invited you to meet with us today to obtain your input of information on the proposed adoption by Fannie Mae and Freddie Mac of the EPA Voluntary Consensus Standards for Radon Testing and Remediation of Multifamily Housing Properties.

All feedback offered in today's session should be directed to FHFA, without reference to the remarks of any other participants. At this time, we will not discuss the status or timing of any FHFA plans with respect to rulemaking on this issue. And this listening session is not an advisory group. However, we may summarize the feedback gathered at today's meeting in any rulemaking document that might be issued in the future, if we determine that summarization is necessary to provide a complete statement of the basis for a future rulemaking.

Nothing said in this meeting should be construed as binding on or a final decision by the FHFA Director or FHFA's staff. Any questions FHFA may ask, are focused on understanding your views and do not indicate a position of FHFA's staff for the agency. And now I'll hand it over to my colleague Mary Owens from FHFA's Office of Multifamily Analytics and Policy, who will be managing the flow of our listening session this afternoon.

Mary Owens:

Thank you, Sarah. And good afternoon everyone. My name is Mary Owens, and I'll be facilitating today's listening session. Today we plan to hear from over 40 speaking guests. Each speaker will have up to six minutes to speak, and we will try our best to stay on schedule, but we ask that everyone speaking today help us do so.

An FHFA facilitator, either myself or my colleague Mary ~~Bear~~[Baehr](#), will call the name of each person when it is their time to speak in the order provided on the meeting agenda. If you do not respond promptly when your name is called the next speaker on the agenda will be asked to speak.

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To ensure speakers are on time, please log in at least 15 minutes in advance of your speaking slot. As your assigned time will be approximate your actual start time may depend on the length of speakers before you.

Each speaker will have the ability to mute and unmute their microphones throughout the session, but we ask that you keep your microphones muted until it is your turn to speak. We also ask that all speakers be prepared to turn on their video cameras during their speaking segment.

I will chime in to give speakers a one minute warning as their time draws to finish. If someone does go over their time, unfortunately, I will have to interrupt you in order to keep us on schedule. If we have to skip a speaker who isn't ready for their designated time slot, we may attempt to offer a later opportunity to speak, but cannot promise that the crowded agenda will allow us to do so.

Before giving a statement, please remember to provide a brief introduction stating your name, your credentials, the organization you represent and any relevant affiliations.

Finally, we are recording today's session. FHFA will also prepare a transcript of today's session which will include the names of all speakers and the organizations you represent. We will post the recording and transcript on FHFA's website and YouTube channel, along with any materials being presented today.

Now without further ado, we will begin to hear from our guest speakers. Our first discussion topic is Health and Safety. The first speaker is Bill Field from the University of Iowa. Bill.

Bill Field:

Great. Thank you very much for having this session today to allow input. I'm a professor in the College of Public Health with the University of Iowa and been involved in radon research for over 30 years, including being involved with several of the studies to help form the basis for the risk assessments.

And just a note, I and colleagues at Columbia University also recently received NIH funding for five years to examine a possible causal association between radon exposure and stroke. Next slide, please.

Okay so as most of us know probably on this call is radon is a radioactive gas. You can't smell it, you can't see it. Enters buildings primarily through the soils. In some locations it can enter to water sources. It's naturally occurring outdoors but the way we build homes its enhanced indoors next. Next.

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So radon's estimated to cost about 21,000 lung cancer deaths per year according to the EPA's assessment. This assessment, as you can see, it's getting rather dated. But this assessment was based primarily on projections from miner data. And since that time, we've had numerous studies performed in both Europe and in North America that actually measure radon in homes and look at risk assessments based on those. And those risk assessments are right in line with the EPA's estimates from 2003.

It's important to note that there's also a subset of people about 20,000 people each year that die from lung cancer who have never smoked. And radon's the leading cause of the lung cancer in this group. Next slide.

So it's what's important to know too is when you're looking at buildings and homes, while we measure radon gas, radon gas is really a surrogate measure for the radon decay products that we breathe in. Next slide.

And two of these radon decay products, polonium 218 and polonium 214, decay by alpha decay. So when they are inhaled in, deposited on the respiratory epithelium, they give a lot of dose in a very small area. And that dose can initiate cancer. Next.

What's really kind of unique among environmental carcinogens is the alpha particles can cause double strand DNA breaks. And since cancer is considered monoclonal, that means that it takes one cell to initiate cancer, there's really no threshold for radon induced lung cancer. Next slide.

One of the other things to note is that in addition to the direct, single and double stranded DNA breaks caused by the alpha particles, there's also double strand DNA breaks and single strands, because of free radical formation within the cells. And that can damage the DNA and initiate the lung cancer. And we're all at someone's different risk.

For example, people that are missing GSTM1, which is a gene that only half the people on the call have, if you don't have that gene, you're at much more at risk of developing radon induced lung cancer than people who have that gene. It gives off antioxidants, which helps deal with the free radical formation. Next slide.

As you can see on the top, prostate and breast cancer are the leading causes of cancer in the United States. But if you look at mortality, which is in the bottom part of the slide, lung cancer is the leading cause of cancer deaths for both men and women. Next.

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If you look at the number of lung cancer deaths each year in the United States, 135,000, it's roughly equivalent to the next three leading causes of cancer mortality overall. So even though radon's not the leading cause of lung cancer, even secondary causes are really important. Next.

What we know about radon, there's global consensus about the risk from studies that were done, miner studies. The EPA assessment that I spoke about. The biological effects of ionizing radiation report from National Academy of Science. And then the WHO guidance that set reference level for radon of 100 becquerels per cubic meter, or 2.7 picocuries per liter. So a lot of this information has shown that radon's a significant lung cancer risk. Next.

If you look at the number of radon induced lung cancer deaths each year, it ranks in the top ten of causes of cancer mortality overall. If it was treated as its own disease category. So if you think about if we could get reduced radon these lung cancer, we'd be getting rid of one of the top ten leading causes of cancer deaths in the United States. Next Slide.

And if you look overall at the risk, this is the EPA's risk estimate for radon. What you really find is the risk is so substantial compared to other environmental carcinogens. If you look at for never smokers, the chance of being exposed at 45 picocuries per liter, its seven in 1,000 people. And for smokers because of the synergism between the two, it's 62 in 1,000 people.

And I think what's important to note is that the risk estimates are that many of the radon studies that were done in homes were based on exposures below the EPA's action level. So they were finding statistically significant increases, even below the action level. So if we treated radon -- if the EPA treated radon like it treats other environmental carcinogens, we'd have to reduce outdoor air, because that's usually based on one in 100,000 chance of lung cancer, or cancer.

So in conclusion, based on the substantial risk posed by radon, Fannie Mae and Freddie Mac Multifamily should require radon measurement mitigation and full compliance with NCR Standards that are performed by qualified professionals to ensure that radon exposure to all building occupants are minimized to the extent possible. Thank you.

Mary Owens:

Thank you, Bill. Our next speaker is Wallace Akerley from the Huntsman Cancer Institute.

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Wallace Akerley:

So my name is Wallace Akerley. I am the Director of Lung Cancer Treatment at the Huntsman Cancer Institute. I'm a Professor of Medicine. And my specialty is non-small -- is lung cancer. I take care of only lung cancer patients. Next.

So radiation definitely causes cancer. We can get radiation exposure from controlled sources and uncontrolled sources. Medical radiation, despite all of the safety mechanisms they put in, still causes some number of cancers. Dr. Field just mentioned a second ago how this happens, and went out of his way to state that radiation can cause damage to the genes.

The definition of cancer is broken genes that let them grow in an uncontrolled fashion. We collect genes over time, collect broken genes over time. And as you collect enough breaks to your DNA that haven't been fixed, you end up with a cancer.

And radon is kind of one of those long acting things. We're exposed to it for a long period of time. It's a gas. It can only be -- it can be breathed. And when we breathe it, it's the respiratory lining. It's the lining of the lungs that can turn into cancer. So radon causes lung cancer. Next.

This chart shows a little epidemiologic data and it's specifically looking at all cancers over time for both males and females. This red line here shows that the lung cancer death rate for both males and females. And what you see is lung cancer by far dwarfs all other causes of cancer mortality. And is equivalent to the next three cancers, and depending on what time you look at potentially four cancers combined, in terms of mortality. The number two cause of lung cancer is radon. Next.

So many cancers have a ribbon. Lung cancer has its ribbon also, but it's the invisible ribbon. Lung cancer is called the invisible killer. Because its death toll tends to be relatively invisible to the media. As we mentioned, radon induced lung cancer is a subset of this, but it should be the one that's actually carrying the ribbon. It has devastating mortality and kills 20,000 people per year. It is truly invisible. And as mentioned, it can't be seen and can't be smell. And most importantly, radon induced lung cancer is preventable. Next.

So I come from the state of Utah, as mentioned. And this is a largely non -- this is a nonsmoking state, we have the lowest smoking rate in the country. And if you look at different cancers that are listed here, you'll see that the state doesn't smoke. We have 57% less lung cancer than any other state. Next.

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Despite the benefit we gain from having an extremely low smoking state, which causes a decrease in lung cancer, you can see here the lung cancer deaths in the state of Utah still double the next leading cause of cancer death. Next.

So where do we stand? Well on January 13, 2005, this problem was recognized, and the Surgeon General put out a National Health Advisory on radon, stating this is the number two cause of lung cancer, and radon affects smokers and nonsmokers. Next.

So this is just my lung cancer clinic. I've made it a little blurry so that you can't see it. But those who have marks over them with little writing on the side, these are all never smokers in my clinic. And it's -- so what does my clinic look like relative to the rest of the world? The majority of my clinic with less smoke -- with less smoking are never smokers.

The majority of my patients are younger, the ages run from 20 to 90. But never smokers get lung cancer at an earlier age. The majority have not been tested for radon. They haven't tested their houses. The majority were diagnosed late, meaning they had metastatic disease. It's not uncommon for a patient who's a never smoker to claim they're having pain or shortness of breath, who then are kind of ignored. Stating just having muscle aches and not actually be diagnosed until they either cough up blood or have a bone fracture. My clinic includes both rich and poor. So this doesn't discriminate based on socioeconomic status. Next.

Mary Owens:

One minute remaining.

Wallace Akerley:

So in conclusion, I'm going to come back to one of -- to the original slide. And lung cancer is still an overwhelming cause of cancer death, despite the fact that the trend is improving. And so what happens if we remove the number two cause of cancer? Important to me is radon induced lung cancer is preventable, and we should do something about it. No one should be exposed to excessive radon, and all housing should be tested for radon and mitigated if necessary. Thank you very much.

Mary Owens:

Thank you. Our next speaker is Kevin Stewart from the American Lung Association.

Kevin Stewart:

My name is Kevin Stewart, and I serve the American Lung Association as Director of Environmental Health, Advocacy and Public Policy. I hold a bachelor's degree in chemical engineering from Princeton University. Over more than 30 years I have been active in public health work concerning radon and I have served at

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the national level in various capacities on scientific and policy matters regarding radon.

Current examples include my roles on the Executive Stakeholder Committee, the R Consortium on National Radon Standards and on the R Standing Committee on Radon Measurement Standards.

And I want to thank the Federal Housing Finance agency for the opportunity to make a statement and today's listening session on Freddie Mac and Fannie Mae and Multifamily Radon Standards.

The American Lung Association is the oldest voluntary public health association in the United States, representing the millions of individuals with or at risk of lung disease. And the Lung Association is the leading organization working to save lives by improving lung health and preventing lung disease through research, education and advocacy.

On behalf of the American Lung Association, I express our strong support for the recent initiative by the Federal Housing Finance Agency to strengthen the multifamily radon policies applied by the government sponsored Enterprises Fannie Mae and Freddie Mac, by requiring full compliance with the appropriate American National Standards Institute, the American Association of Radon Scientists and Technologists Consensus Standards for Radon Measurement and Mitigation.

From a national public health perspective, the Lung Association recognizes radon among the few most serious indoor air pollutants in the United States, as the second leading cause of lung cancer and as the leading cause of lung cancer among those who have never smoked.

The great majority of lung cancer cases ultimately result in the death of the patient, 77% within five years of diagnosis. Moreover, in recent years evidence has been emerging, showing that the proportion of never smokers among lung cancer patients has been increasing. And some research suggests that even the absolute incidence of lung cancer in never smokers has been increasing.

Since we know that most cases of lung -- radon induced lung cancer are preventable. this is all the more reason addressing the problem, therefore demand prompt intervention.

With these realities more than sufficient motivation, the American Lung Association has worked for over 30 years at the national state and community level to protect people in their homes, schools and workplaces from radon gas and its decay products.

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Since 2015, the Lung Association has served as convener of the Leadership Council for the National Radon Action Plan, a collaboration among national organizations representing government, nonprofit and industry working together to eliminate avoidable radon induced lung cancer.

Protecting residents of multifamily housing from the risk of developing radon induced lung cancer is one of our top priorities. An adoption of strong and effective radon policies by the Enterprises is a key initiative of this stakeholder group.

It is the nature of science not to have the final answer on any topic. Additional questions can always be asked. And there are always therefore unknowns. But our shared obligation to protect public health means we must not let the search for more knowledge become an excuse for a failure to talk.

A key principle of public health demands that we do the best we can to protect health and lives with the information we do have available. In the case of radon, the science on radon and lung cancer has been strong and clear for decades, as you've just heard. The remaining unknowns are simply matters of refining our knowledge.

In short, we know that there is a cost to further delay. Every year that passes without taking the necessary steps to find high radon exposures in multifamily housing, and to reduce them, is a year in which occupants and workers in such housing continue to be exposed and put at needless and avoidable risk. A year in which more people will be set on a course ultimately to get lung cancer and die from it, than would otherwise if we took preventive action sooner.

We appreciate FHFA's recent careful review of the NCRS Radon Standards and of the impacts requiring them in the Enterprises multifamily programs. We look forward to seeing effective implementation of these standards, and believe that adoption of and adherence to them, will establish the standard of care that sets the bar for everyone responsible for ensuring the health and safety of occupants and workers in all multifamily housing.

The Lung Association is confident that FHFA, the Enterprises and the radon services industry, have the tools and resources needed to successfully address these issues. And we urge the agency to move forward on implementation with the sense of urgency that this important public health initiative deserves. Thank you.

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Mary Owens: Thank you. Our next speaker is Lindi Campbell from Breath of Hope Kentucky.

Lindi Campbell: Hi, my name is Lindi Campbell, and I started Breath of Hope Kentucky when I was diagnosed with lung cancer myself. Because Kentucky ranks number one in lung cancer cases and deaths. And it was important to me not just to advocate for myself, but for the hundreds of people that I have begun to meet throughout my advocacy.

I've always been healthy, active, have never smoked and at the time of my diagnosis, I considered myself way too young to be dealing with such a life altering disease like lung cancer. We moved into our childhood home when I was one. For 20 years, I grew up in this home and spent most of my time in our finished basement. For eight years, my bedroom was in the basement of that home.

When I was diagnosed, we tested the radon level in that bedroom, and it averaged 3.9 sometimes a little higher, sometimes a little lower. My entire childhood, my lungs were exposed to both radon gas and secondhand smoke. Of the nine family members who lived in that home, seven had a history of smoking, but have never developed lung cancer. I have never smoked, was the youngest, spent the most amount of time in that basement than anyone else in my family. And I'm the only one who develop lung cancer.

When my body was most vulnerable, I was living in what should have been considered a safe place. And yet little did any of us know my health was actually at risk every single day I was breathing air into my lungs. I am one of those individuals who now have broken DNA because of radon exposure, which is what led to my diagnosis.

Here in Kentucky alone I've met 18 other people who have never smoked. They've also been diagnosed with this disease. You can see most of them in this picture on my slide. Sadly, all of them have stage four lung cancer. Their ages range from 27 to 58 at the time of their diagnosis. Two of my closest friends who live within an hour of me have both been diagnosed a few years ago in their early 40's. Both women are still raising young children at home. Both now have verified the history of extended exposure to high levels of radon, they were unaware of until after they were diagnosed with lung cancer.

We already know the Surgeon General has warned that radon is the second leading cause of lung cancer. And yet while we heed this warning for cigarette smoke as the number one cause, we fall short of heeding the warning for radon.

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Is it because this is a second leading cause and not the number one cause? And yet radon is the number one cause in people like me who have lung cancer. Does that not mean something?

Just because you can't see it, smell it or taste radon does not mean it's not there. If radon could be seen, smelt and tasted in the same way secondhand smoke can, we would be seeing a whole different reaction to radioactive gas -- to this radioactive gas.

Can I ask you this? Let's just assume for a minute radon was visible, would you be willing to live in a home that day in and day out had a dangerous gas you know could kill you floating in the air? You know you're breathing it, you can see it, you can taste this, you know it affects your lungs. My guess is you would likely say absolutely not.

That's what radon is exactly. It's just invisible. Which makes it even scarier and makes us that much more vulnerable to its dangers. We can voluntarily escape secondhand smoke because we know it's there. But radon is a silent killer. It lurks in our air and yet we're blind to it. Just because we cannot see it, we know it's deadly.

Will we all just pass the responsibility around or will someone stop and say enough? Enough people are dying from this dangerous gas, and it's time we do something about it. Everyone deserves to be protected from exposure to unsafe levels of cancer causing radioactive radon.

This should not be limited to a building. Every individual, every resident young and old deserves to breathe safe air. I'm sure you feel you deserve it, they do too. When you talk statistics, risk, cost or percentages of death, all I ask you is that you also think about me, my face, my story, my daughters, my husband, my life.

My story could be one of anyone you love. To say it's a matter of expense or inconvenience is an insult to those of us who will spend thousands and thousands of on health insurance premiums and medical care for the rest of our lives.

In December 2017, a surgeon removed two lobes of my right lung. That year we maxed our \$10,000 out of pocket on top of the nearly \$20,000 we already pay annually for premiums. My cancer came back in May 2020, and once again we face these same expenses when doctors removed the nodule to just try to keep the cancer from growing outside my lungs.

I have bloodwork every two months. Chest CT scans every three months. And a brain MRI once a year. I now take a targeted therapy chemo pill every day that is the best and currently the only

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option to help me with my chances of delaying my cancers return or progression. These pills cost \$14,000 per bottle per month. If I did not have health insurance to cover the majority of that expense, I would hate to think of the decisions my husband and I would be forced to make.

Thanks to research, many of us are now living longer with lung cancer. It is important to know we are not cured we will never be cured. Our best hope is scientific research and precision medicine to help us live longer. As our presence, our stories are becoming more and more visible, I promise you this will not be the first or only time you will have someone like me fight for the right to breathe safe air.

We don't get the opportunity for a cure. Preventing exposure to these cancer causing environmental elements is our best chance to help save lives and prevent a lung cancer diagnosis like mine. Thank you so much for your time today.

Mary Owens:

Thank you. Our next speaker is Darioush Ghahremani.

Darioush Ghahremani:

Good afternoon. My name is Darioush Ghahremani. I'm a PhD in Geology and Geochemistry with nearly four decades of research and exploration on the subject of radon and associated gases in the ground and indoor environments.

I'm the president of Radon Service Systems involved in testing diagnostics and mitigation of radon, and its exposure in [inaudible]. Currently, I'm serving on the Board of Directors of R and also on the several standards dealing with radon hazards and technologies, to test, mitigate and produce data for future use.

My research data in Ohio and in California suggests that indoor radon concentration is zone three, which is supposedly a safe zone, is higher than what is considered zone three. And unfortunately, it's been very, very much misleading on EPA zone map, although EPA is specifically mentioning that these maps should be used along with other data locally.

The localized high radon anomaly in zone three in many areas of Ohio, northern Ohio, as well as the southern and northern California, which is considered zone three suggests that radon hazards in zones two and three must be addressed more carefully to protect the public health from unnecessary cancer risk, by mitigating the problem through testing all ground floor, regardless of zoned designation by EPA.

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Therefore, I'm supporting 100% adoption of GSA's policy that requires radon measurement and mediation in full compliance with the NCRS standard by qualified professionals to ensure all building occupants are protected from the radioactive radon gas.

And hopefully, by using more professionals in the field, we can tackle this problem and update our radon national map for various states so people can use it more accurately. Thank you.

Mary Owens:

Thank you. Our next speaker is Amanda Reddy from the National Center for Healthy Housing.

Amanda Reddy:

Thank you. And thank you for the opportunity to discuss radon as a serious public health concern and the important role of testing and mitigation in preventing exposure. I'm Amanda Redd and I'm the Executive Director of the National Center for Healthy Housing, or NCHH, a national nonprofit organization dedicated to developing and promoting scientifically validated measures to protect residents from environmental hazards in their home environments.

I have a master's in Environmental Health from the London School of Hygiene and Tropical Medicine. And I lead a team of housing health and environmental professionals with expertise in biostatistics, epidemiology, environmental health, housing policy, industrial hygiene and more.

We have led over 100 multidisciplinary projects, worked with a broad array of federal, state and local agencies, universities, community groups and private research institutions. And have published and contributed to over 150 peer reviewed articles and reports on environmental health and housing issues.

NCHH develops valid and practical strategies to make homes safe from hazards including radon, to alert low income families and occupants about housing related health risks and to help residents protect their families from unhealthy housing conditions.

NCHH's radon research has resulted in advances in how to assess radon and how to cost effectively control it in homes. The scientific evidence about the impact of radon on lung cancer is clear and overwhelming.

As we have already heard today, radon increased risk for nonsmokers and increases risk for those who do smoke. For every million people exposed to four picocuries per liter of radon over a lifetime, approximately 62,000 will develop lung cancer if they already smoke, and approximately 7,000 will develop lung cancer

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even if they have never smoked. This is roughly equivalent to the risk for dying in a car crash.

And of course as radon levels double cancer risk also doubles. Treating these cancers will cost far more than testing and mitigating homes. NCHH participated in the Earth Study about what you will hear more soon from here Peter Ashley and Mike Kitto.

The team examined how many ground floor units should be tested using one of the nation's largest radon testing databases ever assembled. The study of cost benefit analysis, which builds on the work of others, notes that the cost of testing for radon is about \$50 per unit, per housing unit.

With medical treatment for lung cancer costs at least 68,000 to \$80,000 for each case, and lost earnings at an additional \$210,000, putting this all together we showed that any dwelling unit that is missed by less than 100% sampling, and is therefore not mitigated, has a cost of at least \$16,800. And this cost is not offset by the savings of sampling fewer units.

These estimates do not even include lost tax revenues or intangible costs and benefits such as property management, litigation, family burden and stress. This is just bad policy. We can pay for increased medical care or we can pay for the much smaller costs of testing and remediating homes. The choice is clear.

For the Americans who live in the 6% of U.S. homes that have a radon level at or above the EPA action level. This increased risk is both unnecessary and preventable. We know how to effectively test for radon and how to mitigate exposure.

I noted a moment ago that were nonsmokers a lifetime exposure to radon levels of four picocuries per liter was equivalent to the risk of dying in a car crash. We have effective measures for mitigating those risks too, among them speed limits, seatbelts, airbags and enforcement. And we don't hesitate to mandate their use and save lives.

Similarly, there is no reason to delay action to provide residents in multifamily housing the protections we already know how to provide from radon exposure. Single and multifamily units experience the same dose of radon exposure. The health risks are the same and appropriate access to protections should be too.

NCHH scientists have contributed recently to the published study, the Earth Study I mentioned a minute ago, that evaluated the

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feasibility and the benefits of alternative sampling plans for multifamily housing.

The study found that less than 100% testing of all ground floor units misses radon in far too many of the untested units. For building sizes of five to 20 ground contact units, the 2018 federal testing protocols that currently require our testing of 10% and 25% of ground contact units and each building failed to identify between 47% and 69%, and 32% and 46% [inaudible] depending upon building size.

Even 90% sampling, this is an estimated 4% of units with elevated radon levels, saving very little money and at an enormous cost to our healthcare system and individual families.

We feel that 100% sampling of ground contact units was necessary, feasible, cost effective and wise. There is now clear evidence, the availability of practical, feasible and effective solutions and the significant reduction in medical and other costs, both point to the obvious solution. FHFA should take swift action in proceeding with the Enterprises policy under the February 2021 Radon Directive.

Further delays only increase costs and put tenants, especially low income and minority tenants, at unnecessary risk. Thank you.

Mary Owens:

Thank you. Our final speaker for the Health and Safety session is Rachael Drazan from Cancer Survivors Against Radon.

Rachael Drazan:

Good afternoon. My name is Rachael Drazan-Malmberg. I am a former Collegiate and Olympic level athlete, a mom, a business professional and most importantly a survivor.

I was diagnosed at the age of 31 with stage four lung cancer having never smoked or been exposed to smoke in my life. At the age of 31, the first thing that went through our mind was shock, then we instantly turned to environmental factors.

Having grown up in what I believe to be a strong home environment, we were shocked to learn that radon induced lung cancer was a part of my diagnosis. We had our childhood home tested, and I lived in that home for 19 years. We were shocked to discover that the average level was 69 picocuries, that's 17 times higher than the EPA approved four picocuries. If you can consider the long term effects that that has caused to myself and my family, it's definitely clear why I have lung cancer.

My journey is not unique, however, and I know you heard Lindi talk earlier. I'm very blessed to have an amazing support system and the

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ability to overcome many barriers because of my support system. Many are not as fortunate as Lindi and I are. In our journey -- and that is why in our journey, they're here today.

I am still working full time, taking care of my daughter, advocating and working to change the world. When being asked to speak today, an interesting thought came to mind. How much does it cost me to survive and be a cancer survivor annually? In pulling together some numbers, the annual cost to me to survive is \$154,000. I know Lindi laid out some of these numbers for you. but every treatment is different. And at stage four for the last four years, I've increased my burden financially to my family beyond belief.

That's the financial impact that doesn't include the intangibles, like the mental and emotional burden that this has taken on, not only my family, but those who are in my support system. My eight year old daughter lives in fear daily. If I don't get up and go for a walk every morning, she instantly goes to, mommy's cancer is spreading. Or if I'm tired one day, she instantly says, your cancer meds aren't working. She's constantly frantic.

We will be walking through a public area and she will blurt out to strangers that we've never met, mommy has cancer because of radon. This is the impact that radon has had on our lives.

Although I've told you about my impact, today is not about me, or those of us that have had the opportunity to talk in front of you today. It's about those that are not here and that we have a duty to serve and protect.

The underserved populations and the Americans who live in multifamily housing units, those are who are supposed to radon, a deadly radioactive gas on a daily basis, and they don't even know it. We have a duty and a responsibility to protect those individuals, along with educating them about the environmental risk factors that they're currently unaware of.

There are 45 million rental units in the United States. Of those, 20 million are located in properties with five or more units. It is estimated that 1.5 million units are located on properties financed by the GSEs. These families deserve to be protected. And it is our responsibility to ensure we put policies in place to do so.

By putting stronger policies in place, we have an opportunity to impact 15 million Americans over the next ten years. This is 15 million lives that we can potentially save that don't have to go through what I do on a daily basis. Everyone deserves to be

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protected from exposure to unsafe levels of cancer causing radioactive gas, regardless of their geographic or economic status.

In ending, I'm just one person, but collectively, we are powerful, and we have the ability to make a difference. As I leave you today, I challenge you to be bold, to think more critically, and to assure that we put policies in place that protect those that we have a duty to serve. Thank you so much for your time.

Mary OwensBaehr:

Thank you. Our next section is Assessing Available Data on Radon Exposure Risk to Multifamily Tenants. And our next speaker is Michelle Monte from the U.S. Center for Disease Control.

Michelle Monti:

Okay, can I see the presentation. Okay. Good afternoon. My name is Michelle Monti, and I am with the National Center for Environmental Health at CDC. I'm in the Environmental Health Tracking Section. I have 23 years of experience in public health, 11 in infectious diseases and environmental epidemiology, 12 in environmental public health and health informatics, and ten years working on radon. I also have 19 years of experience in environmental protections and environmental resource management.

And so today I will be talking to you about what we have in terms of radon data on CDC's National Environmental Public Health Tracking Network. We serve as the national repository for radon data. Okay, next slide, please.

So what's important here is the link at the bottom, <https://www.cdc.gov>. And I'm putting that there because there's no way in the amount of time that I have that I can go through everything that we have in terms of radon on our site. And so please, at your leisure, if this is made available to you, which I think it is, you know, go to that link, and please look on our Data Explorer. And you'll find radon data along with a lot of other data. And as I remind people, we are not a radon program, we are an environmental health surveillance system. Okay, next slide, please.

So we work with -- we've been working with our grant recipient states since about 2011. And currently we have radon data from these states at these various numbers of years. We recently had a data call, and we'll have additional radon data display on the network by August or September.

So we have 14 states listed here, and various numbers of years. So when we -- I'm getting some interference here. Can somebody quiet their mic? Thank you.

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So when you look at the radon data from states on the Tracking Network, you'll see that it is displayed by year, as opposed to, next slide please. Radon data from the labs. And we've been working with the National Radon Testing Labs in cooperation with AARST and CRCPD. These seven labs or -- have either sent us radon data or are in the process of sending us radon data. Because of their participation in this, we have radon data for 46 states for 14 years. And we are in the process right now of updating that data set. Next slide, please.

Okay, so this is just one of the maps that we can generate from the tracking network. And there was a lot of interest in having us show the mean radon level in tested buildings. This is using lab data, and it's small, but if you have this on your computer, you would be able to blow this up a little bit and see that this is the mean pre-mitigation radon level. We've tested buildings from the radon tests from labs data set.

And as you can see here, there's a lot of red on this map. And the red is at or above four, which is the EPA's action level for mitigation. And then the orange is two to less than four. The pale yellow is less than two. And you'll notice on this map the hash marks. And the hash marks mean that we have less than ten tests in those counties. These data are displayed at a county level.

And what we want people to know from the hash marks is that we have less confidence in the data from a county that has less than ten tests. The gray says that we have no data. And we believe that we can reduce the hash marks and the gray by getting additional labs to submit data. Next slide, please.

This is just another screenshot. This is the median pre-mitigation radon level. It shows a little bit better than the mean in that if there's less red here, that it's just another measurement, another statistical analysis of the pre-mitigation radon tests that we have.

The data that I'm showing on these maps is at the county level. And what we're working towards is if we can get enough data, we want to show this data at the census tract level. And we believe that having more detailed data at a smaller geography will help us identify those areas that we need to target for further testing and also to encourage mitigation. Next slide, please.

So the maximum pre-mitigation radon level in tested buildings and when you look at this, we're like wow where did all the data go. This is from the state's dataset, okay. And so even though we had

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data from 14 or 18 states, it looks rather sparse when you look at it on the map compared to the lab data. And so...

Mary OwensBaehr:

Also Michelle, you're at time, if you could just conclude your thoughts?

Michelle Monti:

Okay. All right. Next slide, please. A comparison of the lab and the state radon data, it tells you why we still collect both. This state data set has 577 records, while the lab data for the state has 334. I think that might be my last slide. Okay. Thank you very much.

Mary OwensBaehr:

Our next speaker is Michael Fratantoni from the Mortgage Bankers Association. Michael, if you could unmute.

Michael Fratantoni:

Yep, thank you. Good afternoon everybody. I'm Mike Fratantoni, I'm Chief Economist at the MBA and lead our research efforts. I'm speaking today to represent MBA's multifamily lenders. I appreciate that FHFA is holding this listening session on such an important topic.

I'm going to focus on the data and statistical analysis from the Earth Study, which has been mentioned a couple of times already. It was commissioned by HUD and as we understand what's used as the basis for HUD's decision to move to 100% ground floor testing. FHFA is now considering having the GSEs match this standard.

Given my serious concerns regarding the validity of the Earth Study, I would caution against reliance on its findings. To summarize my conclusions from reviewing the Earth Study. First, I don't have confidence that the data regarding radon levels are representative. Second, I don't believe the study is really asking the right question with respect to the proper use of a screening test. And third, I don't think it accounts for current industry processes and practices with respect to what happens after a positive finding.

Relying upon this study without sound data, without properly accounting for current industry practices, I don't see how HUD or FHFA could justify a 100% sampling requirement. Particularly when lower cost, risk based approaches could be used to achieve a similar result with respect to the goal of a policy that we all agree with, to protect residents from radon exposure.

So let me go through some of my specific concerns regarding the Earth Study. First, their sample of 8,000 buildings is not random and they're not representative. On page four of the study, the authors note that participation and contributions were entirely voluntary. On page five of the study, under the heading of Study Limitations and Areas of Potential Bias, the authors are completely honest,

Commented [AARST1]: There is no lower cost risk-based approach that could accomplish protecting residents from radon exposure.

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saying the sample is not representative. Preference was given to buildings with elevated radon. And they deliberately under sampled lower risk regions of the country.

However, they conclude that the study enables a sound examination of testing protocols. I disagree. Without a valid statistical sample, these results simply cannot be relied upon.

My second concern, I don't think the study really asked the right questions. The Earth Study's central question is how many units need to be tested to ensure, with 95% confidence, that they find the unit with radon above four. assuming that every building has one unit with radon above four. This is on page 12 of the study.

But it's not the case that every building has one unit with radon above four. The previous speaker highlighted that. They are working with a non representative sample that ensures a higher percentage of buildings with at least one positive unit.

In my opinion, the right question to ask is how to focus scarce testing resources on those properties that are higher risk. Tables five through seven and nine in the Earth Study actually provide the variables to build a risk based testing regime. Look at whether a property has inside or outside entry on the ground floor. Look at the location of measurement, look at the EPA zone, look at the climate zone.

And I would particularly point to data from this study that shows that properties in hot and humid climates had 44% prevalence of readings above four, while those in cold and dry climates had 0%. Findings like these if they were based on a representative sample could clearly be used to guide a risk based approach.

My final point is that the Earth Study doesn't reflect industry practices in place today regarding what happens after a positive screening test. Even after the change for HUD multifamily properties, the 25% sampling approach is still in place for senior housing loans. For HUD senior housing loans, applicants test 25% of ground level units. If any of the sampled units test above four they have two options, either mitigation for all ground mobile units, or testing 100% of ground level units.

Freddie Mac's guide is similar, sample at 10%, if the screening test is positive, confirm it. And then if that's positive abatement measures must be put in place.

At the end of the day, the goal is not about maximizing the number of tests or developing a database. It's protect -- it's about protecting

Commented [AARST2]: Stipulated: the sample is not representative of all US multifamily buildings. It is the largest data set of US multifamily buildings where all ground contact units were tested. Data from buildings where a small percentage w/ GC units tested would not have helped answer the question about the probability of missing a unit.

Commented [AARST3]: Preference was given to buildings with radon to ensure the sample size for such buildings had sufficient statistical power for valid results. "Forty-two percent of buildings have at least one unit with radon ≥ 4 pCi/L."

Commented [AARST4]: Few properties in zone three were eligible because most lacked 100% testing. The percentage in the sample would have been higher if more lenders and property owners tested 100%.

Commented [AARST5]: This commentary completely mischaracterized the focus of the study, which was to identify the testing protocol percentage that would be most protective of occupant health.

Commented [AARST6]: The sample was valid for the HUD-approved study criteria. The sample was not intended to be random.

Commented [AARST7]: The central question was percentage testing. The study did not assume every building in the US has a unit ≥ 4 ; the key analysis was limited to the 42% of buildings w/a unit ≥ 4

Commented [AARST8]: 42% w/unit ≥ 4 ; 58% w/o a unit ≥ 4

Commented [AARST9]: Factors such as unit location, building climate zone, and room location were considered.

Commented [AARST10]: Units in hot and dry climate zones had 0%; the percentage in eight other climate zones ranged from 5-44%. EPA Zone 3 states FL and NC and Zone 2 state KY had higher % of units with ≥ 4 pCi/L than other states.

Commented [AARST11]: 65% of all properly credentialed measurement professionals are required by state law and/or private certification to test 100%.

Commented [AARST12]: Because 25% testing has a 38% chance of missing a unit, the senior housing loan program's policy is being reviewed and will be harmonized with other FHA policy.

Commented [AARST13]: Incorrect: there are no requirements besides fixing a unit tested within the 10%. This approach ignores all other residents living in a building that has been confirmed to have a radon problem.

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the residence of these properties. In my opinion, current industry practices in the event of a positive screening test do that effectively.

Commented [AARST14]: Current industry practices require proper characterization of all buildings for radon potential, as specified in the EPA-recommended consensus standards.

So where do we go from here? Well we disagree with the findings of the Earth Study. HUD's decision to move forward with 100% testing does present an opportunity. We recommend leveraging the data that's being collected today under the HUD 100% sampling approach to further inform whether and how the sampling rate for GSE loans might need to be adjusted going forward.

The HUD data should be made public to the fullest extent possible, to allow radon testing professionals, public health agencies and advocates and industry participants to clearly understand the baseline levels of radon risk.

There is some risks. If a sample of properties that receive HUD loans may be fundamentally different from those that receive GSE loans. However, I would expect the data from HUD's approach to be much more robust than from the Earth Study.

Commented [AARST15]: Some data prior to March 2021 will not have 100% ground contact test results - it will be less robust than the EARTH study. If only the 100% HUD results are used, the data should be quite similar to the EARTH Study data.

This is an important issue. We appreciate FHFA holding this listening session. We believe that such a critical issue should follow an open and transparent process so we can design an enhanced testing process that is both risk based and built on sound science. Thank you.

Commented [AARST16]: The methods specified in the EPA-recommended consensus standards are both risk-based and based on decades of research.

Mary OwensBaehr:

Thank you. Our next speaker is Jessica Lynch from the National Association of Homebuilders. Unmute and you may begin.

Jessica Lynch:

Thank you. Thank you for the opportunity to speak today and for your interest in hearing from stakeholders on this important issue. I'm Jessica Lynch, Vice President of Housing Finance for the National Association of Homebuilders.

NHB multifamily members build and manage market rate affordable and federally assisted rental housing. Fannie Mae and Freddie Mac financing is essential to increase the supply of apartment -- affordable apartments for very low to moderate income families. The Enterprises multifamily programs provide attractive options for our members to mortgage their new apartments and to recapitalize, rehabilitate and preserve affordability in existing developments.

NHB multifamily builders, land developers and apartment owner members face substantial challenges to produce and preserve apartments that are affordable to low and moderate income families, so access to affordable mortgage products is critical.

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NHB is very engaged in development and implementation of building codes, standards and regulations for single family and multifamily housing. NHB represents the housing industry on a number of consensus committees developing key industry standards. These policies affect the day to day operations of our members, housing affordability and the safety of residents.

NHB does not believe that all regulation is bad. Regulation should be based on sound science, developed with input from stakeholders in the regulated industries and provide state and local jurisdictions with authority to adapt the standard or code to account for local conditions or provide for more cost effective and affordable provisions for local homebuyers.

However, we have found that even the most well intentioned policies to set national environmental energy building or safety standards can result in new unintended negative consequences if those policies take a one size fits all approach.

We are particularly concerned about the new radon standards FHFA is considering adding as requirements for borrowers applying for the Enterprises multifamily mortgage products. To be clear NHB opposes a mandatory use of the EPA's voluntary consensus standards for radon testing and mitigation as a requirement for securing a Fannie Mae or Freddie Mac multifamily mortgage.

These standards were not developed in consultation with key multifamily industry stakeholders, and were not proposed as former regulations by FHFA. Also, the International Code Council Code Development Committees, which are made up of code enforcement, and building experts, overwhelmingly rejected and radon standard during their recent code development cycle. Several members of the ICC committees expressed concern about the blanket application to all geographic areas, not just moderate and high potential radon zones. And others raised concerns about unenforceable language included in the standard.

Therefore, NHB believes it is premature for FHFA to require this EPA voluntary radon standard for Enterprise mortgages at this time. Much more due diligence is needed to ensure the health and safety of residents is done effectively. More research is necessary to determine the percentage of units that should be tested and how often testing should occur, differences based on property location or asset class and appropriate documentation requirements.

This research must be peer reviewed, thoroughly vetted and unbiased. Key industries affected by this regulation, multifamily

Commented [AARST17]: The Consortium is an ANSI-accredited standards developer, meeting ANSI's requirements for due process. NAHB and code officials have both participated on the Consortium's committees, along with EPA, states, and HUD.

Commented [AARST18]: Editing is underway to address this issue in the new construction standards. However, it is clear what's required and what's optional, as is common with other standards referenced in code. Upon request, the Consortium is willing to demonstrate this on a video conference.

Commented [AARST19]: The EARTH study was peer-reviewed, and the journal article was published by the Journal of Public Health Management and Practice. https://journals.lww.com/jphmp/Abstract/9000/Evaluating_and_Assessing_Radon_Testing_in.99157.aspx

Commented [AARST20]: Disclosed limitations of a dataset are not biases; they acknowledge what data were available.

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builders, property owners, lenders and property managers, must be at the table when these radon policies are developed. It is also essential that FHFA undergo a formal notice and comment period before adopting any such policies.

NHB supports a response to radon exposure that is tailored to priority areas as designated by the EPA, as having a high potential for radon levels exceeding the federal action levels. NHB also supports radon mitigation techniques, if they are well researched and justified in terms of health risks in the home environment.

In the Single Family 2021 International Residential Code, radon testing can be performed by the builder, a registered design professional or an approved third party. If FHFA proposes new rate on requirements, similar options should be available for multifamily borrowers and lenders. NHB appreciates FHFA's efforts to ensure that properties that benefit from Fannie and Freddie financing should be safe and healthy environments for residents. We look forward to further follow up on this important issue. Thank you.

Mary OwensBaehr:

Thank you. Our next speaker is David Grammer from RAdata. David, can you please unmute? You may begin.

David Grammer:

Great. Hi, its David Grammer. I am the president of RAdata, indoor air and water quality services in Flanders, New Jersey. We have been operating in the radon industry since 1984, and have the largest operation in the nation. I am the Mitigation Chair for the Executive Standards Committee and I'm the Mitigation Chair for all of the multifamily and single family mitigation standard committees for AARST. I have served for ASTM for E21 Radon Mitigation Standards Product on the EEO-6 Committee.

I'd like to share with the group some of our real world experiences of testing and treating radon, in multifamily structures. We've put a lot of work and effort into the document, we've asked all interested parties to take a seat at the table and to contribute to this work. We've had the Homebuilders Association, we've had scientists, we've had business owners, we've had health officials, we've had the American Lung Association. And we've been working on these guidelines for the past 35 years.

I was in business and operating in 1988 when Ronald Reagan signed the Radon Abatement Act of 1988 brought forward by Senator Lautenberg of New Jersey. And in that guidance, it does dictate that the banks guaranteed – the loans guaranteed by organizations like HUD and FHFA, were to exercise due diligence in assuring that the

Commented [AARST21]: NAHB should also support the recommendation made by EPA on the referenced zone map – all buildings should be tested, regardless of location.

Commented [AARST22]: Third party professional testing by a properly credentialed provider is essential for properties that will not be owner-occupied. Unqualified persons, including builders and registered design professionals, are not permitted to conduct radon testing in 17 regulated states, regardless of what may be in the ICC code.

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communities that they're funding and supplying mortgages for are protected.

In the case of my first study, which is not really a study it was a real life project. There was a complex, an apartment complex in Albany, in the upstate New York area. The development was tested by an environmental testing firm. And as Mr. Fratantoni would infer, the ability to test completely was dictated by the bank's request for inexpensive activity, just to check off a box.

They tested six units in this 150 unit apartment complex and found that they all were under four picocuries. So therefore the mortgage moved forward and everybody was content and it seemed all good. Unfortunately, they didn't realize that there was a geological formation that separated the northern half of the development and the southern half the development into two geological types. And they tested in the lower area where it was less radiation in the soil.

The northern half of the buildings had a resident that had been living there for over 20 years, and he died of lung cancer the year after the mortgage went through. And his family decided that since he was a nonsmoker, and nobody in the unit was a smoker, that they should test for radon.

They found that the radon levels with his home were 96 picocuries. So it's not a matter of finding a 3.9 and a 4.1 to facilitate a mortgage and the ease the ability to check off boxes on a mortgage application, we're talking about true health risks associated to occupants of these buildings that are being financed.

The builder was very, or the apartment owner was very generous in fixing the one unit that had the problem, but he refused to go further and test the rest of the building, leaving unsuspecting people on their own to either test or to just ignore the fact that they couldn't see it, smell it or taste it.

That's a matter of economics. They were trying to control cost. There seems to be a current course of action, however, the property owner of this development refused to do any more than he had absolutely had to.

We've measured and mitigated housing for over three decades. I was the Program Manager for the Western Regional Radon Training Center at the University of Colorado, and an adjunct instructor there and at Rutgers, teaching radon science and radon testing and radon mitigation.

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This AARST Standard is an outstanding work. It's had years of development. The Radon Abatement Act of 1988 was set aside, the bank's requirements was set aside by statements and a position that our industry didn't have the ability to support the type of activity that would be required to support that type of a law.

Well 35 years later, we have built an industry that's cohesive and capable of applying its services at a needed basis. We have the schools and the education facilities prepared to teach these engineering firms that do bank inspections, on how to do their own radon testing.

It's then states like New Jersey that have made it impossible for builders to test their own properties, because their financial motivation to liquidate the property and to move the mortgage to a private person's ownership is their primary goal. Not that all builders are bad and not that the national Home Builders Association isn't an association that should be recognized and admired for their work.

As we develop techniques to make houses and buildings more airtight, what we're doing is we're reducing the risk of infiltration of fresh air, but we're not stopping to consider the fact that there's a direct infiltration through the slab into the buildings from the soil. So whether it be vapors like benzene or PCP or TCE or whether it be radon. these extraction systems for new construction, which I'm sorry I'm getting off track because that's not the purpose of this meeting. Is important.

I have another development that...

Mary OwensBaehr:

David, you're at time, so if you could please wrap up your thoughts.

David Grammer:

I share can. There's a class action suit that occurred from another development that was new construction townhouses. Radon systems were installed. Ten years later there was a death of lung cancer. And the attorney decided that it was a class action case. It cost the builder, the association and RAdata, \$1 million each to settle the case.

There are cases that we have that can demonstrate that testing as the AARST Standards dictate, is affordable. And more importantly, it's a health savings risk. And I appreciate all of our group that has worked on these standards. And I applaud them and take my hat off for the efforts that we've offered to the Fannie Mae and Freddie Mac. Thank you.

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Mary Owens Baehr:

Thank you. Our next speaker is Owen Reese from Alpha Energy Lab. Please unmute, and you may begin.

Owen Reese:

Hello, my name is Owen Reese, and I'm the Vice President at Alpha Energy Laboratories, a radon testing device manufacturer and analytical laboratories located in the Dallas, Texas area.

I've worked in the radon industry for nine years and serve on the National Radon Proficiency Programs Certification Council, which provides guidance on the certification standards of radon testing, mitigation and measurement devices nationwide.

As a national laboratory we have analyzed millions of test kits, excuse me, test kits across the country. We have consistently observed the occurrence of radon in modern structures to be underestimated by the EPA's [inaudible] radon zones.

The EPAs map were developed in 1993, using primarily geological change indicators of the potential for radon. Laboratory data gathered since 1993 has indicated that while the EPAs map has correctly identified broad patterns, it underestimates the prevalence of high levels of radon gas.

While the EPA states this map should not be used to determine the need for testing, it has been used for such purposes in the past. Our laboratory data shows the importance of testing all dwellings for radon. Next slide.

Here you can see the EPAs map for EPA Region Six, which is where our laboratory is located. This region is often perceived as having a low occurrence for radon. However, our laboratory data clearly shows otherwise. Next slide.

Here you can see a comparable map generated using Alpha Energy Laboratory's data with over 50,000 data points included. The gray counties indicate counties with insufficient data that could not be met. As you see, the general trends shown in the EPA map hold true. However, there are substantially more zone one and zone two areas of high risk than shown in the EPAs map. Next slide.

Finally, here you can view the differences between these two maps. Red indicates areas where laboratory data shows higher levels of radon than the EPAs map predicted. Blue indicates areas where radon levels were lower. And gray are equivalent areas or areas lacking sufficient data.

Outside of region six, California and Florida are often considered states where radon is not commonly found. However, our data

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shows that 45,000 tests conducted in California, 13.8% of those were above the EPA's action level. California contains only two zone one counties, Ventura and Santa Barbara, 93% of elevated radon levels found in California were found outside of these two counties. Only 7% of hazardous radon levels were found inside the counties that the EPA identified as high risk.

With 14.4 million dwelling units and California this indicates the potential for dangerous radon levels in nearly two million homes. Florida shows an even higher occurrence of radon, of the 26,000 tests 15.7% were elevated. With 9.6 million dwelling units in Florida, this indicates the potential for dangerous levels of radon in 1.5 million dwellings.

In summation, this data shows the need for widespread radon testing and demonstrates the potential hazards in using the EPA's radon map to determine if any individual dwellings should be tested for radon. The EPA itself states this is an improper use of this map. I quote, "The map of radon zones should not be used to determine if individual homes need to be tested. No matter where you live, test for radon, it's easy and inexpensive."

Simply put, it's not possible to predict that any individual dwelling will have high levels of radon gas. The only way to know is to test. Testing is inexpensive and quick industry capacity is large. Our laboratory is equipped to manufacture and analyze nearly a million additional test annually. And we are only one lab out of many quality, certified and reliable radon testing laboratories in this country.

The only way to save lives is to mitigate and the only way to know if radon is present is to test. I strongly support the adoption of the NBR standards for radon testing and mitigation and encourage the FHFA to act with haste in these active life saving measures. Thank you for allowing me to speak.

Mary OwensBaehr:

Thank you. Our next speaker is David Borsos from National Multifamily Housing Council. David, if you can unmute, you may begin.

David Borsos:

Thank you. Good afternoon. I'm Dave Borsos, from the National Multifamily Housing Council. And for over 25 years, the National Multifamily Housing Council and the National Apartment Association have partnered to provide a single voice for America's apartment industry.

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We'd like to thank FHFA for holding this listening session as part of their decision process for determining the radon testing protocol for the Enterprises. This important step was suggested in an industry letter to FHFA prior to implementation of a new testing protocol for the industry.

First and foremost, the safety of our residents in our apartments is of paramount importance, one in which industry takes the utmost care and consideration to achieve. In this particular section, FHFA is asked for assessing available data on radon exposure risk to multifamily tenants. And in two of those, the two questions they pose are what data should they collect, understanding the efficacy costs and industry capacity. And then also what resources or maps are available to be identified -- to help identify radon risk in geographic areas.

I'd like to focus on two aspects of radon testing and how they influence the decision on how FHFA should proceed. Both of these apply to the questions asked, process and science. First I'll address process that they asked, efficacy and cost to industry capacity.

Shifting to 100% testing protocol across the entire United States must come with an understanding of the impact of the processes of financing multifamily properties that include affordable, rural and small mom and pop buildings.

FHFA has received an analysis and a report that details the number of certified multifamily radon testers. And it would be hard to dispute that the current number could not support the level of testing proposed. Asking where to find this information on capacity starts there, but the Enterprises can engage in discussions directly with those firms that actually do the testing and are used today by the lenders to further analyze capacity.

Those same lenders can provide further detail on the additional costs of the proposal. It is simply not the addition of another canister. No matter the decision, we strongly urge FHFA to develop a detailed timeline and ramp up of capacity to minimize disruption in financing of multifamily properties.

The adoption of a protocol by HUD earlier this year, also provides a good testbed to further understand the impact of the protocol. We urge FHFA to look no further than the experience than HUD to understand impact of a program that is only 1/10 the size of the Enterprises. So its impact to the overall industry comes at a cost of time and process.

Commented [AARST23]: Residents living in such locations and buildings should be afforded the same protections as those living in other places and buildings.

Commented [AARST24]: AARST acknowledges the need to build up and monitor properly credentialed capacity for full implementation of the MAMF standard once the policy is enacted.

Commented [AARST25]: Some environmental testing firms used by lenders, which represent a small segment of national radon measurement capacity, have been using unqualified persons but are now seeking credentials for their personnel. AARST, NRPP, and NRPP-approved training providers support this progress. AARST stands ready to assist them in locating additional qualified personnel. AARST encourages the Enterprises to consult with state regulators and the radon industry.

Commented [AARST26]: According to the commenter representing HUD, radon testing has not had an impact on time and process.

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Last, efficacy of the process should be informed by both the process and the science behind it. There's no disputing the cancer causes -- the cancer causing action of radon. You've heard it in a number of the presentations this afternoon already. It's well documented and well researched. We're not disputing any of that.

Advocacy should address how best to balance the reduction of that risk with a process that identifies and mitigates the risks. The protocols we have for testing and mitigation of other health concerns such as lead, have gone through a collaborative industry approach weighing all the costs and benefits. The decision on radon testing and it's mitigation should be no different, and the recommendation of how to approach it should not rest with a single entity.

The last question to be answered in this section is what data or maps exists to assess the risk of radon. You heard from the prior presenter that there's been no updates to the radon map that the EPA issued in 1993. In fact, they state that there's limitations on the use of that map, and they've not attempted to update the map since it was first issued.

So due to limitation, we're left with the EPA map as a reference point to start with. But to bolster that information, we suggest two approaches for the Enterprise to further analyze the data. I think in reference to a lot of the scientific presenters, there has been a strong reference towards testing in single family homes. They may not have stated that, but I think the testing in multifamily is not as broad.

The Enterprises should evaluate, however, their own data for single family homes across the United States in those three EPA regions to get a gauge on the prevalence of radon and the results they have achieved -- gotten from those tests.

They should also monitor the results from HUDs protocol to determine the prevalence of radon. Both could you use the supplemental EPA map to determine the need for testing in certain regions, as well as working with other industry participants who may have this type of data.

As the Enterprises look towards data on the valuation of specific multifamily radon issues, they'll find it has been somewhat limited in the literature. One study, referenced earlier in the presentation, was sponsored by HUD called the Earth Study, which attempted to examination multifamily radon issue. The study drew conclusions supporting testing protocols suggested by ARS enhancing.

Commented [AARST27]: EPA and HUD rules on lead went through the federal regulatory process that applied scientific evidence and included cost benefit analysis. The current approach being taken by FHFA is similar -- EPA's cost-benefit analysis was provided.

Commented [AARST28]: Except the EARTH Study, which analyzed only multifamily data.

Commented [AARST29]: Scientific rigor should be applied.

Commented [AARST30]: Selectively referencing portions of the EPA zone map while ignoring EPA's directive to test all buildings, regardless of location, is not sound policy.

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However, this study has not undergone a scientific peer review. So we asked Exponent, a leading international environmental and engineering firm, to review the paper. Briefly their concerns about how the study was performed and if the recommendations made to employ testing across the entire United States were supported by the study. We will present our written findings to FHFA as a follow up to this listening session.

Commented [AARST31]: EARTH study's peer-review was led by the Journal of Public Health Management and Practice.

And finally, if FHFA chooses to implement the testing protocols in a national scale, they should ask the Enterprises to evaluate the results after a two year period is determine the efficacy of a broad reaching testing protocol, and whether there should be any adjustments or modifications to the testing protocol. And with that, I conclude my remarks and again thank FHFA for holding this listening session.

Commented [AARST32]: Hopefully this review addresses the actual question answered by the study – what portion of the ground contact areas of a building need to be tested in order to achieve 95% confidence, not whether a building should be tested. We would be interested in receiving a copy.

Mary OwensBaehr:

Thank you. Our next speaker is Jane Malone from the American Association of Radon Scientists and Technologists. You can unmute, and you may begin.

Jane Malone:

Good afternoon. I'm Jane Malone, National Policy Director for the American Association of Radon Scientists and Technologists. Sorry. Thank you again to FHFA, join others and thank you for your continued consideration of this serious subject. Next slide.

I'm going to offer a few more points on data sources focusing on the evolving nature of what we know about radon risk potential in the U.S. When you look at individual states and counties, we see discrepancies in local places, which underscores the importance of not relying on maps for testing decisions. Next slide.

So can you go back one, sorry. Okay. I guess the slide disappeared. I'll talk about Illinois next. Go ahead. Sorry. Okay, I was going to put up a Colorado map, because in Colorado we found that, while it was there are a few counties are not considered high risk there by the EPA survey, all the remaining counties 12 counties that were considered moderate risk, became considered high risk as a result of local Colorado data collection.

And then in this slide that you see on screen for Illinois, the Illinois Emergency Management Agency 2012 test data, basically reclassified 17 moderate risk counties. The left hand map is the EPA map and the right hand is the IEMA data. And that IEMA data reclassified 17 moderate risk counties as high risk, two reclassified from high down to moderate, two down from moderate to low, with insufficient data for eight counties. So this just shows you the kind of variability we have out there generally speaking, when more test

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results are in, higher radon is found. But that's not always the case. So we want to be clear about that. Next slide.

This slide relates to one of the studies that Mike Kitto will soon describe comparing the 1993 results with lab data. Most Michigan counties previously considered zone three are moderate risk. Most Missouri counties previously considered zone two are high risk. So there's major transition in two different states.

The next slide is simply the California map. You've already heard mention of California. This is the EPA zone map for California. The lower left side of that you can see only Santa Barbara and Ventura counties have been considered zone one from the EPA survey. The arrow on this map points to El Dorado County, which is a zone two County. Next slide.

And that's where Lake Tahoe is. See that blue water there, that's Lake Tahoe. The darkest red areas are at very high risk potential and the medium red areas are high potential. Credit to Ron Churchill, the state geologist for California for the information on this county map and the next one.

Here's the Cal --and next slide, great. Here's the California map again, and here I'm pointing to Orange County, which is a zone one county, and that's all the way down the lower left also. And the next slide.

In Orange County, the survey real results found radon ranging from one half picocuries to 25.6. They estimate -- the state estimates that, you know, fully 106,000 residents are at risk of radon exposure because of high radon levels just in Orange County. And next slide.

Here's the map view of Orange County showing test results above four depicted by the yellow dots, which may be hard to see on your screen.

Next slide is the EPA map which is under much discussion. And you can see that there's this bright pinkish red shading, which I think in the original was actually a red. And those are the highest risks. Next slide.

And here's an overview of the EPA survey where that data came from to contribute to that map. Because I'm not sure if people have seen this information. Basically, there were test results, radon test results from just under 5,700 homes. And that information combined with four other factors was considered predictive to predict radon levels for 3,000 plus counties. I mean they went

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through extensive reviews and the view at the time was that that was sufficient.

And so next slide, what I've talked about and what you can see here in the comparison between the EPA map and the CDC map is again, you know, you're just seeing variability. It's not static, and it's not a matter of just ground changing. It's a matter of the test information where test information informs us all the more. Next slide.

No, I'm sorry, can you go back to the previous slide. I'm sorry, I missed one of my points. Note other differences between these two datasets there are on these differences. The EPA survey here check ground levels. The CDC map is point in time were short term tests. So numerous counties are in the different colored groups across the maps. The areas that are gray, white or have hash marks, as Michelle said, that means that the data are not completely available this time. Next slide now, thank you.

So here's the breakout that I got when I downloaded the CDC data. You can download it in ten year bands, if you go to the website that Michelle showed you in her slides. So between 2008 and 2017, there were two million tests that are entered into this CDC data set. And 36% of those two million tests equal or exceed the EPA action level for picocuries. The prior ten year periods, when I looked at those, they showed similar results.

So you're looking at a different makeup from where we were with the EPA. And the EPA survey found, you know, much lower percentage of the before, and also a lower percentage between two and four. It's just what's happening. We're getting in more data. It's not -- there's not, you know, convenient truths here. It's just the fact that when more data come in, you learn more.

Mary OwensBaehr:

And Jane, sorry, you're at time, if you could wrap up your thoughts, please.

Jane Malone:

Okay, just two points. First of all, looking forward to partnership on improving data collection to the benefit of all. But retrospectively, the test data for the thousands of units that were tested under the Enterprises current policies couldn't be mined from the past loan records.

And finally, the current standards would be a prudent step forward. And it's not that the Enterprises don't have policies or extension of credit. You do. They already reflect the will to apply with -- to comply with applicable protocols, methods or laws and utilize

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competent qualified personnel. Transition to the current consensus standard is the next step. Thank you.

Mary OwensBaehr:

Thank you. Our next speaker. Speaker is Michael Berman, M&T Realty Capital Corporation.

Michael Berman:

Good afternoon and thank you for allowing me to speak today about this important topic, radon testing and mitigation standards and protocols. My name is Michael Berman, I'm the president and CEO of M&T Realty capital Corp, a wholly owned subsidiary of M&T Bank. We're an active lender to the multifamily industry to Fannie Mae, Freddie Mac, as well as HUD. And I currently serve on the Fannie Mae U.S. Advisory Council.

As some of you may be aware, in addition to my work in the multifamily lending arena for decades, I've been active in the housing policy arena for many years as former chairman of the Mortgage Bankers Association, 2010-2011, as a senior adviser on Housing Finance to HUD Secretary Shaun Donovan, 2012 to 2014. And as a senior fellow at the Harvard Joint Center for Housing Studies from 2014 until I joined M&T in 2019.

I speak today in my individual capacity as one who has been a participant in the affordable housing and workforce housing industry for over 30 years. I'm grateful for the efforts and careful process of FHFA Acting Director Sandra Thompson who I'm honored to have worked with when I was at HUD. And this listening session today on radon testing and mitigation reflects the thoughtful process which characterizes all of my experiences working with Acting Director Thompson, as well as Associate Director Siobhan Kelly, dating back to my work with them and their FHA team in 2013, 2014 on many issues facing affordable housing finance. Including the GSEs multifamily housing programs.

I have just three brief points that I'd like to make this afternoon. First, I support radon testing and mitigation protocols for the GSEs, which protect tenants who live in our housing that we helped create and finance. Health and safety are critically important priorities for us.

I have personal experience, as do many of us who have been on this planet for over a half century. I have close friends and relatives who suffered and died from cancer as a result of environmental preventable causes. I will not forget the suffering I've seen and the grief of the lives lost people, close to me who have suffered and died too young.

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At the same time, as policymakers and practitioners who make affordable and workforce housing possible through our financing programs, we're obligated to take a risk based science based approach to the protocols of radon testing and mitigation. No one here would suggest that we need to change the speed limit on all highways to 20 miles per hour just because we know that that would save thousands of lives every year. In the case of radon testing and mitigation, we must also be careful not to overreach beyond the science based and risk based analysis.

Second, we should learn from the HUD approach on this issue. I regret that I was not involved with my brothers and sisters at HUD, hardworking, dedicated public servants with whom I have great respect. I regret that I was not still working at HUD to help advise them when they adopted the current radon testing and mitigation protocols for map lending programs last December.

In my humble opinion, this protocol, the same as the one being considered today, was adopted in error. It's neither based on sound scientific analysis, nor sound risk based approach.

The good news for us and for FHFA is that we have the opportunity to capture the data from the HUD experience, and to see in real time how their protocol is an inefficient overreach and in need of amendment.

The HUD process and approach to this serious issue was flawed, and importantly, the research published in the so called Earth Study, which we -- many speakers have discussed, was flawed.

I'm encouraged that FHFA has a process that is more disciplined, science based and risk based, and is clearly reflected in this informed listening session, and the approach which we're witnessing here today.

The application of science and risk analysis, along with a simple dose of common sense, dictates that the standard of 100% ground floor testing of all multifamily dwellings in any risk zone, no matter how designated by the EPA, along with 10% testing of upper floors, is an overreach. It's like the 10% -- it's like the 20 mile per hour speed limit on highways.

Testing 10% of units on upper floors of apartment buildings, without radon being detected on any first floor units, even with 100% units tested, in my humble opinion, it's a clear sign that the HUD protocols are flawed. Maybe there are unique structures of apartment buildings, which can somehow allow the radon from the

Commented [AARST33]: There is no behavior modification policy option available to a tenant exposed to this naturally occurring gas at home.

Commented [AARST34]: The application of science and risk analysis has concluded that 100% ground floor testing and 10% upper floor screening is necessary to properly characterize buildings for radon.

Commented [AARST35]: Radon is a gas that may rise or move sideways within a multifamily building through preferential pathways. Radon emanation and radon in water also contribute to radon potential on upper floors. Upper floor screening is a check and balance. The EARTH Study reviewed upper story radon measurements for 257 buildings; 7% (18) of those buildings had upper floor measurements ≥ 4 pCi/L. High upper story radon levels were associated with higher ground contact levels. Note that numerous examples of elevated radon levels on upper floors, which are caused by preferential pathways, emanation, and water, were provided to FHFA and the GSEs during previous meetings.

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ground to skip the first floor entirely and appear on the upper floors. But there does not appear to be any widespread evidence of that. I'm not sure where HUD got that protocol.

Furthermore, a protocol of 25% testing of first floor apartments in appropriate risk zones, compared to the new HUD test of 100% of ground floor units, has yielded no meaningful or increased findings of radon in any of the EPA risks zones.

And in addition, to ignore the distinctions between EPA radon zones one and three, for example, simply ignores some of the scientific data and health risks implications of that data.

Further, there should be distinctions for larger multifamily properties, versus those with under five or five to ten or even 20 units, as was mentioned by prior speakers. In addition, data analysis that's been mentioned today should carefully sort out single family properties from the data for multifamily properties and that would include single family rental properties. I believe that much of the analysis we've seen today does not make those important distinctions.

Mary OwensBaehr:

Okay, sir, you're at time, if you could please conclude.

Michael Berman:

Sure. My last point is that FHA has the opportunity to give a practical timeline for us, and we should be able to do testing and mitigation post-closing as we do with green and other programs. And we should adopt a protocol, FHA should, where whatever we adopt, whatever FHA adopts is reviewed in six or 12 months increments following adoption to see the efficacy of those standards. Thank you very much, I appreciate the opportunity to participate today.

Mary OwensBaehr:

Thank you. Our next section on the agenda is Radon Testing and Mitigation. And our next speaker is Peter Ashley, U.S. Department of Housing and Urban Development.

Peter Ashley:

Good afternoon. And thanks to FHFA for organizing this important session. I'm with HUD's Office of Lead Hazard Control and Healthy Homes. I have an academic background in environmental health. And my work experience includes private sector and state work in regulatory toxicology and chemical risk assessment.

I've been at HUD for about 25 years, serving as an environmental scientist, about 12 years of those 25 I've directed the policy and standards division within my office. The focus of the division is to support research and develop policy and guidance that addresses residential health and safety hazards, such as lead, mold tests,

Commented [AARST36]: Radon sometimes emanates from concrete walls and floors in upper stories of buildings with no ground contact units. Stack effect can cause radon to move up an elevator shaft or stairwell or utility chases (preferential pathways). The commentator does not appear to understand building science in regard to soil gas.

Commented [AARST37]: Factually incorrect statement. FHFA should request corroborating data. EARTH Study: 38% chance of missing a unit.

Commented [AARST38]: Factually incorrect statement. FHFA should request corroborating data. Distinctions between zones have become less certain as more radon test data are reported. Zone 3 has high radon buildings just as Zone 1 has low radon buildings; hence, the EPA's disclaimer that all buildings should be tested, regardless of location.

Commented [AARST39]: The EARTH Study showed no significant difference in high radon levels between building sizes. (Table 10, HUD Report) To the best of our knowledge, radon is unable to distinguish between buildings by size.

Commented [AARST40]: Correct, much of the national data are single family. But radon is not capable of differentiating between building types and neither should the GSEs' policy. Radon does not impact single family owner-occupied, single family rental, and multifamily differently.

Commented [AARST41]: The current GSE policies require radon testing to be completed pre-closing. We're unaware of any problems related to capacity or transactional timing caused by this existing policy. The current policies already permit mitigation to be conducted post-closing.

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indoor air quality issues -- and indoor air quality issues such as radon.

I've also represented HUD on the Federal Radon Action Plan Workgroup that was spearheaded by the EPA. And I currently represent the department on the National Radon Action Plan Leadership Committee. Next please.

I want to talk a little bit today about -- give you some background on how the Earth Study, I know there's a lot of interest in this today, but how that got funded by HUD. First, I wanted to mention that we have staff from my office, as well as other HUD offices, that have participated in and are currently participating in the Radon Standards Development committees that are headed up by -- and organized by AARST, the anti-AARST Standards Committees.

So the Earth Study was funded through one of our Healthy Homes Technical Studies grants. It was funded in fiscal year 2017. These are competitively awarded grants. They award them every year to address multiple health based issues, residential health issues.

Radon is an area that we highlighted. We were aware that there was a need for research on multifamily radon testing protocols, because of the variability of requirements that existed at the time. You know, differences between the Consensus Standard -- Multifamily Consensus Standard for Radon Testing that recommended 100% ground floor testing. The HUD program at the time was 25% ground floor testing. And of course, the GSEs were at 10% ground floor testing.

So our application criteria, I want to point out, includes factors for data quality, ensuring data quality, and conducting rigorous data analysis. We have rating factors that we publish in the Notice of Funding Availability, and these are two. So we look for quality research plans that include plans for development of a quality assurance plan which was done for this study.

And we expect that our grantees publish their findings in peer reviewed journals. And that's what was done for the Earth Study. Recently -- the paper from this study was recently published in the Journal of Public Health Management and Practice. I believe that was published online earlier this month. And that is a peer reviewed journal.

The study findings contributed to HUD's Office of Multifamily Housing, changing their radon test requirements from 25% to 100% of ground contact units.

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But I also want to point out that their decision was not solely based on this study. It was also based on the NCR Consensus Standards you've heard about, you know, that process from other speakers today. But a lot of effort goes into developing the standards. And that standard also requires testing of 100% of ground contact units.

And then I just wanted to mention there's another publication authored by Dr. Antonio Neary from CDC on testing of units in multifamily buildings. It was a theoretical analysis, and his findings, you know, are based on the prevalence of eye level radon in a building. But it was -- findings are consistent with some of the findings of the Earth Study. I guess that's the best way to put it. So there is another study that would not support 25% testing of ground contact units in the vast majority of cases. Next slide please.

I also wanted to talk a little bit today about, you know, based on my many years of experience in environmental health, I wanted to explicitly discuss why people tend to underestimate the risk of radon exposure.

Mary OwensBaehr:

Apologies. You're at time, if you could conclude your thoughts?

Peter Ashley:

Okay, so that's based on these items here. Its familiar. Radar's ubiquitous, it can't be sensed, odorless and colorless. There's a delayed health effect, and you cannot definitively link a specific lung cancer case to radon exposure. But the evidence for risk is strong. And I think this reinforces the reason why effective radon testing mitigation requirements need to be incorporated into housing financing and into systems that ensure quality housing, such as housing and building codes. That concludes my remarks for today. Thank you.

[PASTED IN FROM PART TWO HERE]

Mary OwensBaehr:

Thank you. Our next speaker is Carey Asper, Nova Group.

Carey Asper:

Thank you. And hello, everyone, I'm Carey Asper, I'm the Director of Nova Group's national due diligence platform, which includes providing assessment services to many of the enterprise lending partners. I'd like to thank FHFA for hosting this call.

I'm going to talk about sampling and making estimates about population parameters. And this contrasts a little bit, well a lot a bit, with the NCR's multifamily measurement protocol that requires measuring the entire population. That population being all the ground contact units at a multifamily property.

And in science and research entire populations are typically not measured. Rather, a sample for that population is collected. The

examiner subjects this data set to various statistical tests to render conclusions.

The question is, what are the sample characteristics required in order to have a reasonable level of confidence that the data set is representative of the population? And our application -- if our conclusion is that the property in question does not have a unit with radon exceeding the EPA action level, how confident are we set our sampling confirmed the absence of a radon problem? And can we get there without measuring the entire population? If we're wrong, we committed a type two error, a false negative, if we concluded the absence of elevated radon when in fact it's present.

So the aforementioned recent Earth Study, as well as Neary in 2019, spent some time discussing the sampling frequency required to avoid a false negative. Their conclusions differ in that Neary provided [basis for selecting the sample size](#), while the Earth Study concluded that measuring the entire population is required to avoid failing to identify radon above the action level.

Now what stood out to me about the study was that in order to consider the sampling successful, a property that has one or more units with elevated radon must capture an elevated result. So therefore, these studies describe the probability of missing an elevated unit under various sampling frequencies.

I didn't see any analysis provided of the data set itself. And this is a very different and important question. There is value in running [some descriptive statistics on the sample set and presenting an upper level confidence boundary](#). With this information, conclusions derived from a given data set may not lead to the rejection of the presence of an elevated unit, even though one was not represented in the sample set.

Now the mass can be complex. And one reason is that the distribution of the sample results vary depending on the data set in question. And I think [Neary discussed this](#). For instance, samples collected in areas of low radon prevalence will have many low and non-detect results. You can't fly it and if you do, you get kind of an L shaped distribution that's difficult to model.

On the other hand, datasets that are collected in areas of increased rate on prevalence will transform nicely to the normal distribution. And because data collected from areas of low prevalence are difficult to statistically analyze, due to the absence of radon, this may be basis to exclude some geographic ethical areas altogether. We've seen in this presentation that there are some very good data

Commented [AARST42]: The Neri study relied on hypergeometric modeling - a solid theoretical approach that EARTH also examined, see Table 10 of the HUD report. EARTH also evaluated test results for 7892 units across 687 buildings and concluded that the hypergeometric model was not sufficient since probability of missing a unit did not in fact decrease as building size increased.

Commented [AARST43]: These calculations were made.

Commented [AARST44]: Neri: "These results indicate that the current percentage-based testing approaches may incorrectly classify some multi-family housing units as free from radon risk based on too few samples. The potential for inaccurate classification of a property as not having radon could result in occupants being unknowingly exposed to radon levels above the EPA action level and could place occupants at greater risk of developing radon-induced lung cancer."

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that's been collected since the EPA map of radon zones was published that will allow policymakers to determine whether or not there are some areas that can be excluded from screening.

However, since HUD has adopted the NCR protocol, we've had the opportunity to look at some of our own data that we've collected in connection with completing HUD due diligence. In a few properties that I've come across, and this would be -- we've collected up to a minimum of 90, up to 120 samples on ground contact units. Several of them were observed or hits were included in the population, hits defined as four picocuries or greater. And several just with one or two exceedances slightly over the action level.

I took a random sample of 10%, log transformed the results and showed that the upper confidence boundary was in the range of four to 4.2. While none of the random samples selected included an elevated result.

So I recommend we look further at the statistics around the data set collected, the sample collected, to allow for smaller sample sizes. Keep it in mind, the design of these models should avoid type two errors.

I'd expect a consensus based organization to be tasked with deriving these models. And importantly, I recommend including this analysis and the radon laboratory reports whereby the upper confidence boundary is reported along with the results of the samples collected.

And I recommend all this reporting, or excuse me, I recommend this reporting for all radon samplings, not just GSE execution, because there are many other commercial lending executions that lend on multifamily, and we need to have a level playing field. Everybody should have the same data.

In practice, the participants of a lender transaction would have the flexibility to complete limited sampling, or the full protocol. In the event limited sampling is selected, if the upper bound exceeds the action level then either the property requires mitigation or full measurement protocol would be necessary.

And I expect to be reasonable to complete the additional measurement as a post-closing item to avoid any unnecessary delays with a transaction. Perhaps an escrow proportionate to the initial sampling result can be posted. But in any event, the owner would be required to mitigate elevated units. And I believe implementing these recommendations or something close to it,

Commented [AARST45]: This is why proper characterization of all buildings is necessary, as specified by the 100% ground-contact requirements in the EPA-recommended consensus standards.

Commented [AARST46]: The EARTH study, independent research, has confirmed the standard's experience-based requirement to test each ground contact unit.

Commented [AARST47]: Limited sampling has been found to be unprotective by the EARTH study because units with high radon will be missed. HUD initially permitted 25% screening. Evaluation of data confirmed this approach actually increases cost and transaction timing.

Commented [AARST48]: Current GSE policy requires measurement pre-closing. No problems have been reported by the GSEs with transactional delays related to radon testing. The unintended consequences of permitting radon testing to be conducted post-closing is unreasonable repair escrows that may be highly inaccurate. Making financial decisions based on speculation is not sound policy. Properly characterizing buildings for radon potential pre-closing eliminates the uncertainty in potential post-closing repairs related to radon. Radon mitigation is handled post-closing in the existing GSEs policies.

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would result in more multifamily properties being tested and therefore more housing with radon issues corrected. Thank you.

Mary OwensBaehr:

Thank you. Our next speaker is Pattie Farrell from Wells Fargo.

Pattie Farrell:

Hello, good afternoon. Can you hear me?

Mary OwensBaehr:

Yes, we can.

Pattie Farrell:

Hi, I'm Patti Farrell, Managing Director and Head of Multifamily at Wells Fargo. I am also on the Fannie Mae DUS Advisory Council and Vice Chair of the Executive Council. Thank you for inviting the lending community to speak today, specifically thank you for allowing Wells Fargo to participate and to be heard.

For background, Wells Fargo is a HUD, Freddie Mac and Fannie Mae lender. We offer a balance sheet and a CMBS execution, and we support life company and debt fund executions as well. Wells has participated in the FHA and the GSE space for more than 25 years through our various legacy companies.

We're very pleased to have helped to provide financing for billions of dollars of multifamily housing, much of which has been dedicated and directed, I'm sorry, to the affordable and the workforce housing market. While Wells Fargo has a strong reputation in affordable housing, we are focused on healthy housing for all, regardless of the demographic in any specific location. This includes a wide variety of housing alternatives across the U.S. in large markets, middle markets and small tertiary markets, so that residents can thrive.

Radon is one key element of this healthy housing assessment. Understanding and determining whether elevated radon levels exist is a very important piece of the overall financing risk assessment that takes place. So it's important to note that Wells Fargo does not dispute that radon testing is very important and required.

Further, we're not disputing that a consistent approach across all GSE lenders could be helpful to the industry and to the tenants across the country.

Wells Fargo is not here to suggest that testing should be minimal, or to necessarily take exception to what the radon industry is suggesting, or FHFA is considering. Wells does believe that testing should be sound, based on accepted and proven science, completed by qualified professionals, and should reflect a risk based approach to testing that would give the lenders, owners and tenants confidence that the existence of radon gas has been accurately determined and assessed.

Commented [AARST49]: Adoption of the EPA-recommended consensus standards requires qualified professionals to conduct radon measurement and mitigation.

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Testing protocols should allow and factor in the availability of qualified vendors to address the demand, the availability of testing and labs to process the results and an industry of experts to address the final results and what's needed to mitigate when appropriate.

Wells is only asking and strongly suggesting that FHFA approach the question of what the appropriate level of testing is based on strong proven data and science. A significantly larger sample size will not necessarily produce more reliable outcomes. More testing does not necessarily mean better results.

It's our fear that implementing a large sampling size will only cause disruption by creating a stressed system due to longer timelines and excessive testing protocol. This could have negative impacts on the industry's ability to address housing needs and demands. Applying a testing protocol that is consistent done on a risk based approach, based on geographic areas, construction type, and property size is appropriate without being excessive.

In conclusion, Wells Fargo supports the GSE lenders recommendations on radon testing submitted to FHFA, to ensure a process that is not disruptive to the lending industry, a disruption that could have negative consequences to ensuring the housing industry continues to allow for safe and healthy housing units.

Finally, Wells Fargo is also supportive of a solution that could allow for post-closing testing and monitoring of units to address any additional follow up that could be necessary. Thank you for -- thank you and looking forward to any follow up that is needed as a result of this discussion and the information provided.

Mary OwensBaehr:

Richard Meyer:

Thank you. Our next speaker is Richard Meyer, Lumen.

Thanks to the FHFA for hosting this session today. My name is Richard Meyer. I'm a registered architect. And I've worked for the last 30 years managing Fiscal risk issues for multifamily lending at Freddie Mac and now at Lumen.

While at Freddie Mac, I witnessed the initiation of environmental due diligence required -- requirements in the early 1990's. These requirements were developed in response to the Superfund Law of 1980. By employing environmental professionals we worked to develop reasonable standards to evaluate the risks as well as the liabilities addressed by Superfund.

ASTM standards followed and they closely resembled the requirements put in place by Freddie Mac. I provide this context to

Commented [AARST50]: Correct - peer reviewers deemed the EARTH study sample to have sufficient statistical power.

Commented [AARST51]: In research yes; in environmental testing methods, no. Full characterization of a building is necessary.

Commented [AARST52]: Conflates research sampling with environmental testing.

Commented [AARST53]: EARTH study weighed risk meaning probability of missing a unit with high radon and concluded partial testing unsafe.

Commented [AARST54]: EPA radon zone map is not predictive of risk. EPA states that all buildings should be tested, regardless of location.

Commented [AARST55]: There is no evidence to support variation in risk based on construction type. Radon is not capable of distinguishing between building construction types.

Commented [AARST56]: Evaluation of test results for 7892 units across 687 buildings concluded probability of missing a unit did not decrease as building size increased. Radon is not capable of distinguishing between building sizes.

Commented [AARST57]: We are interested in reviewing these recommendations.

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suggest the reasonableness of the requirements that Freddie Mac put in place as they were tested by the industry via ASTM.

Several environmental risks beyond Superfund were also part of the protocol, and they included lead paint and asbestos, as these issues were viewed as potentially impacting safe and decent housing. Later mold and radon risk evaluation were added for the same reasons.

As with other environmental risk, an attempt was made to develop a reasonable standard, not an exhaustive study, to evaluate radon as it may impact credit risk, as well as safe and decent housing.

Beyond lending due diligence standards, I believe it's important to rely on building authorities, code enforcement and strong property managers to promote safe and decent housing.

I personally question if the lending platform is the most effective venue to fully evaluate radon risk. Thank you for the time and allowing me to speak.

Mary OwensBaehr:

Thank you. Our next speaker is Bill Long, U.S. Environmental Protection Agency. Bill, if you can unmute.

Bill Long:

Okay, sorry about that.

Mary OwensBaehr:

You may begin whenever you are ready.

Bill Long:

Yep, my name is Bill long, and I serve as EPA's Director of the Center for Radon and Air Toxics and the Office of Air and Radiation. I appreciate the invitation by FHFA inviting me to speak on this important topic and for your agency's consideration of increasing action on radon exposure in multifamily housing.

My remarks are going to cover radon standards, radon contractor proficiency and EPA's radon map. First, on the standards, radon is a EPA Class A carcinogen and a leading environmental cause of cancer mortality. It is one of the largest risks within EPA's portfolio.

Unlike many other environmental problems, however, the methods to test for and fix high radon levels is straightforward and uncomplicated. We have a high level of confidence that radon mitigation systems work. Use simple technology, reliably reduce radon are durable, and reduce lung cancer deaths.

The EPA believes that the standards of the practice for mitigating radon are essential to defining quality and protecting public health. And over the last decade, the EPA has transitioned from developing and maintaining our own standards to supporting and participating

Commented [AARST58]: Superfund standards do not provide any informed precedent for radon. The ANSI-AARST standards recommended by the EPA are the equivalent of ASTM consensus standards AND have been developed by a diverse group of subject matter experts and stakeholders.

Commented [AARST59]: Freddie's policy is outdated, has permitted unqualified work, and nullified state laws. An updated policy is necessary to protect building residents from exposure to unsafe radon levels.

Commented [AARST60]: The lending platform facilitates full review of risk, safety, and soundness for the entire property at the time of sale, renovation, or refinance, which is why hazards such as chemical vapor, lead, and asbestos are included in the environmental review- along with radon.

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in the development of voluntary consensus standards, organized by a standards development organization that has been accredited by the American National Standards Institute.

These voluntary standards cover a range of radon measurement, mitigation and other technical practices that address radon exposure assessment and reduction.

The National Technology Transfer and Advancement Act states that federal agencies and departments shall use voluntary consensus standards as a mean to carry out policy objectives, except where inconsistent with applicable law or otherwise impractical.

Executive Order OMBA-119 outlines a number of factors for agencies to consider when deciding to use a standard, including the level of protection the standard provides, or is expected to provide for public health, welfare, safety and the environment.

When the EPA elects to use a government unique standard in lieu of an available VCS, the EPA is required under the NTTAA a to report its decision to the Office of Management and Budget, and Congress, along with an explanation of the reasons for not using an available VCS.

The EPA views that our participation in the development of these voluntary consensus standards is in the public interest and is compatible with EPA's mission or authorities, priorities and budgetary resources.

The EPA supports the development of these standards in several ways, including serving on standard development committees. Our view is that such consensus standards are better, have broader support, and stay more current with technological development than those that would be developed by EPA alone.

Second, on contractor proficiency, professionals who provide radon testing and mitigation services also play a key role in public health protection efforts. And every reasonable effort must be made to ensure that such professionals employ effective approaches, methods and technology to measure and reduce exposure to this carcinogen.

Our statute, the Indoor Radon Abatement Act, recognizes the importance of establishing a quality, professional workforce for radon testing and mitigation. At the onset of our radon program in the 1980's and '90s, we stood up a program that established the standards of quality for assessing and identifying qualified service providers. And in the early 2000's, we transitioned from direct

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administration of a service provider proficiency program to oversight of two independent organizations responsible for certifying radon service providers.

As part of this process, we conducted a one time evaluation and acknowledgement of the two certification bodies, the National Radon Proficiency Program and the National Radon Safety Board. Since then we have been operating under that construct. At a request through congressional direction for the past four years and in response to growing demand for radon services in the United States, we are developing an updated framework for oversight of radon certification in the United States.

Third, and finally, EPA's radon map. The EPA's zone map was developed in response to congressional direction in the early 1990's. The map was intended to help states as they were starting up their programs. The map was intended to be used to identify potential, not risk.

The EPA's national policy is that every home should be tested and fixed if radon levels are at or above four picocuries per liter. And that individuals consider fixing if between two and four. It was never intended to be a way to predict radon that would be in a home.

In conclusion, EPA supports adoption of any policy that requires radon measurement and mitigation in full compliance with the EPA recommended voluntary consensus standards by qualified radon professionals, certified by an EPA recognized proficiency program. Thank you.

| **Mary Owens**:aehr

Thank you. Our next speaker is Shawn Price, First Environmental Technology. Shawn, can you please unmute?

Shawn Price:

Yep, that's okay. And there we go. All right. Very good. Thank you for the opportunity to share some of my experiences and perspectives. Been in radon on for 32 years. The first almost decade was on one of the programs that Bill Long just mentioned, the Radon Proficiency Program where I was a contractor.

A lot of the early protocol developments were also being done. The state radon maps, the data that was used to generate those maps were done by some of the -- my peers at RTI international and SC&A. Once that program was privatized, I came over to the real world, if you will, and I've been managing laboratories for the last 23 years. I'm also a volunteer on the -- several ARRTT's committees. I'm the Chair of the current Standards Management Council that

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oversees the consortium. And I'm also the Chair of the Standards Workgroup on all measurement, building types, including the multifamily. Next slide.

ARRST is one of many ANSI accredited developers. ANSI is part of the ISO network. It is the caretaker of the standards developed in North America. So they put out a document called the Essential Requirements and all of the ANSI accredited standards, developers have to adhere to those requirements. Next slide.

Part of those essential requirements are, you know, ensuring lack of dominance, openness, balance, the true consensus process. Everybody gets a vote. These documents are public reviewed. They're put out. There are a lot of arguments, pros and cons within the committee. And once that we put these out for public comment, we always are met with really good ideas of, hey did you mean this? And what if you said it this way? And so these are always being fine-tuned, refined, as again part of the requirements is they have to be updated at least every five years.

So since we've been developing standards over the last 16 years, we've taken some of the standards. They all started with the EPA, you know, basic guidance back in 2005. We've got a lot of real world experience with them now and we're putting out what I think is much more clear, concise, harmonized documents. Next slide.

So within the committee itself, we have an oversight committee called the Executive Stakeholders Committee and working committees, and they all, again within the spirit of that essential requirement are there to ensure balance and lack of dominance.

So I've listed some of the very common, you know, stakeholder perspectives that are on every single committee. We may have additional perspectives on, say a new construction committee, we may bring in architects. And a water standard, we may bring in, you know, water quality experts as well. But you'll see that this is not just radon people writing, you know, self-serving standards, this is a very open and fair and defensible process. Next slide.

Since the topic of the day is multifamily, you know, we have really refined this, probably in the last two updates because of the widespread use with the HUD program, we've tried to take a lot of the editorial language out and get, you know, right to the point. So 100% of the ground floor testing, 10% of upper floor testing. Why? Well the foundations are like Swiss cheese, there's a lot of openings, there's a lot of pathways, you can't see them, they're not -- they're invisible. These gases move around, there are building pressures, air

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pressures that we can't see, you can't just pick a spot and hope that you found it. All right.

Unlike lead and asbestos, radon moves around. It's found in every zone so there's no zone exemption in there. And testing frequencies, even when it's low, things can change, the building can change, the geology can change, drought, wet years, sinkholes, you know, things like that.

So consistent with EPA guidance, even when low, there's a recommendation to test every five years. Now that a building has been mitigated, well mitigations may last for 20 years, the ground, the system may change. So every two years you need to do some checks, you need to do some testing, OM&M programs are required. And you know, in this situation, it would really be required for the duration of the loan. And all of these standards are accessible and as read only format in Standards.RS.org. So next slide.

So when you go to the Standards.RS.org, you can just scroll down on the main page, or you can click the view purchase standards link. And it just takes you down further in the page. You can read all 11 of our consensus based standards that have been published. You can find on the public access, new standards or old standards that are out for public review. You can participate in committees by submitting your resumes and volunteering. You can submit questions to committees and things like that. So I encourage everybody to go to the site and, you know, browse through the standards and see what they say. Next slide.

With my day job, you know, I've been doing this for like I said, for 23 years. We've gotten a lot of calls since kind of the rumor hit the street that, you know, FHFA was going to make a policy change, and that the Freddie and Fannie policies may change -- may, you know, be different than the current seller servicer guide. What does that mean to us? Can we?

Mary OwensBaehr:

Shawn you're at time, if you could just conclude your thoughts?

Shawn Price:

Okay, sure thing. And so fortunately, we have upgraded our capacity. Even within the last year, just in the last year, we've upgraded, you know, almost 70% of our capacity, we feel that we have redundancy. We've got capacity upgrades. We're load balancing to ensure that one facility doesn't get overloaded. We are continuing to, you know, provide data to CDC, because we also want data aggregation. We want to go by what the data tells us to go by.

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And we want to have this better isolated for multifamily, not all single family.

And more importantly, what I really like with his policy, and I'll be brief, for many years, I've gotten the calls. I got one test at an apartment complex and its high. I need one long term follow up. And my question is, what are you going to do about the rest of the building? We don't have to do anything about the rest of the building, I just have to look at this one unit because that's all Freddie recommends.

So I'm very happy that this policy is being reviewed. And I hope that the outcome will be we will be adhering to the standards and, you know, testing these buildings properly if we're going to test them at all. Thank you for your time.

Mary OwensBaehr:

Thank you. Our next speaker is Michael Kitto, formerly New York State Department of Health.

Michael Kitto:

Hello. First slide, please. Thank you. Hello everybody. I'm a recently retired research scientist with some 50 year or 50 publications, over the 31 years I worked at the New York State Department of Health. Most of these publications were regarding radon, including the mapping of radon occurrence in New York State at the township level. So we've gone sub-county down to the township level. Next slide.

We recently completed the HUD funded study of radon occurrence in multifamily buildings. I'll show you a summary of the radon results that were voluntarily submitted by these radon professionals. Next slide, please.

Only results submitted by accredited professionals were accepted. We only -- this study only included ground contact units. While most buildings had -- we strove for 100% of the units to be tested in the buildings, we did end up accepting that one unit would be missed, often because it couldn't be picked up or deployed, just you know, measurement issues. And so we had to go down to allow at least one miss for these buildings so that we could maintain statistical significance.

Lastly, we went with buildings from five to 20 ground contact units, some were actually larger buildings up to 77 ground contact units. One important part was that all the data that was submitted have to have the correct and proper quality controls, which included 5% blanks and 10% duplicate, plus annual calibrations of their radon detectors. Thank you.

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The four measurement devices were used, most of them were activated charcoal detectors. They were equally measured across the seasons, somewhat more a little bit in the spring. Ninety three percent of the buildings were three storeys or fewer, so they're not high rises, so to speak. We had nearly 8000 units, we had the arithmetic mean of 2.36 picocuries per liter. The National Residential Radon Survey found levels to be much less and that was again done in the early '90s with 5,700 homes approximately.

There was -- we had 1,63 units that were greater than four, about one in seven. Again, the National -- the EPA early study found this to be less. And we found that in our study that 84% of the measurements were done above grade, or what we call slab on grade. Nothing between except concrete between the ground and the floor that people were living in. Next slide.

This is an example of the variability in radon levels at a seven building complex. When testing only one unit per building, one could easily allow these buildings to remain a health hazard, if they sampled the ones that I, you know, that are below four, if they just happen to pick those. Even 25% sampling, don't -- go back please. Even 25% sampling could conceivably miss the high levels in five of these, five of the seven buildings, the ones I have circled there.

So it's conceivable that they would just pick these two out of each building. And these would pass as being okay, and 25% sampling when indeed they are not. So this exemplifies the need for greater testing protocols. Next, please.

For a building -- so now we're getting into the data. So for buildings which contained at least one unit with elevated radon, these are the probabilities of missing the unit with partial testing. If one falls down, let's say the 25% column, you can see that variability due to the building size, which is in column one. And the average on the bottom is 38%. So you got a 38% chance of missing this unit in these buildings.

So if you go across the bottom row, you can show -- and see that it's 75% sampling it still poses a significant risk at six and a half percent. And even at 90% this leaves some risk. And I should put out -- should note that 90% testing of buildings with less than ten units is essentially a 100% sampling because you're going to sample all it at 90%. Next one, please.

This is a graph of the same data to visualize the tight grouping or agreement at the higher sampling rates. So this is just a graphic of the earlier numbers. And you can see that it doesn't matter what

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the building size is here the -- it's pretty tight as far as the probability of missing these units. Next one, please.

Since 50%, I think you missed one. Can you go up one? Okay, well I'll just -- So since 50% of the -- can you go down one, maybe that's where the slide went. Nope. Okay, go up. Since about 50% of the buildings contain no units with elevated radon, I had a table which somehow got lost, that provides the probability of missing a unit with a -- with radon in it in a random building using partial testing.

Because those -- the previous table was only for those in which there was at least one unit in the building that contained radon. And you would see that at -- and if you just pick a random building, and as I said half of the buildings contained no units with elevated radon, at 75% testing, the chances of missing a unit ranged anywhere from around 2% to 4%. That was at 75% testing. So --

Mary OwensBaehr:

You are at one minute, if you could conclude your time. Thank you.

Michael Kitto:

Okay. So one has to ask themselves if, you know, if they're willing to take the 2% to 4% chance of dealing -- living with this class A carcinogen. Okay, next slide.

The last, I have two slides I'm going to talk about and this is regarding a talk I gave in 2016. Go down one. Thank you. Next slide.

Okay, so this shows, oh next one up. This one goes -- shows you the EPA zone on the left and the radon zone designation that I found. And I found that if you take just zone three, that 75% of the time it agreed, but 25% of the time the zone threes should have been zone two or zone one. And you can see those are down through the different ones.

And what you come up with is something like on the bottom that I have listed there where the agreement was about 70% of the time. And when we found that we had something like 18 states also have data available online. And we found that, you know, the predictions are not that -- they're good, but they're not perfect. And I think the data that Michelle Monti and CDC is working on will help alleviate this. Next -- last slide.

And this is just the final which I want to compare to the 1992 study, and which this study, again, with over two million data points. We found that 61% of these compared to the 84% for the EPA, and that we found that based on the data that's out there from these measurement companies, that roughly 18% of the numbers -- of the results are greater than the four. And so it's significantly greater

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than 6% that was predicted in 1992. They said there was around six million homes with four picocuries. I contend that when CDC gets through the data, they will find this to certainly be double or triple that. Thank you.

Mary OwensBaehr:

Thank you. Our next speaker is Joshua Kerber from Minnesota Department of Health.

Joshua Kerber:

All right, good afternoon everybody. Thank you for the opportunity to speak before this listening session. My name is Joshua Kerber and you can go to the next slide, please.

I'm an environmental research scientist from the Minnesota Department of Health Radon Program. I've been involved in the public sector part of the radon field for over 20 years, working in two different state programs and a university. My main interest here is aiding radon programs and contractors to build upon their technical capacity to reduce radon and use lung cancer. Today, I'm here representing the state and tribal radon programs for across the country. Next slide.

A few things about the AARST Radon Standards. They are the current consensus standards and they're currently the only consensus space right now on standards available. There's a lot of public sector support for these standards. Many states have adopted these standards. And just in the last ten years more than 50 states and federal government stakeholders have served on the various AARST Radon Standard committees, and many continue to serve and maintenance -- maintain these even today.

These standards set the minimum requirements for measurement and mitigation in multifamily buildings. They are the only standards to do so. There are no other standards regarding radon measurement and mitigation of multifamily buildings at this time.

There are benefits to following these standards. First, you can have confidence in radon test results. These standards stipulate where and how devices are to be deployed and retrieved and by who. With better confidence and device accuracy and the testing of all ground floor contact units, there's much better public health protection. After all, some people living in these units do not have control over their radon situation.

In addition, when 15 radon issues in multifamily buildings, there's a common occurrence called collateral mitigation. This occurs when a radon mitigation system is installed in one unit, but ends up lowering the radon in the surrounding units as well. This can lead to

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multiple units being fixed with a single radon system, and not needing a system in each and every unit. Next slide.

There's issues with the current policies. There's a lack of guidance and specificity in the GSEs policies. This leads to the nullification of state laws and regulations. We have numerous examples of regulations being bypassed or ignored. So many projects do not have the requisite 100% ground contact units being tested. This leaves many people vulnerable to elevated radon.

In addition, we have untrained, unlicensed or uncertified people conducting tests in situations where there are laws and rules regulation of who can place and retrieve devices. This leads to regulatory action from the state being taken against the individual placing the kits at the simple direction of a project manager.

In some instances, the project manager is withholding information from radon labs as a means to not identify where the project is located, thereby not allowing the labs or the regulators to know where the work is being conducted and by who. This can also lead to non-reported radon work to the regulated states and again, nullifying state laws and rules. Next slide, please.

There's also a lack of adherence by some lenders to the GSEs environmental policies, which require all work to be conducted in accordance with applicable state laws and regulations. In a regulated radon state, and there's about 20 of us, radon testing being conducted in multifamily buildings shall be done by a currently licensed or certified radon professional.

Unfortunately, nationwide we have numerous examples of regulations being ignored or sidestepped. Sometimes the lenders are new, uneducated or unaware of the regulations. That's understandable. But in other instances, the lenders are aware, but proceed with insufficient radon results and/or data gathered and generated from unlicensed individuals. This is nullifying state laws and putting occupants at risk.

Whether the issue is not testing 100% of all ground contact units, or not having a licensed person conducting or overseeing the testing, no lender should be ignoring state laws and regulations simply to close the deal. But unfortunately, this is an occurrence we see far too often.

And finally, by not following these standards, you are exposing a large health equity gap. By only testing a fraction of the necessary units in any given building, you're missing the total radon risk

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reduction, sorry, you're missing the total radon risk of the structure. What's more is that many of the occupants in these buildings are living either rural or affordable housing, which will make it more difficult for them to afford a radon reduction system.

This is especially true of any building that has tenants. Not only are many tenants from lower income, but as non-owners they have very little to no control over the radon issues. Sure they can test their own unit to see what the radon level is. But they do not retain the right to mitigate their own unit without approval of a building owner. Following the MDR standards would help alleviate these issues. That's right.

So my final slide is our recommendations FHFA is to adopt the use of the AARST Consensus based standards for radon measurement and mitigation. This is the best approach to protecting public health and promoting health equity, while also lowering liability concerns of building owners and lenders. In addition, there are many in the radon world that have extensive expertise and the wherewithal to help in the training and dissemination of this information. I appreciate your time today. Thank you for the opportunity to speak.

Mary OwensBaehr:

Thank you. Our next speaker is Carlton Aihara from Ecosense.

Carlton Aihara:

Hello, this is Carlton. And first of all, I would like to extend my appreciation to the FHFA for providing the opportunity to share our thoughts on how our company can contribute to protect the health and wellbeing of their citizens.

My name is Carlton Aihara, Vice President of Ecosense and we're based in San Jose, California. We are a technology driven company focused on developing radon detection and monitoring solutions that offer one of the better detectors in the market for real time and continuous monitoring purposes. We think our Wi Fi enabled product EcoCube is going to be applicable to the real time and continuous monitoring of radon levels in multifamily dwelling units. And I would like to take this opportunity to talk about how the EcoCube can be applied to the situation. Next slide, please.

So you know, as we've been talking throughout this session, you know, radon gas, I don't need to repeat some of these messages. But, you know, it's odorless, faceless, colorless, radioactive, and it causes over 20,000 deaths in North America, and the leading cause of lung cancer among nonsmokers.

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And where are we focused our solution is to make sure that we provide a way to, you know, monitor and measure the radon levels in both fast, accurate and reliable method. Okay, next slide.

Now there's something very important that I wanted to point out, which is the fact that the radon levels in a typical environment will fluctuate over time. We did this measurement, you know, over 90 days, for example and, you know, a lot of things could impact this, including weather. And you know, in the cold months if you close all the windows, the radon vents accumulate in your -- inside the house. So that will lead to, you know, higher readings.

In the summer, when people open up the window, well that naturally gives that flow through the house to, you know, sort of take the radon out of the problem area so you tend to read low.

So one of the things that we were focusing on is the fact that, you know, for a way to assess the radon levels accurately is to, you know, do it over a long term. You know, we're saying 90 days, you know, sometimes it could be over a year, depending on the season. But here I think it's very critical that you have the ability to do the long term monitoring, and of course, it has to be, you know, real time and accurate at the same time. Okay, next slide.

Now I'm not going to get into a lot of this discussion, but we have a line of products that assess and defects. And they're all spec the same. In other words, our professional model, which is NRPB and NSP certified, it's also -- has the same, you know, detection technology as our consumer products. Radon I and also the EcoCube.

But I wanted to feature the EcoCube, next slide. Because the biggest feature here is that it's Wi Fi enabled. So in a typical situation of multi dwelling units, where you may want to monitor, you know, multiple units or multiple dwellings, then on a single lab, you can actually monitor, you know, 20, 30, you know, up to 100 devices all at the same time on a single app.

And the other thing is that it's a Wi Fi base. In other words, you can monitor this remotely without, you know, being there, you know, physically, you know, in the premise of the dwelling. So I think this is one of the solutions that I think it will make sense in the mall by dwelling situation. Okay, next slide.

So just, you know, a quick picture on some of the applications and multifamily homes, of course schools, daycares, you know, anywhere where a long term and continuous monitoring is required.

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I think the solution will work best for that. And to the last slide, please.

Yeah, so just in summary, as you know the radon has infected, you know, every Americans and in North America, and as I mentioned, it's very important to assess the radon levels over long periods of time, as I showed in the graph. And of course, the real time continuous monitoring is critical in determining the exact radon level and the variances that may cause in the house. And the remote monitoring offers, the convenience in nonobtrusive means to check radon levels. Thank you very much.

Mary Owens:

All right. Thank you very much. We are now going to move on to the next session of our listening session. This is the Effects on Multifamily and Radon Industries. Our first speaker is Kyle Hoylman from the American Association of Radon Scientists and Technologists.

Kyle Hoylman:

Good afternoon. Thank you to FHFA for hosting this session. My comments are related to the impact adoption of the EPA recommended consensus standards by the GSEs will have on the multifamily market.

A lot of information has been circulating about the perceived impact on transactional delays and costs related to this policy. I'm here to tell you that perception is not always reflective of reality.

In regard to transactional delays, the reality is adoption of the standards will have little to no impact. In fact, when compared to the existing policies, timing will actually be reduced.

For example, Freddie's current policy of conducting a short term test prior to closing, followed by a long term test of at least 91 days when the potential for radon is confirmed, creates a greater impact on timing than simply following the standard. The standard provides options that add as little as two days to the follow up testing process, not three months.

As we've heard from other speakers, properly characterizing buildings requires testing 100% of ground contact units. The practice of characterizing only 10% of ground contact units takes the same amount of time as testing 100%. Indeed, testing ten units in ten buildings takes the same amount of transactional time as testing 100 units in those same ten buildings.

We've analyzed more than 1,000 multifamily projects. The average turnaround time for testing is 35.4 days from client engagement.

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Other due diligence items that may present a lesser health risk or concern often take as long or longer to complete prior to closing.

Other items we've heard should be considered, consideration for permitting radon testing after closing. Current policy requires pre-closing testing, yet we've heard nothing about the laser capacity concerns. This consideration is problematic, as the assumption that all units have the potential for a radon problem would need to be made in order to determine an adequate repair escrow.

This approach would likely have unintended negative impacts on the transaction. Simply working with the options included in the standard to complete pre-closing testing would seem to make the most sense.

Consideration for exempting certain property types, such as affordable and rural housing. These property types are not currently exempted, yet we've heard nothing about delays or capacity concerns. Exempting roughly 15% of properties in the absence of supporting data is bad policy. Why should residents living in these housing types not be afforded the same protection as those who don't?

Consideration for exempting properties located in low risk areas. Testing in low risk areas is not currently exempted, yet we've heard nothing about delays or capacity concerns. In fact, Freddie's guidelines specifically states, Freddie Mac will not accept use of the radon -- EPA radon zone map designation as a valid reason for not testing. The EPA advises that the map should not be used in lieu of testing during real estate transactions. Actual testing data suggests that radon potential in low risk areas is much higher than previously thought. Why should residents living in these geographical locations not be afforded the same protection as those who don't?

Finally, we've heard this policy will create a significant economic burden. Our analysis of this item suggests an economic impact when amortized over the loan term of less than a penny per day per unit. When coupled with the cost benefit numbers we've seen, common sense would dictate supporting the adoption of this policy.

Bottom line, if transactional timing and cost were significant issues, they would be significant issues today. They don't appear to be though. Deviating from the EPA recommended consensus standards to address concerns that may not be valid, will continue to have the same impact on the residents living in these communities. Here's an example of that impact. Next slide, please.

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This property was located in Lexington, Kentucky. In accordance with the existing Friday policy 10% screening was conducted in 18 buildings. Fourteen of those buildings contained a residential unit that had concentrations above the EPA action level. At that point, the policy would stop, fix those 14 units, clear those 14 units, disregard any other unit in any other building on the property or the exposure of radon to those persons living in those units and move on.

Instead, the client chose to do the right thing. They assessed 100% of the ground contact units. And what we found was 108, not 14, of the 144 residential units contained radon concentrations above the EPA action level. In fact, 16 of those units were greater than 30 picocuries per liter of air, which is the nuclear regulatory number for personal protection.

None of these were on the initial screening list. And the client chose to mitigate 100 residential units where the policy would have stopped short. We see this as a protection issue for the occupants of the building, as well as a liability management issue for building and property owners.

While the impact of this policy on the multifamily market is minimal, the impact of the residents living in these communities is tremendous. If the intention of the GSEs radon policy is to protect residents from exposure to unsafe concentrations of cancer causing radioactive radon gas, while providing for important risk and liability protections for its multifamily stakeholders, full adoption of the EPA recommended consensus standards is the right policy decision. Thank you for providing me with the time today to address this group.

Mary Owens: Thank you. Our next speaker is Mike Flood from the Mortgage Bankers Association.

Mike Flood: Good afternoon. My name is Mike Flood, I'm a Senior Vice President at MBA. Our members represent 100% of GSE lenders, FHA lenders --

Mary Owens: Mike, you are muted.

Mike Flood: Of course I am. Somebody had to do it. My name is Mike Flood with MBA. And our lenders represent 100% of GSE lenders, 100% of FHA lenders, and this is a substantial majority of commercial multifamily lenders.

Mr. Hoylman, and if I'm not saying your name, right. I respect your comments. I'm going to take exception to some, I will agree with

others. And I look forward to working with you and everybody else on this call to find common ground that allows us to safely protect tenants and produce sorely needed affordable housing.

So the question is, how do we get there? And let's start with a key objective of risk. What do we believe in? Let's start with the end. As an industry, we believe in a risk based approach to testing standards that is periodically reviewed to ensure it remains relevant, leverages on data on HUDs experience with its current implementation of the standard, and is based upon sound science.

And we believe a risk based approach is necessary for a few reasons. Certainly, when you think about 100%, that's a difficult standard for anyone to match. Today, we also heard that we should not rely upon EPA maps for risk, but we should adopt EPA's voluntary standard as a requirement, which is a bit of a predicament.

On top of that, Mr. Hoylman, I respectfully disagree that there's a consensus standard. We have two at HUD alone, one for multifamily and one for seniors housing. Then we have -- the GSEs have their own standards. Some of the states have their own standards, and the private sector has their own. So it's good that we're having this discussion so we can figure out the right approach.

And finally, the new standard calls for 10% testing of units above the ground floor, but at the same time EPA states the testing is unnecessary for residential units above that same second floor. So it's good for us to figure this out and find the right approach home.

The second objective is to create a workable timeline for implementation of any increased radon standards. We recommend creating a timeline that takes into account (a) the increased demand for radon testing standards should enhancements occur, and (b) I agree with Mr. Hoylman, let's allow radon testing and mitigation to occur post-closing.

This allows a few things to happen, regardless of the amount of radon testing that we enhance, this will allow for the industry to build up the capacity of radon testers that are certified, that are necessary to complete it safely, and allow the industry to continue to produce affordable housing that we all know is sorely needed.

Now let me talk a little bit about the implementation issues that we are seeing. And the way we've been able to do this, as you all know is HUD has had this program, even though we disagree with it, in place for about six months, and we've collected some anecdotal information from our lenders.

Commented [AARST61]: Survey, never repeated, that fueled zones map: 1993. Recommendation of continuously maintained standards: 2019. The EPA, including the EPA map, clearly states that all buildings should be tested, regardless of location.

Commented [AARST62]: There is one US consensus standard - ANSI-AARST MAMF. The National Technology Transfer and Advancement Act requires use of consensus standards. HUD uses MAMF but has an exception on sampling for senior housing which will soon be harmonized. 11 of the 18 states that regulate measurement use MAMF, and a 12th has policy quite like MAMF. The GSEs' current policies are not standards, they're policy requirements contained within seller / servicer guidance documentation.

Commented [AARST63]: Single family residences don't include separate dwelling units on the upper level. The commentor doesn't appear to understand the building science related to this item. Radon gas can rise within a multifamily building through a stairwell, elevator shaft, pipe chase, or other preferential pathways. Upper floor testing is a check and balance. The EARTH Study reviewed upper story radon measurements for 257 buildings; 7% (18) of those buildings had upper floor measurements ≥ 4 pCi/L. EPA does not state testing is unnecessary on upper floor residential dwellings.

Commented [AARST64]: AARST supports a six-month implementation timeline to allow for potential capacity challenges to be addressed.

Commented [AARST65]: Incorrect statement: Mr Hoylman stated the opposite.

Commented [AARST66]: The HUD policy went into effect in 2013.

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And unfortunately, Mr. Hoylman some of it disagrees with what you had. We are finding that the average delay in the pipeline is about eight weeks when we're looking for a radon tester. Why is this hard to see? Well right now HUD has as one of the largest pipelines in history due to the economy. They're doing a great job. But we are finding about an eight week delay.

Commented [AARST67]: There are multiple potential and resolvable reasons for a delay, notably environmental firm communications or internal capacity building. Upon request, we'll make our data analysis supporting an average 35.4 turnaround time available for review by FHFA and the GSEs.

Two, radon testers are in short supply. Let me put this in context. Our data shows that there are less than 300 certified multifamily radon testers for the entire country. Put this in even further context, the states of California, Texas and Florida, there are only 22 trained qualified radon testers.

Commented [AARST68]: There are more than 6,000 radon measurement professionals in the US, including more than 500 in CA, FL, and TX, who are qualified to conduct multifamily radon testing. In addition, AARST supports a six-month implementation period to address potential capacity challenges.

And finally, while it may not be the greatest cost in the world, we are finding out that since there is increased demand in the HUD product, that the cost of radon testing, the costs are increased by two to three times from \$5,000 to \$20,000, depending on the complexity of the building.

Commented [AARST69]: This statement is not correct. A typical multifamily testing project averages \$5,000, which is much less than the \$20,000 the commentor states.

And while I hear Mr. Hoylman at one -- saying it's one cent per day, this is not Sally Struthers, this is cancer. Let's make sure we spend dollars prudently and on a risk based approach.

Commented [AARST70]: The cost-benefit analysis for radon measurement and mitigation in multifamily buildings shows significant benefit. Preventing radon-induced lung cancer using the risk-based approach developed over decades of research is a good return on investment. We welcome the opportunity to work through the actual economics associated with the statements made by the commentor in regard to measurement costs.

And then finally, we have found at present no meaningful differences in radon testing. Again, we understand that this is six months of anecdotes. You never put national themes on a small representative sample. But this is why we ask that we continue to collect data from HUDs program and make sure we right size testing going forward.

And finally, what's important about the HUD program is let's remember that it is 1/10 the size of the GSE program. So while we are all for enhanced radon testing, we are all for protecting our tenants, if we implement the standard at HUD it's going to have a 10x effect on the GSEs. Why do I say that? The pipeline is 1/10 the size. HUD is typically around 160,000 units a year, the GSE is around 1.6 million units a year.

So the delays that we are concerned about, the post-closing that we were looking for, and the reason for risk based approach is so that we can do that balance between protecting people as fully as possible, but at the same time allowing us to produce the affordable housing that the Biden Administration and the rest of us believe is necessary.

Commented [AARST71]: Post-closing testing should be avoided for the reasons previously stated. The GSEs' existing policies require testing to be conducted pre-closing. We're unaware of any delays caused by the existing policy.

So in conclusion, and we believe in four things, a risk based approach to testing that aligns with the risk of contracting cancer

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over a seven year time horizon that's posed by radon. An approach that is based upon sound science, and we ask you all to pay careful attention to the Earth and Neary studies. A reasonable timeline to implement radon -- enhanced radon standards with the ability to complete radon testing and mitigation post-closing. And the use of HUDs data to inform the process.

Commented [AARST72]: Actually incorrect. The minimum latency period for radon-induced lung cancer is five years, and the latency is cumulative over a lifetime. Upon request, we'll make resources available to provide detailed information about the cumulative effect, latency, and other risk attributions.

We thank you all for holding this hearing. We thank you for everyone's participation. We look forward to working with you going forward and we will -- follow us -- we will send a follow up letter with these recommendations involved in it from the industry so that everybody has a chance to review and make sure we have a transparent process. Thank you very much.

Mary Owens:

Great, thank you so much. Our next speaker is Dan Brendes from Berkadia.

Dan Brendes:

Good afternoon. My name is Dan Brendes and I am Senior Vice President for GSE Lending with Berkadia, a private commercial mortgage banking investment sales and servicing company and one of the largest Freddie Mac, Fannie Mae and FHA multifamily lenders.

I've served in the real estate finance industry for over 30 years, the last 20 years focused on multifamily. And I am currently a member of the Fannie Mae DUS Advisory Council.

So thank you for allowing me to speak today. I stand behind the goal of effective radon testing and ensuring we are financing safe and affordable housing. Enhanced radon testing is important, but I believe the current proposal calling for 100% testing of ground floor units and 10% of above ground level units actually impairs our ability to effectively address this issue.

Commented [AARST73]: Based on the research presented, properly characterizing buildings for radon potential requires 100% ground-contact / 10% upper floor testing.

The health implications associated with high radon levels is a serious issue. But moving so rapidly to these new protocols ignores a number of real life challenges, which include the following.

First, as a testing industry there are real logistical and capacity issues in meeting the proposed testing requirements. This includes everything from enough canisters, to technicians, to scientists capable of administering, reading and delivering testing results across the country.

Commented [AARST74]: There are no reports of capacity concerns with the existing GSEs policy. The same number of days is required to complete 100% or 10% testing. Potential capacity challenges, if any, are able to be addressed through a reasonable (6-month) implementation timeline.

Second, radon levels vary widely based on geography. It matters where you are located. EPA's radon maps identify known concentrations and should be used to focus enhance testing efforts.

Commented [AARST75]: Per EPA, all buildings should be tested regardless of location, as stated previously.

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And third, there will be an immediate and negative impact on the GSEs financing system, in terms of time, cost and process for both property owners and tenants. Consider that FHA finances approximately 160,000 units per year, we are going to overlay this new requirement on a model the FHFA, or excuse me the GSEs, that finances ten times the number of units.

We know there are some issues with the current FHA implementation. And I foresee those same issues in a larger testing environment with the GSEs.

We need to focus on the data and use our available resources to mitigate in areas where we have high known radon levels. The recommended testing completely overestimates the industry's ability to administer these new protocols. We can do more to effectively mitigate radon by focusing resources on those areas known to have high radon levels.

It is important to address this issue without paralyzing the industry that is working every day to provide safe and affordable housing. I support a risk based approach to testing. I believe that additional data and study will enable us to formulate a more thoughtful and effective plan for addressing radon levels in this industry. A plan that can be effectively implemented and evaluated over time. This concludes my remarks and thank you for your time.

Mary Owens: Thank you. Our next speaker is David Wilson, formerly of the U.S. Department of Energy, Oak Ridge Lab.

David Wilson: Thank you. First slide, please. In a nutshell, I've been doing radon research since about 1986. However, and primarily with the DoD, which has a large number of family housing multifamily predominantly within, both international and domestic. We've also been doing involved in radon mitigation research and about 1,500 multifamily housing units. Next slide, please.

The key consideration here that you need to address, and let me just kind of back up a little bit. A lot of people are unaware of this, but when I first started working at ORL, I was tasked to look at, on the peripherals, of lead based paint and asbestos, sampling strategies within multifamily housing.

What I found out was that if you tested a few units, and you tested positive lead and asbestos, odds are pretty good that most of them did have it. That transitioned me over to doing radon. And what I found out with radon is radon doesn't exactly play by the same rules. Whereas with lead and asbestos, the houses were built at

Commented [AARST76]: There are no reports of capacity concerns in response to the HUD policy. There are also no reports of capacity concerns with the existing GSE policies. The requirements to meet demand can be vetted once the policy and effective date are clear.

Commented [AARST77]: Per the HUD commentor, this statement is not accurate. As stated, HUD has no reports of its radon policy creating transactional delays.

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about the same time, using the same builder, a lot of other considerations. So it makes sense that the same building materials that contain lead and asbestos were incorporated.

Radon is different. It's a micro geology. It's a footprint type argument. And early on in '88 to '92 we worked very closely with the U.S. military, primarily the Navy, in terms of looking at statistical sampling considerations in terms of dealing with multifamily housing.

The problem that we got into is that when you statistically back into a zero, or one unit in a population as having radon, traditional environmental statistics kind of fall apart. There were a series of publications that we put out that described this particular problem.

Ironically, the Monte Carlo method is the best way to model this. For people that were discussing statistics earlier, my recommendation is find ten data sets that you're happy with, and then apply Monte Carlo methods on it. In terms of one -- say one through ten units, 1% to 10% positive. And run through the process in terms of that.

At the conclusion of our studies though, let me just kind of get back on track here. The U.S. Navy and Marine Corps, after we looked at this 90 ways from Sunday, and they are, you know, family housing organization with a finite budget as well, they concluded that you have to test 100%.

Their policy is very clear. They want to protect all people from exposure to elevated radon. If you deviate from that, if you go to a lower number, you need to be honest and upfront with people that we're protecting almost everybody, or a certain number of people, but we're not catching that -- we're not catching it all.

The other thing that we found in working out the DoD data set was the fact that around five years seems to be a good time to do it. You need to be planning on that for the remaining lifetime of the, you know, of the building.

The other thing that you get into sometimes in terms of dealing with in family housing and stuff like that, is that mitigation, oh my God, if I ask the question I have to fix it. How are we going to fix it? Mitigation is very well established. It's been established for over 30 years in terms of the approach with that, you know, in that particular regard.

The current standards addresses a lot of questions both on testing and mitigation that were provided to the industry for answers. In

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terms of energy efficiency, in terms of upgrading envelopes, etc., it is a little complicated in terms of going forward. Theoretically, when you reduce the air change by 50% you double the radon levels. In practice it's entirely different.

If you take old housing stock that, and you fix the stack effect, believe it or not you can make the radon levels go down. However, in the newer stock that's being built in low radon areas like zone three that have extremely tight envelopes within say less than 0.3, the radon levels become entirely unpredictable.

The bottom line is the only way to know is to test in this population. With respect to radon resistant new construction with it, there's ancillary data that clearly shows that you put some pipe in, pass some stat, radon levels in the population do appear to be lower.

But no home is ever radon proof. But one thing I can say working with thousands of military homes that had RNC installed, is the fact that the end game, the fix, if the RNC is installed properly, is very predictable. It's a fan. It's a performance indicator, and a post mitigation test when you're done. So that becomes very easy on the on the back side. And for that particular reason the Navy and Marine Corps now require that all installations are RNC incorporated in their family housing. Thank you.

Mary Owens:

Thank you. Our next speaker is Ed Hussey from Sabal Capital Partners.

Ed Hussey:

Thank you. First, I'd like to thank FHFA for organizing this listening session, and for taking the time to listen to all sides of the opinions on this issue, which is an issue in our industry. My name is Ed Hussey, and I'm the Head of Agency Lending for Sabal Capital Partners. We're both a Freddie Mac, Optigo multifamily lender, including their small balance loan program and a Fannie Mae small balance lender. As you can see, our area of specialty is small balance.

A primary concern to any agency lender, and to our owners, is the safety of our tenants. That is why this is such an important issue. Another concern is affordability of housing. When you look at the small balance, the five to 50 unit programs, that represents close to 50% of the rental units in the country. It also represents a lot of naturally occurring affordable unit. Units that just [inaudible] in the tenants that they are geared towards they represent affordable housing.

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They also tend to have more owners that own three to five properties, not large owners in multiple regions. The cost of doing business matters a lot to the small owners. We have to make sure that we continue to provide affordable lending opportunities so that they can maintain and preserve their affordable rental at the housing for these tenants.

Commented [AARST78]: Living in a healthy and safe indoor environment that does not contain unsafe levels of radon gas likely matters to residents of these buildings.

So due diligence costs matter a great deal to the small housing owner. We need to make sure that we are doing effective due diligence. We need to make sure that the due diligence is not only cost effective, but scientifically effective in identifying risks associated with it.

That's why we believe that it's important that this new measure being considered be studied thoroughly. And if implemented, implemented in a proven risk base gradual method, not an immediate term. As many have discussed, with HUD implementing this policy there has already been an increase in the amount of time and costs associated with radon testing, due to fewer number of licensed testers and to lack of laboratory capacity to be able to process this.

Commented [AARST79]: Per the HUD commentor, this statement is not accurate. HUD reports no concerns with transactional delays or costs.

Commented [AARST80]: There are more than 6000 radon measurement professionals in the US. Both labs that participated in the session stated there are no issues. AARST supports a six-month implementation period to address capacity challenges, if any.

Also as mentioned, the number of loans multifamily units that HUD is involved with in multi -- in financing, is dramatically less than what the agencies are doing. And should they be added to this process, it would dramatically change the timeline involved with due diligence. That's why we support a reasoned view, an analysis of HUDs experience as they go through this. And we support a post-closing testing and implementation of this should it becomes to pass.

Commented [AARST81]: Again, the existing GSEs policies require radon testing to be conducted pre-closing. Mitigation is managed post-closing. No reports of transactional delays have been reported.

We also support the lenders recommendations already sent to FHFA regarding this. We believe this is an important topic and we want to continue the discussion to make sure that the safety of our tenants is also analyzed with the affordability of their housing. Thank you.

Mary Owens:

Thank you. Our next speaker is Daryl Carter from Avanath.

Daryl Carter:

Good afternoon everyone. I am Daryl Carter, Founder and CEO of Avanath Capital Management. Director Thompson, I express my gratitude to you and your colleagues at FHFA for convening this very important forum.

Avanath is an owner/operator of 90 apartment communities comprising 12,000 apartment homes. Our properties are in major metropolitan markets, mainly in high cost markets such as Los Angeles, San Francisco, New York, DC and Boston. We own affordable rent regulated properties, low income housing tax credit

properties, project based section eight and other affordable properties.

Fifty percent our residents our section eight voucher recipients, 70% of our properties are located in communities of color. I am also a former chairman of the National Multifamily Housing Council. And I fully echo the comments made earlier by David Borsos.

We've worked diligently to mitigate all environmental hazards in our properties. And we fully support all efforts to make housing safer. Nevertheless creating and preserving affordable housing is incredibly challenging. Excessive protocols and higher due diligence costs impacts housing affordability. And certainly my old friend, Mr. Hussey he just mentioned the additional costs on small owners, but it also happens to impact larger owners.

The other thing is that many on the call are implying that testing is done in a laboratory. And the comment that it would take only 34 days, it is no function of reality. You're not testing in a laboratory, you are entering someone's home, and that is one of the homes of our residents. So the logistics are extremely challenging and make, you know, conflict with local tenant access laws.

You know, I -- we're the first in two hours owner/operator that's actually in the trenches dealing with this when we refinance or are acquiring a property. But there are municipal notice provisions with specific protocols for landlords or consultants to enter tenants

I mean particularly in a place like New York City, these are very, very complicated. And so we may give a tenant notice that they're going to be tested. And if the consultant doesn't show up, then that may - then we have to do it all over again.

The other thing is placing canisters in apartment is disruptive to residents. And most consultants are ill-equipped to provide the appropriate explanation to our residents.

Also, for liability reasons a consultant cannot enter an apartment without one of our staff members. So testing requires the deployment of one of our onsite team members, which adds additional costs. While that maintenance person is accompanying a consultant all day inspecting 100% of the ground floor units, that is maintenance that they ought to be doing to benefit that apartment community.

Also residents push back and are quite suspicious of canisters left in their homes. Also tests can be disrupted by pets and small children.

Commented [AARST82]: As stated previously, we welcome the opportunity to provide support for the average time to complete radon testing. This average is based on the placement and retrieval of the devices, analysis of the devices in a laboratory, and submission of the measurement report to the client.

Commented [AARST83]: Tenant notification is already in place in such locations, and the GSEs' testers already comply. The standard provides guidance on notices.

Commented [AARST84]: Radon professionals don't deserve this slanderous suggestion. Our experience suggests the property owner or management firm is typically the reason for cancellations or delays related to testing.

Although the commentor may give a tenant notice of testing, the EPA-recommended standard requires notification. All residents must be informed of the conditions that must be maintained in order to obtain a valid measurement result.

Commented [AARST85]: The standard provides direction about device placement and retrieval as well as communications with tenants and management.

Commented [AARST86]: Onsite staff collaboration is a vital and appreciated resource. Initial testing occurs on a one time basis.

Commented [AARST87]: Accurate and early communication with tenants prevents this type of scenario. The standard provides direction about device placement and retrieval as well as communications with tenants and management. In a very small percentage of cases, devices cannot be retrieved because of occupant tampering or the activities of pets or small children.

Commented [AARST88]: The standard includes provisions for managing extenuating factors that prevent device placement and/or retrieval.

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If the 100% requirements are to be implemented, there should be provisions for post-closing testing.

Commented [AARST89]: No reports of transaction delays have been provided.

One of the things that has been rarely mentioned in, you know, the last two and a half plus hours are mitigations. And the one point I'd like to make that the mitigations, which are some form of venting, is actually very inexpensive. We have performed mitigation on a number of properties. Very few people on this call have discussed mitigation.

There are brilliant scientists, consultants and researchers participating on this forum. Using the comparisons of the pandemic, there seems to be far more focus on testing than creating a vaccine, which is mitigation. We should use some of this brilliance and resource to focus on better and cheaper mitigation methods that, you know, and if we -- that will go along with our testing protocols. Again, I thank FHFA for allowing me to testify and thank you very, very much.

Commented [AARST90]: Building radon-reducing new construction is a vital prevention strategy. Preemptive substandard mitigation of an existing building has the potential to release excessive radon where levels are not high.

Mary Owens: Thank you. Our next speaker is Bill Tryon from Partner Engineering and Science.

Bill Tryon: Thanks and thanks for the opportunity to provide feedback today. I'm the Chief Strategy Officer for Partner Engineering and Science. And I've been in the environmental industry for over 30 years and have experience on both the lending and consulting side. For 20 years I ran the environmental due diligence operations for Wells Fargo Commercial Real Estate. And for the last ten years I've been in consulting.

Partner Engineering and Science is a major provider of due diligence reports, including environmental engineering, and seismic investigations for commercial real estate. And we have a big practice that supports Fannie Mae, Freddie Mac and HUD loans, in addition to other commercial lenders, investors and owners.

Some of our clients ask us to provide some feedback, since we routinely complete radon assessments in the clients with [inaudible] National Radon Testing Standards now. We have experience with radon testing and multifamily properties, as well as providing appropriate recommendations with our own reports to satisfy HUD and the existing Fannie and Freddie requirements. And we think this gives us a unique perspective on the costs and timing associated with compliance with the revision to the standards.

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Just to be clear, we're not for or against a change, we just want to provide information so that people are taking action from a position of knowledge.

I think it's obvious that if you increase testing costs will go up. Currently, Fannie Mae and Freddie Mac radon sampling tends to cost less than \$1,000 per property, as compared to \$5,000 to \$10,000 per property for HUD transactions in the revised protocol.

Plus, about 25% of properties will -- in the HUD protocols have come back with elevated radon concentrations that require additional confirmation sampling and mitigation, which we've seen run in the range of \$2,000 to \$4,000 in the last year, or per unit in the last year. Cost can vary a lot depending on building design and conditions. But that's a typical cost that we're seeing.

We also see some delays in the time to collect samples. As was mentioned earlier, finding the right people to collect samples can be problematic. There is an additional time element to the collection of samples and placement of canisters and collection of the canisters at the end of a project. And in the event that some canisters are destroyed, retesting can be required, which will further extend the requirements for sampling.

We have a lot of licensed professionals on staff. They're all busy, and they will get busier when this is implemented. As someone mentioned earlier, there could be a 10x impact on the extent of sampling involved. And while the laboratories may be capable of handling that volume, we believe that the radon professional industry is not.

At Partner we have a lot of licensed professionals, but we would need time to conduct additional training to staff that needs of revised standards. In zone one areas in the country there are a lot of licensed professionals now. But there's a real shortage in areas with low radon zones, or low radon concentrations like zone three.

We'll commit ourselves to training and certifying a lot of people around the country to meet the demand. But to build capacity the industry will need more time. A phased implementation of changes would allow for a ramp up within the professional community.

Finally, you would think we would be excited about changes to sampling requirements because they would result in increased fees for our firm, but we really have mixed feelings. We're concerned that apartment owners will react negatively to this process, and that we will be caught in the middle.

Commented [AARST91]: This range directly conflicts with the \$20,000 cost cited by another commentor. Our experience suggests an average cost closer to \$5,000 per property.

Commented [AARST92]: 25% with high radon levels is four times 6% found in the EPA 1993 survey. This is consistent with our findings.

Commented [AARST93]: Environmental consulting firms using subcontractors typically require longer to complete testing.

Commented [AARST94]: Private proficiency certification requires completion of training by an approved trainer; multiple online course options exist. Training is widely available.

Commented [AARST95]: Agreed, six months should work well.

Commented [AARST96]: We contend that residents will react favorably to living in healthy and safe indoor environments that do not expose them to unsafe levels of radon gas.

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Our records show that there are plenty of lenders who don't require radon sampling at all. So the change could actually encourage less sampling if borrowers moved to other sources of financing. If there is a change in testing requirements, you can count on us to work hard to educate lenders and borrowers about the process and the value of testing.

Again, thanks for the opportunity to provide some feedback today. And please feel free to reach out if we can help in any other way. Thanks.

Mary Owens:

Great, thank you. Our next speaker is David McCarthy from CRE Finance Council.

David McCarthy:

Good afternoon. I'm David McCarthy, Senior Director for Policy and Government Relations at the Commercial Real Estate Finance Council, also known as CREFC.

CREFC is a trade organization that represents more than 300 commercial and multifamily lenders, servicers and investors and third party service providers including participants in the enterprise multifamily space. CREFC is dedicated to promoting liquidity, transparency and efficiency in these markets.

Multifamily lenders and investors do not want renters exposed to radon. Affordable and market rate housing should be safe housing. We support an increase in radon testing and we as an industry are committed to implementing the most effective testing protocols.

Our industry stands ready to work to detect and mitigate radon exposure in multifamily properties, and we offer the following four points.

First, testing infrastructure must support an increase in radon testing demand. We have serious concerns that rapid adoption of the proposed standards will create an unprecedented national demand without adequate testing capacity.

Commented [AARST97]: We agree and recommend a 6-month implementation timeline to address potential capacity challenges, if any.

Second, increases should be focused and based initially on risk rather than a one size fits all. Increased testing should use available data and science to identify at risk areas and properties to identify and mitigate radon exposure where it is most likely to occur.

Commented [AARST98]: Decades of research support adoption of the EPA-recommended consensus radon standards.

Third, our industry is ready to work with FHFA and the Enterprises to implement new testing standards and address operational challenges. And we'll provide some suggestions.

And finally, while the focus here today is on radon in multifamily buildings, we know that radon does not only exist in multifamily units. Government policy should not overlook radon risks in single family homes.

Commented [AARST99]: We agree.

So more detail on our recommendations. First, overburdened testing capacity is a threat. CREFC supports a risk spaced scientific approach that provides time for the testing industry to build capacity to meet demand. A higher radon testing requirement is futile, if it is not supported by a robust testing infrastructure. An Enterprise driven demand increase on testing will have impacts far beyond the Enterprises own operations, as non-Enterprise multifamily properties will still need access to radon testing.

A strain testing infrastructure will siphon testing resources from these high risk areas and quick ramp up without qualified testers could call into question results and exacerbate the situation for at risk tenants.

HUD's adoption of the proposed standards in December 2020 serves as an early warning signal. Environmental testing firms report that the increased thresholds on HUDs requirements have -- for testing have already extended radon testing timelines. And the Enterprises annually produce ten times the number of multifamily units compared to HUD. Testing timelines are expected to increase once the Enterprise increases their testing.

Commented [AARST100]: HUD adopted its multifamily policy in 2013. Per the HUD commentor, transactional delays caused by radon have not been reported. In addition, the existing GSEs policies requires testing pre-closing. We're unaware of transactional delays caused by the existing policies.

Now while HUD has already implemented the proposed standards, the standards have been in place for less than a year. Utilizing HUD data, FHFA should study the impact from the increased demand and calibrate a phased approach that matches testing supply with demand.

Commented [AARST101]: The standards were implemented in 2013.

Moving to our second point that testing enhancement should be risk based. Again, affordable housing should be safe. Market rate housing should be safe. A risk based approach focused on testing -- it can focus testing resources to buildings that need it most and allow the testing industry to scale up.

Commented [AARST102]: Radon is unable to determine the difference between rural housing, affordable housing, market rate housing, etc.

Radon testing is intrusive to tenants and their -- and normal actions such as opening windows or other common activity could invalidate testing results. Thus, it's important to educate and focus resources to overcome these issues.

Commented [AARST103]: Tenant communication is key. The standard provides guidance for notifications and risk communication.

Several states with higher incidence of radon occurrence have already determined that 100% ground floor testing requirements are necessary, and property owners and lenders work with these

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qualified testers in those states to meet those requirements. But a national requirement needs to align with the risk posed. At minimum policymakers should use available and new data records and geological features in formulating a risk based approach.

Commented [AARST104]: Radon does not line up with risk predicted by the EPA map and data. The EARTH study found more high radon levels in FL CA KY than some of the licensing states.

Finally, our industry is ready to work with FHFA to implement new testing standards and address operational challenges. HUD's experience can serve as a valuable tool in crafting and implementing a testing policy.

A few quick points to note. The nature of a HUD loan has a longer timeframe to complete than an Enterprise loan. Radon testing on HUD properties can be at least a six to eight week process, though HUD allows for a four month window for testing completion.

Meanwhile, the current Enterprise loan closing is 60 to 90 days, and radon testing generally needs to be completed prior to loan closing. Allowing for some post-closing testing as the industry awaits an increase in testing capabilities will alleviate timing pressures.

Commented [AARST105]: The existing GSEs policies require radon testing pre-closing. Transactional delays caused by radon testing have not been reported.

Finally, FHFA should commit to periodically reviewing the standards as additional data and experience add to our understanding of the radon risk. Thank you for the time and the opportunity to speak and we look forward to continuing this important conversation.

Mary Owens:

Thank you. Our next speaker is Rick Wolf from Greystone and Company.

Rick Wolf:

Hi my name is Rick Wolf. I'm an EDP at Greystone. I oversee Production, particularly production of the -- our small business. I want to thank FHFA for hosting this forum. This very important topics and appreciate the opportunity and the depths that the speakers have offered here today.

I also want to say that I do, you know, in listening to what Mike and Dan and Ed and Daryl say, I support their comments and can appreciate the need for balance to address this complex issue.

I think the thing that I would want to emphasize is that the -- particularly in a small loan space, we're talking five to 50 units, and I think Ed had mentioned that's roughly 50% of housing stock. There's a lot of units there. And to get into them is a time consuming and logistical, significant effort.

Commented [AARST106]: The smaller properties have risk comparable to larger ones: all occupants should be protected. Radon is unable to differentiate between building sizes.

There's also alternative sources of financing in this space. And I want to make sure, if we're solving a problem of health and safety, which I think we all agree and I certainly do, is something that we want to address the need to address.

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I think that it's important that we don't simply move people to other sources of financing that don't require this testing. I would recommend and support a balanced approach that is, as Mike said, is a risk based approach. Is based in science where we can look at the data and appropriately calibrate the methodology, and one that has a reasonable timeline for implementation so that we're not simply having people move to a source of financing that does not require testing, or has far more lacks standards.

Commented [AARST107]: We agree.

And maybe offers a financing solution that is not in the best interest of the borrower that may move them to short term financing, that exposes them to other risks like interest rate risk. Which could also impact rents, and also impact the tenants and the quality of the tenants.

Keeping them within a Fannie or Freddie loan is important for a lot of reasons, not just for the interest rate that they may get. The loan product's important, the standard of care, life safety, health safety that the agencies promote, is very important.

And I feel that if we push people away into other sources of financing that don't have a radon standard, we're not helping them in the long run. You're not preserving affordable housing, you're not preserving life safety, and you're not necessarily solving the safety issue that we're talking about here today.

So I would support a balanced approach, a risk based approach, something with a reasonable timeline, and then something with the post-closing requirements to remediate. And so with that, I thank everybody, and again I thank FHFA for this opportunity to speak. I hope we can find a balanced approach here and keep the flow of transactions moving and keep the business moving. Thank you.

Mary Owens:

Thank you. Our next speaker is David Pearson, from Related.

David Pearson:

Hi good afternoon, and thank you very much to the FHFA for convening this session and allowing me the opportunity to speak. I'm David Pearson. I'm the Senior Vice President for Related Affordable, which is the division of the Related companies that focuses exclusively on the preservation and renovation of existing affordable multifamily and senior apartments throughout the country.

Related Affordable oversees approximately 45,000 units of multifamily affordable properties throughout the country. And certainly providing a quality place for our residents to live that is a healthy environment, is of a topmost priority for us.

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But I think what I wanted to reiterate was to echo a lot of what Daryl Carter said, from Avanath, a little bit ago. When a policy is created it certainly needs to recognize the realities on the ground. And the realities on the ground are that doing 100% of units pre-closing is just not going to be feasible at certain of these properties.

For one, sellers will not always allow us to access 100% of the units. Sometimes they don't have keys for 100% of the units. It takes staff time from them, as Darrell mentioned, because we need to be with the testers as they're going in a dropping off canisters in all these units.

There's a lot of logistics around not just radon testing, but all the various environmental testing that goes into the due diligence process, not to mention appraisals and market studies. There are multiple, multiple visits that need to occur at each acquisition or during a refinancing. And adding this additional layer of testing requirements on top of what exists, is going to create a much larger burden.

And the other aspect is that, you know, residents -- certain of the residents are frankly very suspicious of canisters that get left in their units for several days. We find that, you know, a number of them get thrown out the window or thrown in the garbage, damaged by pets, or children accidentally, which requires follow up testing and follow up testing. And after multiple tries, we're still not able to get to 100% compliance to all ground floor units.

So there needs to be some aspects of post-closing requirements to follow up for units that are not able to be obtained prior to closing. And some reasonable level of percentage units that need to be required before closing. Otherwise it's going to result in borrowers having to choose other lenders to ensure that they're able to close out their acquisition in a timely manner and successfully. Because this will just become a non-feasible financing tool for us to use if it puts our capital at risk. So I appreciate the opportunity to speak and look forward to seeing the outcome.

Mary Owens:

Thank you. Our next speaker is David Levy from Walker Dunlap.

David Levy:

Yes hello, good afternoon. My name is David Levy. I'm the Chief Credit Officer Walker & Dunlop. Walker & Dunlop is the largest Fannie Mae lender and also a top Freddie Mac Optigo seller/servicer. I've been underwriting multifamily loans for over 35 years and thus for have extensive experience in risk evaluation associated with multifamily housing.

Commented [AARST108]: The standard provides for managing extenuating factors, such as access issues. We agree that obtaining access to 100% of all units is not always feasible. Guidance is present in the standard for these scenarios.

Commented [AARST109]: Yes, effective tenant communication is key. Our experience suggests a small number of devices cannot be analyzed for these types of reasons. Again, guidance for extenuating factors is contained within the standard.

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And of course, I strongly agree with the intent to protect occupant health and safety in multifamily housing. Everybody here does. But there needs to be a practical approach to accomplish this. Without a one size fits all testing protocol it is infeasible to implement.

Commented [AARST110]: The existing GSE policies require radon testing of all properties to be conducted pre-closing.

I've worked with the Fannie Mae DUS Advisory Council and others to provide written detailed feedback to FHFA on our major concerns. If the anti RS testing protocol was easily implemented in a non-disruptive manner, I would of course be supportive of it. But unfortunately, it is not.

Commented [AARST111]: We're unaware of any disruptions caused by radon testing: radon is not proven to be the cause of transactional delays.

As we mentioned earlier, radon levels vary widely across the country based on variations in geography. And we've proposed an alternative approach that recognizes this, and bridges the gap between where we are today and concerns raised regarding the appropriate level of testing.

Commented [AARST112]: We welcome the opportunity to review any alternative approaches proposed.

Fannie Mae and Freddie Mac are the primary source for financing affordable multifamily housing in the country. These are incredibly important programs that have financed millions of units of affordable housing nationwide. Now more than ever, affordable housing is critically needed, and access to a safe, clean, affordable home is a catalyst for healthier communities.

Can we enhance the way that the agencies currently address radon? Absolutely, but let's do it in a way that follows the science and does not disrupt their mission.

One of the bases for concerns regarding the current testing protocols is the Earth Study. As we have heard, the results were not independently derived, as preference was given to obtaining data that included buildings with already known units with elevated radon.

Commented [AARST113]: The study was independent. 58% of the buildings did not have elevated radon, although key analysis entailed looking at results with elevated levels. The commentator does not appear to understand the intent of the research.

And additionally, there are very large data gaps in the study as only 3% of the units included, were located in low radon areas.

Commented [AARST114]: Few properties in zone three were eligible because most lacked 100% testing. 5% of the buildings were in Zone 3. Again, the commentator does not appear to understand the intent of the research, which wasn't to determine what properties should be tested.

Therefore, in order to determine if changes to current Fannie Mae and Freddie Mac protocols should be made, unbiased and independent studies that are representative of different apartment types across different geographies, and utilizing appropriate follow up testing should be undertaken.

It's very important to this conversation to recognize that the majority of properties financed by Fannie Mae and Freddie Mac are not located in the high radon zones of the country. In fact, their greatest concentrations are in the lowest radon areas where the average radon levels are half of the EPA actual level.

Commented [AARST115]: We don't agree with this statement and would welcome the opportunity to review the supporting data. As the EPA commentator confirmed, though, all properties should be tested, regardless of location.

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There are also a number of concerns regarding implementation, and they relate to logistics, timing and costs. Adoption of such an expansive change in current radon testing protocols require a transparent review of these issues. And a careful analysis of the implications before implementation.

In regard to logistics and feasibility, in recognition that HUD has recently adopted the NCR protocol it's important to make clear that that lending promo is entirely different than Fannie Mae and Freddie Mac in many ways, but certainly in terms of scale and timing.

In terms of just pure scale, as you heard, Fannie Mae and Freddie Mac finance approximately 1.6 million housing units per year. This compares with HUD at about 160,000 units, or a fraction of that size. That equates to around 1,000 properties for HUD, compared to 10,000 properties for Fannie Mae and Freddie Mac.

If we assume two storeys per building just for relative comparison, HUD ground for testing would cover around 80,000 units per year versus 800,000 for Fannie Mae and Freddie Mac. The capacity and scale of the infrastructure required to support this type of testing does not currently exist. We've provided a detailed review of this deficiency to FHFA.

While recognizing that the HUD program is certainly smaller, prior to enacting any changes for Fannie Mae and Freddie Mac, let's of course perform a detailed review of their experience and findings. As proposed testing protocols even include upper floors of apartment properties, what were those results? What about buildings built over subterranean garages? How do results vary by geography?

Mary Owens:

You're at time, sir.

David Levy:

So lastly, I just wanted to say that we can certainly eliminate barriers to accessing Fannie Mae and Freddie Mac loan programs and develop a thoughtful alternative that also protects occupant health, we can do both. Thank you.

Mary Owens:

Thank you. This concludes our session on the Effects of Radon Testing and Mitigation on the Multifamily and Radon Industries. Our next session is a discussion on Radon Industry Capacity, Certification and Regulatory Environment. Our first speaker is Dallas Jones from the American Association of Radon Scientists and Technologists.

Commented [AARST116]: We would welcome the opportunity to review this data. We provided FHFA and the GSEs a detailed analysis of capacity that disagrees with the information provided by the commentator. As previously stated, a reasonable implementation timeline of 6-months is sufficient to address capacity challenges, if any.

Commented [AARST117]: We've provided numerous data points to FHFA and the GSEs to support radon being identified in upper floors, over garages, and throughout all geographical regions.

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Dallas Jones: Thank you for the opportunity. My name again is Dallas Jones, and I am the Executive Director of the American Association of Radon.

Mary Owens: Mr. Jones, would you mind speaking up a little bit? It's a little bit hard to hear you.

Dallas Jones: Okay. Can you hear me now? Is this better?

Mary Owens: It's very faint.

Dallas Jones: How about now? Still very faint?

Mary Owens: That's a little better.

Dallas Jones: A little better. All right. I'll speak as loudly as I can. I don't know why my mic is not working well. So as I was saying, I am the Executive Director of the American Association of Radon Scientists and Technologists, keyword being scientists. We do focus on science.

Our association includes the oversight of the National Radon Proficiency Program, which has its own autonomous certification council, which determines the rules of that program and manages that. And then we also have the AARST Consortium on National Radon Standards, which is accredited and annually audited by the American National Standards Institute.

I personally co-founded my first radon business in 1988, and have about 25 years or more of radon training experience, before coming on board as the Executive Director. Next slide.

Mary Owens: Can please mute your phone if you're not speaking. Thank you.

Dallas Jones: So one of the arguments we've heard today is that individuals with no radon measurement training should be allowed perhaps to test properties as part of the due diligence process for radon assessment of multifamily properties.

When we look at the short timeframe and the affordability for an individual to receive the necessary training to perform such an important task correctly, there just isn't any reasonable excuse that we can see for using unqualified testers.

If you look here at our graph or the chart, you can see that the cost of the measurement professional exam prep course averages less than \$300 and takes only 16 hours to complete. If you add in the cost of the certification exam, the certification fees and even a copy of the multifamily measurement standard, you'll see that an

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individual can complete the whole process in 20 hours for just over \$700, it's likely.

The other thing that I'd like to mention here is that capacity is accomplished by having trainers that are there to make sure that we get people brought up to speed with the skills and the job abilities needed.

So if you see here we have at least eight classroom courses that are NRPP approved for exam prep, and additional 13 NRPP approved courses that are offered on the web. These are either regularly scheduled as live on the web or on demand.

And then we have an additional for home study courses. My staff told me this morning, that in the last ten days we've had two additional applications for courses to be approved. So we're quite confident that we have the structure to train people. If we had six months of lead time from the announcement of AARST radon policy, we're quite confident in we have interviewed and had some conversations with trainers across the country that we could ramp up to meet the demand. Despite what you've been led to believe perhaps my some today. Next slide.

Currently, as far as the capacity, we have almost 2,300 individuals that are certified as radon measurement professionals in the NRPP, you add in almost 450 from the NRSV, and then over 4,000, almost 4,100 that are state licensed.

It's also just important for you to know that testing every ground floor a unit on a property doesn't slow the process any more than testing 10% or 25%. We've had extensive conversations with professionals that are out there doing these jobs. And deployment is still going to be done in a day and retrieval two days later. Yes, they may have to have some additional technicians there on site to get that done, but it's also noticed -- or notable that the industry has had plenty of practice performing the 100% testing standard within the HUD program.

And I think moving forward, it's not going to be a stretch for the industry to accommodate the GSEs with the capacity to move forward. Next slide.

Mary Owens:

That's time, if you could please wrap up your comments.

Dallas Jones:

Well final thing. Just recently we have done a quick search of the NRPP database. And we have found at least 36, large due diligence firms that are already have plenty of people that are certified. We verified these firms for the type of work they do. They cover over

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100 locations across the country. And as many as 140 certified employees certified in radon measurements. The staff have seen a rise in applications for exams.

And again, we can't -- the important thing here is that we can't expect to have the capacity that everyone is wanting without having a policy in place that we can relate to the folks in the areas where we need to build that capacity. Thank you for the opportunity.

Mary Owens: Okay, great, thank you. Our next speaker is Kim Steves from the Conference of Radiation Control Program Directors. And again, I wanted to remind everyone to please mute your phones, if you're not speaking, we're getting a little bit of feedback.

Kim Steves: Do you have slides for me?

Mary Owens: Just a moment, Kim, we're going to pull those up.

Kim Steves: Thank you.

Mary Owens: It appears we're having some technical difficulties. All right.

Kim Steves: Thank you. My name is Kimberly Steves. I am the Director of the Kansas Radiation Control Program at Kansas Department of Health and Environment. And I currently serve on the Board of Directors for the Conference of Radiation Control Program Directors.

I have worked with the health businesses for the state of Kansas since 1988. As the Director of the Radiation Control Program for Kansas, I have been responsible for our state radon program for more than 30 years. This includes the direct leadership of this program during the time in which Kansas developed and worked through the legislative process to have laws approved, requiring the certification of radon professionals in our state, and the mandatory submittal of radon testing and mitigation data to the state. I am trained and certified in radon testing and mitigation. Next slide, please.

I'm speaking today as a representative of the Conference of Radiation Control Program Directors, otherwise known as CRCPD. Our primary membership is made up of radiation professionals in state and local governments. I currently sit on the Board of Directors of the CRCPD as its past chair.

The CRCPDs mission is to promote consistence in addressing and resolving radiation protection issues, to encourage high standards of quality in radiation protection programs, and to provide leadership in radiation safety and education.

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CRCPD also provides a forum for centralized communication on radiation protection matters between states and federal governments and between individual states.

The reason I am here presenting to you today during this listening session is because our members have spoken. The state radon programs feel very strongly that adoption of policies utilizing the NCR multifamily radon standards by Freddie Mac and -- Freddie Mac and Fannie Mae is needed. Next slide, please.

Older standards which address radon testing and mitigation in multifamily buildings are no longer being maintained. The NCR multifamily standards are the most accurate and up to date standards current with the most recent science and technology.

Contrary to some of what's been said today, these standards were developed using science based and risk based processes. The consensus process used to develop and maintain the standards is universally accepted. The CRCPD and the state radon programs are committed to the use and adoption of these NCR standards. Next slide.

What I'm sharing here is a table illustrating the states which currently have legal requirements for certified or licensed individuals to provide radon testing and mitigation services. As you can see, the NCR standards are the primary source of protocols for performing radon work. With these states any alteration or modification to the standards would put the radon professional in violation of state law.

In August 2019, EPA issued guidance on the use of voluntary consensus standards for state indoor radon grant recipients to alert the state to the agency, the EPA is recommendations, to reference the most current voluntary consensus based standards when implementing their radon program. The NCR standard, which is the most current, is not an EPA standard.

As I mentioned previously, along with representing CRCPD, I am also representing the program of the Kansas Radiation Control Program. Our program is in the process of updating our own regulations to adopt the NCR standards, instead of the now retired old EPA standards. It is a slow process but moving forward and I know several of the other states on this list are also in that process. Next slide.

We cannot use radon data to determine radon risk. There is no way to know if a building or unit has elevated radon except by

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performing a radon test. Radon data only tells us the potential. It is important to emphasize that as more data becomes available, greater potential for elevated radon is being identified throughout the United States. With more energy efficient building practices mandated in code and in lending policy, this trend is expected to continue.

The 20 states which have laws requiring radon professionals to be certified or licensed, also require that radon testing and mitigation data conducted in their state be submitted to the state program. If FHFA wishes to review radon data associated with their previous Fannie Mae and Freddie Mac loans, those 20 states should have been provided that data by the loan lists, and CRCPD is happy to review those loan lists and coordinate with our states to share that data with FHFA. Next slide.

To conclude, the state and the CRCPD the state radon programs and the CRCPD strongly support incorporation of policies requiring that Fannie Mae and Freddie Mac utilize the EMCR radon standards without modification for the testing and mitigation on multifamily buildings. We stand ready to provide expertise from state radon programs to consult in the development of a strong policy towards this goal. Thank you.

Mary Owens:

Thank you. Our next speaker is Brian Hanson from Kansas State University.

Brian Hanson:

Good afternoon. Thank you, Mary. I appreciate that. And I always hate following Kim because she's always out talks me by a mile. My name is Brian Hansin. I am the Coordinator for the Radon Programs that are housed at -- in the College of Engineering here at Kansas State University.

Since 2009 K-State has housed the national radon program services via cooperative agreement with the U.S. Environmental Protection Agency providing national public risk -- technical assistance on radon risk to all aspects of the public be it the industry, be it the real estate market, be it home buyers and sellers, etc.

Since 2002, I have been the Coordinator for the Kansas Radon Program, again working very closely with Kim Steve's, handling the state level radon technical assistance and public education and professional education here in Kansas.

K-State is also one of the original U.S. founded regional radon training centers from 1988, providing professional entry level and continued education for the radon industry. And since, for the last

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four years now, we have housed the only university based secondary radon chamber as certified by the National Radon Proficiency Program.

The current lack of standardization related to radon testing protocols in federally and privately funded multifamily building projects does create substantial challenges for us here at K-State in terms of our provision of technical assistance to the public.

Our programs take weekly calls or more from lenders, buyers, sellers, environmental management companies, radon professionals, related to what the protocol is that they should be following when conducting multifamily measurement activities.

Currently, we have to refer those clients and those technical assistance contacts back to their specific finance agency, because of the lack of consistency of the radon testing protocols for multifamily situations, in order to properly determine what the environmental reporting requirements are going to be for the project in question.

Adoption of the NCR multifamily measurement standard would allow our program to refer those questions to a freely viewable, sole source documents, eliminating that challenge of what protocol am I supposed to be following.

Standardization of the testing protocols would provide multiple benefits. One, all questions concerning which protocol for testing to use would be answerable by reference to a standard. It is what it is in the document.

Two, error rates and measurement results would be greatly reduced due to the standardized deployment procedures, and standardization of quality assurance quality control activities across the industry.

Three, as has been mentioned previously, mitigation activities can be targeted to the elements of this building or buildings in question that actually have radon problems rather than needing to address an entire structure that might, quite frankly, be overkill in terms of radon reduction or control.

And four. standardization of measurement protocols would provide the greatest protection to end users of those spaces in regards to the radon gas exposures, i.e., our tenants. The K-State Radon Programs strongly support the adoption of the NCR multifamily measurement standard by Fannie Mae and Freddie Mac in relation to their multifamily residential finance programs.

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I want to thank FHFA for having this meeting today, taking the time to listen to us all. And I would like to relinquish the rest of my time. Thank you.

Mary Owens:

Thank you. Our next speaker is Nate Burden from American Association of Radon Scientists and Technologists.

Nate Burden:

Hello. Yeah, this is Nate Burden. I want to thank again, the Federal Housing Finance Agency for inviting me to talk at this session. I appreciate that. I'm the current President of the Pennsylvania AARST Chapter, the American Association of Radon Scientists and Technologists.

Pennsylvania has about 40% of their homes have elevated levels above four. In fact, some of the highest radon levels have been found in the state of Pennsylvania. Central PA had radon levels over 3,000 picocuries per liter. Allentown, PA with the X level of four, actually as much as 17,000 picocuries per liter.

The question about zone maps, even in zone three areas such as Philadelphia, we have measured radon levels over 400 picocuries per liter. Therefore, using that map as a reason to concentrate where are you going to be doing radon testing is sort of a misnomer, you know, for that. Obviously with CDC, they are changing that.

As for that also as being a health -- a nuclear physicist and radon scientists, going to Carnegie Mellon, and I guess the concern here is also whether we have the capacity to do that. CPCPD specifically in 2019 trained all of their licensed testers and mitigators.

That's over 400 testers and mitigators just in the state of Pennsylvania, and [inaudible] and, you know, and the AARST NCR multifamily standard for radon measurement and radon mitigation. That was a two day course that was given to every single licensed radon tester that was just in residential, where the EPA felt it was necessary to get ahead of the game by training everyone in their state on multifamily housing, both for measurement and mitigation.

The second thing is having done houses and apartment buildings and things like that, the logistics is already built into the actual standards. There are sections that deal with communication. How that communication is supposed to be done. People are specially trained in that messaging to that. So that's not something that is intrusive I found in doing numerous apartment buildings, where that information is clearly communicated to the tenants, its coordinated where enough time is given that everybody can do what's the required amount in order to get an accurate test. And most tenants

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want to know what the radon levels are. So that becomes very important.

Lastly, again it is appropriate and important for the GSE policy to require radon measurements and radon mitigation to adhere to the RS ANSI standards. And that basically, we feel radon induced lung cancer is preventable number one. And that when a good GSC policy that addresses radon actions following these standards, we can actually save lives and reduce the risk to the occupants.

Be aware that even in any zone, there is no specific way to know unless you do radon testing. So that is so critical to be done. As I said, lastly I do not find, at least for the buildings that I've tested, we've tested over 100 buildings, you know, in my career that doing this the correct way, and all of that is included in the actual NCR multifamily standards on communication to the client, to communications to the tenants. All that is carefully done in order to reduce the amount of impact to everyone involved. Thank you very much.

Mary Owens: Thank you. Our next speaker, Sara Jensen from the U.S. Department of Housing and Urban Development.

Sara Jensen: Hi everyone and Mary, do you have some slides? Yes, you do. Thank you. So good afternoon everyone. My name is Sara Jensen and I'm the --

Mary Owens: Sara, you are on mute all of a sudden. You were - there you go.

Sara Jensen: Okay, it looks like some -- Okay, well hi again. I'm the Housing Program Environmental Clearance Officer for the Office of Housing at HUD. And I'm here to speak today about housing experience with the radon policies for multifamily FHA, laid out in the map guide. And for healthcare FHA, under the Office of Residential Care Facilities laid out in the 232 handbooks. Next slide, please.

Some short background, in 2011 HUD's Office of Healthy Homes and Lead Hazard Control participated on the federal team led by EPA that developed a federal action plan on radon. The primary goal was incorporating radon testing and mitigation into HUD's programs.

In 2013, multifamily issued a notice called HUD Office of Multifamily Development Radon Policy. HUD reviewed industry practices, including those at Fannie Mae and Freddie Mac, and the resulting policy incorporated best practices for the detection and mitigation of radon.

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The notice required NCR's testing standard that allowed 25% sampling of ground level unit, instead of 100% ground floor testing. The notice also encouraged, but did not require testing for 223 SP finance, located in zone three of the EPA zone map if confirmed by available state and local radon data or maps.

In 2016, this guidance was incorporated into NACA directly. In 2017, the Office of Residential Care Facilities incorporated the radon policy into the 232 handbooks. But with one important change. No zone three exception for 223 (f) refinance. This change was driven by EPA guidance and by radon field data showing elevated radon levels in projects located in zone three. HUD also considered that Freddie Mac and Fannie Mae did not allow zone three exception. Next slide, please.

There were some intermediate updates in 2018. But the next big policy change was the 2020 Mac Guide, published in December 2020 and effective March 18, 2021. This update requires 100% ground floor testing following the standard, and removes the zone three exceptions for 223(f) refinance. Both updates were driven by data, the radon field data for the zone three exception and the HUD funded Earth Study for the 100% ground floor testing.

And I do want to note that the Office of Residential Care Facilities is currently updating its 232 handbook with a goal to align the radon requirements with the map guide, with the caveat that map and 232 follow a different radon testing standard. Next slide.

This slide highlights key points of the 2020 map radon policies. For these and other details, please visit HUD's posted webinar on the 2020 Radon Requirements. The link is on the slide, or you can search HUD map webinars and you'll find it. So next slide.

I want to end today by talking about the impact to the FHA platform. There have been three major radon policy changes, the creation of the policy in 2013, the removal of the zone three exception for healthcare FHA in 2017, and the 2020 map guide.

While there may be individual cases of delay, particularly right at the policy transition, HUD has seen no discernible patterns of impact on application numbers for processing timelines at the first two policy change points.

In fact, we have unprecedented numbers of applications for both multifamily and ORCS. Housing does see the potential for delays due to COVID restrictions on site visits, particularly for residential care facilities. And responded with flexibility on radon reports

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submission timeline. So HUD is sensitive to potential delays. We're just not seeing them from the radon policy outside the context of the global pandemic.

It is too early to comment on the impact of the 2020 map changes. Multifamily currently has 450 projects in the queue, and so staff are still mostly processing applications submitted under the 2016 map guide. However, we do not anticipate any impact on application numbers for timing from the shift to 100% testing, since the radon professionals already visit the site for 25% sampling.

We actually anticipate that in some cases, the 100% testing requirement may limit the number of times a radon professional has to revisit a site. Because under the 25% sampling policy, any unit had elevated radon, the radon professional had to go back on the site to do 100% radon testing. With the new policy, this will no longer be the case.

We are hearing concerns from lenders about finding radon professionals to make site visits for projects in zone three. However, I would note that HUD heard these same complaints on the ORCS policy in 2017, and did not see any actual impact on application numbers or processing timeframe.

While ORCS is seeing that HUD is happy to share our experiences in more detail with FHFA, Fannie Mae and Freddie Mac, we also support EPA and CDC efforts to collect radon data so that we can all work from the best possible information about radon risk. Thank you for the opportunity to speak today.

Mary Owens:

Thank you. All right our next speaker is Robert Hazelton of Dominion Due Diligence Group.

Robert Hazelton:

Hello, I'm Rob Hazelton, Founder and CEO of Dominion Due Diligence Group. We're a third party environmental engineering firm that specializes in servicing a HUD FHA housing portfolio, including mortgage insurance products under map, section eight renewal studies, public housing repositioning, RAD, rental demonstration, low income housing tax credits.

I hold a degree from Bucknell University followed by many professional licenses for environmental studies. I started this company 27 years ago and annually we inspect more than 2,200 multifamily and senior living properties in this country. I'm involved with the HUD -- I've been involved with HUD since the inception of the map guide. An active industry participant all subsequent iterations of the guide. Working with Sara many times.

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For the past decade, I focused on affordable housing and regulatory barriers which exacerbate our country's growing housing crisis. I'm currently a Board Member of the Federal Home Loan Bank of Atlanta, HSBC, the National Housing Association and National Housing Rehabilitation Association and the Multifamily Lenders Council.

I want to thank FHFA for letting me speak and raise my industry concerns potential unintended consequences and recommendations on radon.

Concern number one I have, in affordable multifamily houses its estimate upwards of 40% of development costs is governmental regulatory barriers. Since the most recent HUD multifamily map guide, my firm's experiencing environmental sampling costs of multifamily properties increased by more than 500%. And all the while the affordable housing crisis grows.

Commented [AARST118]: We assume this statement is related to all environmental sampling, combined, not just radon. The commentor does not indicate the period of time over which this increase occurred, which is likely decades.

When is excessive testing in the name of risk reduction going to be recognized as another impediment to solving our country's growing workforce and affordable housing crisis?

Concern number two, the EPA mapping data of radon zones is from 1993 and based on 1980 data update. The [inaudible] update the maps, the EPA recommends test everywhere and everything. Listening to today's discussion, it's obvious that many governmental agencies are mining for data and requiring excessive testing of multifamily housing as a means to accumulate data is another tax on the poor of this country. Just adding to the in-affordability of rental housing.

Concern number three, too much weight has been put on the Earth Study which is inherent limitations to the analysis, including its only for New York State. The adoption -- to adopt the conditions in New York State as a nationwide test requirement does not appear statistically viable or prudent.

Commented [AARST119]: This statement is incorrect. The study was a national study led by the NYS Health Department research scientists; 3 of the 152 properties were located in New York.

Concern four, radon testing in multifamily is difficult to schedule, unit access, resident tampering, weather, seasons and not being able to ensure controlled close house or building conditions. Many of the qualified speakers today talk about the practicality and affordability of testing. But I contend, those comments are only accurate in the single failing assessment.

Commented [AARST120]: A small percentage of areas are unable to be tested due to these types of items.

We're with the largest provider of HUD due diligence in the country, and I can unequivocally state that 100% testing is not practical in multifamily housing.

Commented [AARST121]: 100% testing is currently required by HUD. Per the HUD commentor, transactional delays and other issues have not been reported.

Concern number five, radon exposure is a dose response relationship. And while maybe not exactly linear, it is dose response. This is important understand that the average homeowner is in place for 13.3 years in this country based on the most recent census.

The two radon victims who spoke earlier, my heart goes out to them. But they both talked about being in their houses for 22 and 19 years respectively. If the average multifamily renter stays only three to four years, assisted living facilities that we deal with with HUD a lot, the average day is 2.5 years. And skilled nursing the median stay is under six months. What is their exposure risk rate to radon at that point? Have to ask.

I have concerns that much of the science and risk evaluation being used to justify increased testing in multifamily housing is based upon the single family risk, not the multifamily risk.

Unintended consequences, we got to understand that may happen because of these changes in rules. Number one, there'll be an increased cost burden to multifamily, senior housing which the residents will ultimately pay the bills through increased rents.

Unintended consequence number two, the most recent HUD map standard and by far the most stringent [inaudible] in the country has increased reporting turnaround times. The current HUD radon standard is stretching reporting times within six weeks, which is a volatile market with rising interest rates and ever-growing inflation of disruption costs, presents greater transactional risk.

Consequence number three, currently the radon testing market failures capacity to meet the new HUD lending standards. At this time, should FHFA increase just these standing testing standards that mainly would cause significant backlogs of loan applications. Again, hurting housing in this country.

Consequence number four I see is rural housing [inaudible] a greater burden of cost and time. Any environmental tests in the rural market costs two to three times more due to availability of licensed professionals and the cost for travel. We've got to understand it's going to increase costs for rural even more.

Consequence number five, an increase in greenfield and new construction development can be expected I believe. Reasonable [inaudible] being too burdensome and costly to increase in radon, asbestos, mold, lead testing. I know of affordable housing providers who have stopped looking for acquisition rehab projects using FHA

Commented [AARST122]: Lung cancer latency is a minimum of five years, cumulative over a lifetime. We're happy to provide subject matter experts related to this topic to discuss the cumulative exposure risks attributable to radon.

Commented [AARST123]: Unfounded.

Commented [AARST124]: Our data supports a 4 to 6 week turnaround for radon testing, with an average of approximately 35 days.

Commented [AARST125]: We disagree with this statement and request supporting data. Our experience is little cost differential, if any, exists between rural, suburban, and urban properties.

Commented [AARST126]: Asbestos, lead, and mold testing are not conducted on new construction projects.

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mortgage insurance, just because of the environmental testing expense. They're abandoning the urban core to build new construction in the suburbs.

Consequence number six, regulatory burden is likely to increase the amount of non HUD or GSE loan lending and other naturally occurring affordable housing, which results in more families living in housing that will have no obligation or requirements to test for radon.

So recommendations, housing types, regards to occupancy should be evaluated differently. More transient housing like AFLF and SNF and senior housing deserves a lesser testing threshold due to reduced risk, I would believe.

New construction design for vapor of radon gas mitigation is a greater means of risk reduction for little incremental costs. I do believe 11 states are requiring this in recent construction. And the HUD mortgage insurance program is required as well. This is a best practice to be carried through all housing programs.

Commented [AARST127]: Important observation. Less than half of the states require RRNC for multifamily.

Commented [AARST128]: Not true.

I recommend that FHFA --

Mary Owens:

[Inaudible] you are at time. Please wrap up your comments.

Rob Hazelton:

Sure, thank you. I will just say in summary, this country's in an affordable housing crisis and we should create solutions, not impediments. I believe we all have a duty to serve to increase the ability of both safe and affordable housing. Thank you for letting me speak.

Commented [AARST129]: We don't think providing a healthy and safe indoor environment for residents is an impediment. We're sure renters in buildings subject to GSE loans would agree with this statement.

Mary Owens:

Thank you. Our next speaker is Jane Luxton from Lewis, Brisbois, Bisgaard and Smith. Jan, you are on mute. If you are on the line. We cannot hear you. Okay, we're going to move on. Our next speaker is Keith Bartlett from the Building Evaluation Service and Technology.

Keith Bartlett:

Hi Group. Can everyone hear me? I'm good? I don't know what that was.

Mary Owens:

That was my dog. Sorry.

Keith Bartlett:

That's okay. All right. My name is Keith Bartlett. I'm with Building Evaluation Services and Technology. I am President of BEST. I've been performing property condition environmental site assessments for the past 30 years. And that included doing the first Fannie Mae DUS in the country, which was an environmental site assessment which included radon.

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At that time, there wasn't much training on radon. So I went through and went through the EPA contract mitigation approval process to learn about radon. So I have been doing radon for lots of years.

The -- since 1992, BEST has performed over 10,000 property condition environmental site assessments on multifamily properties, following guidelines for both Fannie Mae and Freddie Mac. Over that 30 year period anytime it was above four picocuries per liter, we required remediation. So we've been involved with lots of remediation and testing throughout the country.

I was on the ASTM committee for developing environmental site assessments and property conditions. And over the past 30 years I've put on many seminars teaching lenders about property condition and environmental site assessments.

I have three points to make. One, testing in zone three, number two logistics of actually completing this, and three discussing the Earth Study.

Radon in zone three. As a low potential or an [inaudible] indoor radon level of less than two picocuries per liter when remediations at four picocuries per liter and above. EPA did the testing and determined that radon levels were less than two picocuries per liter and has never changed this determination.

Since 1992, BEST has been performing radon testing across the country and on multifamily properties in all zones, and typically have found -- have not found elevated levels of radon in zone three. After testing -- doing longer testing.

This supports EPA's low potential for radon in zone three. Radon in zone three has not been revised by EPA. So most multifamily owners have -- that have sampled in zone -- have not found high levels -- and will find the new proposal for radon testing in zone three, time consuming and expensive.

EPA has not revised remediation above four, but the same standard in zone three will be hard to explain to owners that are knowledgeable of radon, and in their zone. To believe multifamily owners are not aware of radon risk on their property is unrealistic. And since zone three by EPA standards is below two, convincing an owner to substantially testing is going to be difficult.

One example is the Earth Study only tested 3% in zone three. Which five of their study, they didn't sample zone three since it was

Commented [AARST130]: EPA has never had the resources to update: if so, likely more areas would be zone 1 or 2. In addition, EPA clearly states that all buildings should be tested, regardless of location.

Commented [AARST131]: We previously provided a number of examples to FHFA and the GSEs of properties containing elevated radon levels in zone 3 areas.

Commented [AARST132]: Owners that are knowledgeable about radon understand all buildings need to be tested, regardless of location.

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considered by EPA a low potential for less than two picocuries per liter. I'll get more into that later.

Commented [AARST133]: This statement is not correct. See the previous comments related to the number of zone 3 data points. The commentor does not appear to understand the intent of the EARTH Study.

We're just -- BEST works with hiring local radon testing firms to meet the current radon requirements for both Fannie Mae and Freddie Mac. Roughly 10% of the ground floor units are typically tested for radon and usually it takes many phone calls and emails to get bids to perform the radon testing.

Commented [AARST134]: Hiring subcontractors does impact turnaround time. See our previous comment that suggests this item is the likely cause for concerns related to transactional timing.

Costs can be increased by 100% to get faster results to meet the Fannie Mae and Freddie Mac requirements. Our problems of getting qualified firms currently is sub -- increasing the requirements will make it even more difficult and costs will increase.

Performing radon testing post-closing is recommended. The timeframe for current radon testing is roughly three weeks. It usually takes a couple days to find a radon consulting firm and weeks -- a week or two to complete the results. And many times the results are late, causing loans to be affecting the loan closing.

Commented [AARST135]: This statement supports our average turnaround time of 35 days, as previously stated.

Substantially increasing those requirements will increase the timeframes to find qualified radon professionals, due to the increase in testing requirements.

Commented [AARST136]: As previously stated, the current GSEs policies require all properties to be tested. Increasing the number of areas tested at the property will have no impact on timing.

Post-closing will allow more competitive bids since the results will not be needed to close the loan. Costs will be reduced, giving more time to find qualified radon professionals. The current requirements on radon testing on the second floor is not reasonable in a single family home that HVAC system is on the bottom floor and could distribute that air, which may have radon in it.

Commented [AARST137]: FHFA, the GSEs and others are not discussing single family homes; we're discussing multifamily buildings with upper floor dwellings that are separate from the ground floor areas.

A second floor of a multifamily property has a separate HVAC system. And there's no way that the floor can bring air to the second floor. So testing on the second floor is not recommended.

Commented [AARST138]: Radon moves through elevator shafts, stairwells, and other preferential pathways. Emanation has nothing to do with HVAC systems -- the contaminant is already present within the dwelling.

With this logistically in zone three since it is considered low potential, the number of qualified radon professionals is small in zone three. So it's hard to find someone in zone three that's qualified. The cost to test for radon is going to increase substantially.

To put it into perspective, BEST typically inspects a property that's 150 to 250 units, roughly. The new guidelines will increase this to 75 to 225 units tested, placing 75 to 125 canisters in a timeframe is going to be intensive and roughly \$100 a canister is going to increase the cost to \$7,500 to \$12,500 on a typical 150 to 250 unit property.

Commented [AARST139]: This number is outside of the \$50-\$80 per device average for most testing. Most likely, the use of subcontractors is driving up this cost for the commentor.

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These more costs will be difficult for owners to swallow.

Mary Owens: Mr. Bartlett, you were at time, if you could please conclude your comments.

Keith Bartlett: Okay. I appreciate being able to speak and I appreciate the Federal Housing Finance Agency making time available for me to speak. Thank you.

Mary Owens: Thank you. So that concludes our last session on Radon Industry Capacity Certification and Regulatory Environment. I'm going to pass the mic over to Charles Ostroff with Fannie Mae. He is the Multifamily Chief Credit Officer and he will be providing closing remarks on behalf of the Enterprises. Charles.

Charles Ostroff: Thank you Mary. I just wanted to thank FHFA for hosting this listening session. I also wanted to thank the representatives from Freddie Mac that worked with our team in putting this all together.

I think this was a very thoughtful and productive conversation. This was a long session, and we're grateful for all that took the time to participate within this session. I want to add the Enterprises have a long history of proactively addressing health and safety issues for residents in the properties we finance. Residents safety is key to fulfilling our mission and missions with Freddie Mac.

Again, we appreciate your comments very much, and also the input that you did provide today. Today, we you know, today -- your input today will shape Fannie Mae and Freddie Mac's radon testing approach.

We are going to review the feedback we received today, along with any additional written comments submitted to FHFA. I am being told that the email address to submit comments can be found on the bottom of the invitation that you did receive. And again, I just wanted to stress that we are appreciative of everyone's time today. And again, I wanted to say thank you, but especially thank you to FHFA.

Mary Owens: Thank you so much, Charles. So that concludes today's session. As Charles mentioned, we are accepting public comments through Friday, August 6th. So there's still time to submit your comments if there are things that you would like to add to this discussion today.

To submit written comments, we encourage you to send them to www.FHFACommunications@fhfa.gov. Thank you for all who participated today. We greatly appreciate this discussion and we value your feedback. Thank you.

August 6, 2021

The Honorable Sandra L. Thompson
Acting Director
Federal Housing Finance Agency
400 7th Street, SW
Washington, DC 20219

Re: FHFA Proposed Radon Testing Requirements

Dear Acting Director Thompson:

The undersigned national associations appreciated the opportunity to provide oral comments to the Federal Housing Finance Agency (“FHFA”) during the recent Multifamily Radon Listening Session. As a follow-up, we respectfully submit the following comments and recommendations for your consideration as you continue to review proposed radon testing protocols for Fannie Mae and Freddie Mac (the “Enterprises”) multifamily financing executions.

Our organizations represent a broad range of key industry stakeholders, including for-profit and non-profit multifamily property owners, lenders, developers, managers, housing cooperatives, investors, and housing agencies involved in providing rental and cooperative multifamily housing affordable to millions of American families regardless of their income.

The multifamily industry is dedicated to providing housing that is affordable, decent, and provides for the health and safety of its residents and their families. Importantly, we understand and accept our obligation to conduct the necessary environmental tests to evaluate the presence of potential environmental hazards such as radon and to undertake mitigation efforts should hazards be identified.

However, the industry continues to have issues and concerns with certain practical and procedural aspects of the adoption of the Environmental Protection Agency’s (EPA) Voluntary Consensus Standards for Radon Testing and Mitigation for all multifamily properties financed by the Enterprises.

We support the FHFA’s efforts to develop standards that are comprehensive, data-informed, readily executable by lenders and borrowers, and that can be effectively and consistently implemented, mitigated, and enforced. Our recommendations are based on an effort to find a prudent, responsible, and science-based approach that will allow for adequate environmental testing that will fully protect residents without also undermining the production and financing of much-needed multifamily housing.

We acknowledge the research conducted by the EPA and others showing long-term exposure to high levels of radon potentially increases lung cancer risk. However, we have reservations about the validity of some studies that have been cited as the basis for advancing an expanded radon testing protocol. We highlighted some of those concerns during the listening session and offer some additional observations within this letter.

KEY OBJECTIVES

The multifamily industry objectives are two-fold:

- First, to ensure that any changes to protocols protect the health and safety of our residents and are technically practical to implement; and
- Second, to ensure that the science of radon testing supports any changes in protocols.

To meet the objectives above, the implementation and impact of far-reaching changes to testing protocols must be formulated to ensure:

- Adequate testing capacity exists,
- Accurate and reproducible testing methodologies take into consideration the unique features of occupied multifamily properties,
- Any such testing prioritizes the safety of residents, and
- Protocols have minimal impact to the flow of capital to the multifamily industry.

Additionally, we believe that analyzing radon testing data collected from HUD since March 24, 2021, when the revised Multifamily Accelerated Processing (“MAP”) Guide radon testing became effective, would disclose useful and practical insights to help inform the process for the Enterprises. FHFA has a unique opportunity to benefit from the “lessons learned” from HUD’s execution of the revised radon testing protocol.

IMPLEMENTATION ISSUES/CHALLENGES

The multifamily industry and key stakeholders have significant reservations with the proposed testing protocols. We remain concerned that the implementation of such standards, which require a significant increase in testing, would not result in added safety to the residents and would come at the expense of affordable housing construction and preservation. Testing protocols should be calibrated to accurately and practically detect hazards.

In order to determine if changes to current Fannie Mae and Freddie Mac testing protocols should be made, *unbiased* and *independent* studies that are representative of different unit types and building configurations across different geographies and utilizing appropriate follow-up testing should be undertaken.

There are also a number of serious concerns regarding the implementation of the proposed testing protocols that relate to logistics, timing, and costs. Adoption of such an expansive change in current radon testing protocols requires a sophisticated and transparent review of these issues and a careful analysis of the implications *before* implementation.

Specifically, the current lack of radon testers across the country that are certified by the National Radon Proficiency Program or the National Radon Safety Board and are able to meet the requirements of the present standards is already a major problem, and that problem would only be exacerbated by the demands of enhanced testing requirements.

In fact, our data shows there are only 318 certified multifamily radon testers for the entire country. To put this in context, there are only 29 fully trained and qualified multifamily testers in all of Texas, California, and Florida. The industry is concerned that the normal timeframe to close a Fannie Mae or Freddie Mac multifamily loan, which is typically two to three months, could be unduly delayed due to the lack of qualified testers. This would constrict the much-needed financing and production of multifamily housing.

Prior to implementing any new radon testing standards, we urge FHFA to look to HUD’s ongoing implementation experience, since adopting their new test protocols, to help inform changes to the protocol for the Enterprises. In addition to leveraging the EPA’s longstanding work in this field, we would encourage the use of radon inspection data from HUD on the prevalence of radon in multifamily buildings when considering the appropriate balance between testing requirements (i.e., every unit vs. sampling) and its practical impacts on the financing and production of multifamily housing.

Over the next year, the industry will collect data to better understand the challenges and concerns that HUD is experiencing, and this data will be shared with FHFA. We strongly recommend that FHFA conduct the same research. That additional research would allow FHFA and its stakeholders to more reliably develop a successful program, mitigate risks, remove obstacles, and suggest any enhancements that would serve to improve the HUD process as well.

The industry cautions on implementing any testing standards that would effectively alter the speed and liquidity provided by Fannie Mae and Freddie Mac and undermine their ability to finance multifamily housing. In this regard, it is important for the FHFA to keep in mind the two fundamental differences between the HUD MAP program and the GSE program that are relevant here. First, the HUD program is much smaller and is 1/10th the size of the GSE's multifamily programs, which finance 1,600,000 units annually. Second, the timeline to close a GSE loan is typically 60 to 90 days, whereas the timeline to close a HUD loan, under normal circumstances, is typically 6 to 12 months. As a result, any negative impacts experienced under the HUD MAP radon testing protocol would be amplified if that protocol were applied to the GSEs.

As much as 40-50% of the Enterprises' business is for multifamily acquisitions. Delays posed by revised testing protocols would be particularly burdensome to sponsors acquiring properties who have limited due diligence and closing timeframes. Due to the significantly longer timing on HUD processing, very few acquisition loans are even made. We estimate it at less than 5% of their business.

To mitigate pipeline impacts, the industry also recommends that a process be developed to allow for post-closing testing should testing not be completed prior to closing.

Finally, adopting new standards and protocols should be an iterative process that could be refined after additional data has been collected, vetted, and peer reviewed. We will continue to formulate this process and will submit recommendations to FHFA as soon as practicable.

SCIENCE

FHFA should adopt regulations that are:

- Based on sound science;
- Developed with input from stakeholders in the regulated industries; and
- Able to adapt the referenced standard or code to account for local conditions.

We have found that even the most well-intentioned policies to set national environmental, energy, building, or safety standards can result in unintended negative consequences if those policies take a one-size-fits-all approach where one size does not in fact fit all.

Broad Stakeholder Input is Critical for Testing Protocols

We are particularly concerned that FHFA is considering the mandatory use of the EPA's Voluntary Consensus Standards for Radon Testing and Mitigation ("Consensus Standards") as a requirement for securing a Fannie Mae or Freddie Mac multifamily mortgage. Currently, the "Consensus Standards" reference protocols for measuring and mitigating radon in multifamily properties that were developed by American Association of Radon Scientists and Technologists (AARST). These standards were not developed in consultation with key multifamily industry stakeholders and were not proposed as formal regulations by FHFA in compliance with the Administrative Procedure Act.

INTERNATIONAL CODE COUNCIL

It is telling that a broad stakeholder code making body, the International Code Council (ICC), recently voted down new radon construction and testing protocols. These code amendments were introduced by AARST and they are similar, if not identical to the provisions that AARST has urged FHFA to adopt. The outcome of the deliberative, expert consideration that underlies the code adoption process should carefully be reviewed by FHFA, and it suggests that FHFA would be well-served to seek broad industry consensus on any new radon testing protocols.

In general, national model building codes for multifamily and single-family residential properties are developed through an open, transparent consensus process run by the International Code Council (ICC). State and local governments typically adopt these nationally recognized model codes, often amending them to reflect local construction practices, climate and geography. Standards referenced in these codes must be developed through a consensus process, must be written in mandatory language, and must not require the use of proprietary materials or a proprietary agency for quality control or testing.

The ICC's code development process has two key steps:

- New code proposals are first considered by a set of code development committees made up of stakeholders, including building code officials, engineers, and builders. One-third of the committee's members must be public safety officials. Committees are required to consider all views, objections, and the cost impact of all code change proposals. Committee members vote to approve the code change, make modifications to it, or vote against it.
- Following a public comment period, the final determination of which proposals will be incorporated in the next edition of the national model building codes is made by public safety officials who have no vested financial or personal interest in the outcome of proposed code changes.

The ICC is in the process of developing the 2024 codes. AARST submitted six different proposals, five of which would apply to multifamily buildings in some way:

- (1) In the International Building Code (IBC) require radon mitigation systems per AARST CC-1000 to be provided in all educational buildings.

- (2) In the IBC, require radon mitigation systems per AARST CC-1000 be provided in all apartment buildings.
- (3) In the IBC, require radon mitigation systems per AARST CC-1000 be provided in **all** buildings, except either Appendix F of the International Residential Code (IRC) or AARST RRNC shall be used for dwellings.
- (4) In the IBC require the same systems and compliance methods as Item #3, but as an appendix that a state or local government must opt to include at the time of adopting an updated code.
- (5) In the International Mechanical Code (IMC) require sub-slab soil exhaust systems to comply with AARST CC-1000.
- (6) In the International Property Maintenance Code (IPMC), require testing of existing multifamily buildings per AARST MAMF and (if necessary) installation of radon mitigation systems per AARST RMS.

AARST CC-1000 is a general design and installation standard for all buildings. MAMF is the testing standard for multifamily buildings, and RMS is a design and installation standard specifically for multifamily. RRNC is a design and installation standard for single-family houses.

The ICC code development committees charged with reviewing these proposals overwhelmingly rejected them. Comments from the relevant committees disapproving all six proposals included the fact they applied to Zone 3 areas of low radon potential in addition to the moderate and high-potential zones and the comments raised concerns the CC-1000 standard had suggestive and unenforceable language. The four IBC proposals were disapproved unanimously 14-0, as was the IMC proposal by an 11-0 vote. The one “outlier” was the property maintenance code proposal which was rejected by a 10-1 vote.

One concern with AARST MAMF is that it requires testing to be conducted by a “Qualified Measurement Professional,” defined as:

“An individual that has demonstrated a minimum degree of appropriate technical knowledge and skills both sufficient to place, retrieve and analyze (as applicable) radon detectors and to design, plan, and implement quality procedures when conducting radon measurements in multifamily buildings:

- a) as established in certification requirements of the National Radon Proficiency Program (NRPP) or the National Radon Safety Board (NRSB); and
- b) as required by local statute, state licensure or certification programs that evaluate individuals for radon specific technical knowledge and skills.”

This requirement for a tester certified by one of the two private organizations listed in Item (a) is excessively limiting, and more practical options are available. For instance, the radon testing requirement that was added in 2021 edition of the single-family International Residential Code allows radon testing to be performed either by the builder, by a registered design professional (e.g., an architect or engineer), or by an independent third party approved by the building official

or authority having jurisdiction. If FHFA proposes new radon requirements, similar options should be available for multifamily borrowers and lenders.

The EARTH Study

As noted during the listening session, there are very few studies evaluating the effect of radon's impact on multifamily properties, and there is one study that HUD cited in support of the revisions to the radon testing provisions under the MAP guide. The EARTH study was funded by a HUD grant, yet its process and conclusions have not undergone a peer review. FHFA has received a paper from the DUS Advisory Group, which engaged two radon testing organizations to review the EARTH study. The findings from Blackstone and BEST – who are highly experienced radon testing organizations – call into question the scope, process, and conclusions offered in the study.

Furthermore, during the listening session, Dr. Michael Fratantoni, MBA Chief Economist, offered his critiques regarding the EARTH study with respect to the data and approach. His view was that these shortcomings call into question the results of the study. Specific concerns regarding the EARTH study included the fact that the sample of eight thousand buildings is not random and is not representative. Without a valid statistical sample, these results simply cannot be relied upon as the factual basis for nationwide radon testing standards.

He also noted that the study does not ask the right question. The EARTH study's central question is how many units need to be tested to ensure with 95% confidence that they find the unit with radon above 4, assuming that every building has one unit with radon above 4. But it is not the case that every building has 1-unit with radon above 4. The Earth Study was working with a non-representative sample that ensures a higher percentage of buildings with at least one positive unit. In Dr. Fratantoni's view, the right question is how to focus scarce testing resources on those properties that are at higher risk. As a result, a properly grounded, risk-based approach is called for.

Moreover, the EARTH study also does not reflect industry practices in place today regarding what happens after a positive screening test. Both HUD and Freddie Mac require similar approaches. If the screening test is positive, then the results must be confirmed. If the second test confirms an elevated level of radon, then abatement measures must be put in place. *At the end of the day, the goal is not about maximizing the number of tests, it is about protecting the residents of these properties.*

Finally, we also engaged [Exponent](#), an engineering and scientific consulting firm, who for over 50 years has provided engineering, scientific, environmental, and health consulting services to corporations, insurance carriers, government agencies, law firms, and individuals. Exponent conducted a critical review of the study, "Evaluating and Assessing Radon Testing in Housing with multifamily federal financing (The EARTH Study)," by Kitto et al. (2021), as well as a predecessor article, "Evaluation of percentage-based radon testing requirements for federally funded multi-family housing projects," by Neri (2019). Exponent's analysis shows that the EARTH study conclusions were deeply flawed and did not support their recommendations. Exponent concluded that:

- *The radon data analyzed by the EARTH Study are not representative of nationwide multifamily housing units, which limits the generalizability of study findings.*

- *The EARTH Study and Neri analyses fail to consider and properly account for measurement error inherent to radon testing methods, including the risks and associated costs of making incorrect decisions.*
- *Health cost and risk assumptions are overly simplified, inadequately supported, and not demonstrably applicable to the national population of multifamily housing occupants.*

We have attached their report for your detailed review.

Balancing of factors

One last thought to consider was raised during the listening session. In some ways, radon testing is much like other safety protocols including automobile safety measures such as seat belts and collision airbags to reduce the risk of harm to motorists. However, we do not go so far as to also reduce the speed limit on all roads to 20 mph, as we balance safety factors against the risk. The same holds true for radon testing: it is not about simply testing 100% of the units. Other factors should help drive the decision, such as building design, geographic location, known radon risks, and duration of residency.

Much more due diligence is needed to ensure that the testing protocols intended to support the health and safety of residents are effective and have a practical benefit. More research is necessary to determine:

- The percentage of units that should be tested and how often testing should occur;
- Differences based on property location or asset class; and
- Appropriate documentation requirements.

To support new testing standards, this research must be peer-reviewed, thoroughly vetted and unbiased.

RECOMMENDATIONS

- *Allow adequate time to work with industry stakeholders to develop and adopt regulations that are based on sound science and adopt the appropriate standards to account for local conditions.*
- *Conduct additional research to determine the appropriate percentage of units that should be tested and at what frequency, based upon the property location and construction.*
- *Allow sufficient time to work with multifamily lending experts, qualified testers and environmental consultants to gather data to identify the appropriate number of qualified testers that will be necessary to efficiently handle the volume of any new testing protocol before it is adopted.*
- *Support testing protocols with a training program and funding to expand the number of fully qualified testers.*
- *Conduct independent peer reviews of that research to ensure that unbiased standards are adopted and implemented.*
- *Refrain from adopting private radon industry consensus standards that were not developed with appropriate levels of voting representation by multifamily developers and multifamily industry associations.*

CONCLUSION

The undersigned associations would like to thank the FHFA for providing a forum for the industry to express their concerns and recommendations. We look forward to continuing to engage with FHFA and industry stakeholders to address this important issue, with the common goal to balance the need to protect tenants' health and safety and to continue to provide much needed affordable housing.

If you have any questions or require additional information, please contact Mike Flood at mflood@mba.org or Dave Borsos at dborsos@nmhc.org.

We look forward to working with you on this important issue for the multifamily industry.

Sincerely,

Commercial Real Estate Finance Council
Council for Affordable and Rural Housing
Mortgage Bankers Association
National Apartment Association
National Affordable Housing Management Association
National Association of Home Builders
National Association of Housing Cooperatives
National Association of Realtors
National Leased Housing Association
National Multifamily Housing Council
The Real Estate Roundtable

Exponent[®]

Ecological & Biological Sciences

**Critical review of radon
testing evaluations by Neri
and “The EARTH Study”
by Kitto et al.**





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by Kitto et al.**

Prepared for

The National Multifamily Housing Council
The Mortgage Bankers Association

Prepared by

Exponent
15375 SE 30th Place,
Suite 250
Bellevue, Washington 98007

August 5, 2021

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Acronyms and Abbreviations

ACD	Activated Charcoal Detector
ATD	Alpha-Track Detector
EARTH	Evaluating and Assessing Radon Testing in Housing
EIC	electret ion chambers
L	Liter
NRC	National Research Council
pCi	picoCuries
U.S. EPA	United States Environmental Protection Agency
U.S.	United States

Executive Summary

Exponent conducted a critical review of the study, “Evaluating and Assessing Radon Testing in Housing with multifamily federal financing (the EARTH Study),” by Kitto et al. (2021), as well as a predecessor article, “Evaluation of percentage-based radon testing requirements for federally funded multi-family housing projects,” by Neri (2019). For buildings with varying numbers of ground-floor units, the Neri article presents a probability analysis of the sample sizes required to ensure with high probability that testing identifies at least one unit with elevated radon (at or above 4 pCi/L) when such levels are present in the building, given stated assumptions and with acknowledged limitations. Neri offers these findings as “a starting point for a discussion” and concedes that “much work remains to be done to clarify or improve existing radon testing recommendations.”

The EARTH Study cites Neri’s work and applies the same probability model, but this subsequent evaluation differs in at least three important respects. First, the EARTH Study uses selected data from actual radon testing at multifamily properties. Second, rather than proceeding from the objective that the test sample size be sufficient to detect (with high probability) elevated radon when present, as is the case of the analysis by Neri, the EARTH Study authors impose the stricter requirement that initial testing include (with high probability) all ground-floor units with elevated radon. Third, the EARTH Study authors reach a definitive concluding recommendation regarding radon testing: “[f]or the vast majority of multifamily building sizes, all ground floor units in multifamily buildings should be tested for radon.”

Exponent’s review finds that the EARTH Study fails to provide much of the clarification called for in the Neri article. Specifically, because of its requirement for exhaustive sampling, the EARTH Study does not consider and provides no additional guidance on such questions as which units to test, whether to test multiple structures on the same property, and how to respond (i.e., with further testing or mitigation) to a measured radon concentration at or above 4 pCi/L.

Furthermore, we have identified multiple methodological issues—including some limitations that are acknowledged but not consistently respected or addressed by the authors of the EARTH Study. These identified methodological issues substantially constrain the reliability of the EARTH Study recommendation for 100% radon testing of ground floor units in multifamily buildings:

- ***The radon data analyzed by the EARTH Study are not representative of nationwide multifamily housing units, which limits the generalizability of study findings.*** Non-random data “preferences” were used when compiling data, the compiled data were not geographically or regionally representative, and data did not capture daily or seasonal variation in radon concentrations. The report’s estimates of the percentage of units with elevated radon levels missed by testing fewer than 100% of ground-floor units may be inaccurate for areas of the country poorly represented by the data (i.e., U.S. EPA Radon Zone 3), and these inaccuracies would be propagated if the cost-benefit and health risk calculations reported in the EARTH Study were applied at the national scale.

- ***The EARTH Study and Neri analyses fail to consider and properly account for measurement error inherent to radon testing methods, including the risks and associated costs of making incorrect decisions.*** Consequently, the reported analyses are insufficient to support the EARTH Study’s finding that 100% ground-floor testing of buildings with up to 20 ground-floor units would provide 95% confidence that no ground-floor units in tested buildings have radon levels exceeding 4 pCi/L. Specifically, 100% sampling will generate significant false positives, and lead to potentially substantial unnecessary mitigation costs that are not included in the EARTH Study cost-benefit analysis. Additionally, the authors do not address the false negatives that occur, even with 100% ground-floor testing, when tests of units with actual radon levels exceeding 4 pCi/L yield measured radon concentrations below 4 pCi/L.
- ***Health cost and risk assumptions are overly simplified, inadequately supported, and not demonstrably applicable to the national population of multifamily housing occupants.*** Estimates of the number of lives saved per decade by mitigating residential units with elevated radon measurements have been applied by the report’s authors to a study in which almost half (43%) of the properties were assisted living facilities and did not consider resident demographics, duration of tenancy, hours per day spent indoors, the relative contribution to lifetime radon exposure, or any other confounding factor (e.g., smoking, occupational exposure) affecting lung cancer risk.

Introduction

Exponent has performed a critical review of the study, “Evaluating and Assessing Radon Testing in Housing with multifamily federal financing (the EARTH Study)” by Kitto et al. (2021) and “Evaluation of percentage-based radon testing requirements for federally funded multi-family housing projects”, a theoretical study by Neri (2019) on which the EARTH Study is based, as well as supporting and associated documents and reports. We identify limitations of the EARTH Study, in view of the guidance provided by Neri for radon testing in multifamily housing, as well as additional methodological deficiencies in the EARTH Study.

The Neri article presents a probability analysis of the sample sizes required to ensure with high probability that testing identifies at least one unit with elevated radon when such levels are present (at or above 4 pCi/L) in buildings with varying numbers of ground-floor units, given stated assumptions and acknowledged limitations. Of the assumptions underlying this analysis, two are particularly worthy of note:

- *Adaptive sampling*— “[i]dentification of one unit as high radon would result in either further testing of all units or installation of a radon mitigation system for the structure.”
- *Statistical independence*— “[r]adon concentrations in each unit of a multifamily housing complex are unrelated.”

Neri acknowledges that radon concentrations in adjacent units may be correlated, and the sample sizes estimated in his analysis may therefore be conservative, requiring more testing than necessary to detect the presence of elevated radon at a building. In acknowledgment of the limitations that these assumptions place on the analyses, rather than making specific recommendations on the level of sampling, Neri offers his findings as “a starting point for a discussion” and concedes that “much work remains to be done to clarify or improve existing radon testing recommendations.” Neri calls for additional research to inform decisions about which units in a building to test, whether multiple structures on the same property should be tested, and which actions should be taken when a radon concentration above 4 pCi/L is measured during testing of a structure.

Although the EARTH Study cites Neri’s work and applies the same probability model, this subsequent evaluation differs in at least three important respects. First, the EARTH Study uses selected data from actual radon testing in multifamily buildings. Second, rather than proceeding from the objective that the test sample size be sufficient to detect (with high probability) elevated radon when present, the EARTH Study authors impose the requirement that initial testing at a building be exhaustive—i.e., that the test sample include (with high probability) all ground-floor units with elevated radon. Third, citing their analyses as the basis, the EARTH Study authors reach a definitive conclusion: “[f]or the vast majority of multifamily building sizes, all ground floor units in multifamily buildings should be tested for radon.”

Exponent’s review finds that the scope of the EARTH Study fails to provide much of the clarification called for in the Neri study. One key area of uncertainty identified by Neri was the correlation of radon concentrations among units in a building. Although the EARTH Study data from multifamily buildings in which all ground-floor units were tested provide an empirical

basis to estimate this correlation of radon concentrations in adjacent units, the EARTH Study does not explicitly address this aspect or its implications for the radon test sample sizes determined by Neri. Additionally, because of its requirement for exhaustive sampling, the EARTH Study does not consider adaptive or targeted sampling approaches and provides no additional guidance on such questions as which units to test, whether to test multiple structures on the same property, and how to respond (i.e., with further testing or mitigation) to a measured radon concentration at or above 4 pCi/L.

Methodological Criticisms of the EARTH Study

In addition to our concerns about the adequacy of the EARTH Study’s scope, we have identified multiple methodological issues—including some limitations acknowledged, but not consistently respected, by the authors—that substantially constrain the reliability of the EARTH Study recommendation for 100% radon testing of ground floor units in multifamily buildings:

- The EARTH Study radon data are not nationally representative;
- The EARTH Study does not account for measurement error;
- The EARTH Study cost-benefit and risk analyses are incomplete.

The technical details and implications of these methodological issues are described and discussed below.

The EARTH Study radon data are not nationally representative

The EARTH Study authors acknowledge several limitations and areas of potential bias in their data set and they take care to note that, “[i]t was not the intent of this study, nor do the authors suggest, that the radon prevalence found in this study is nationally representative of radon at United States (U.S.) multifamily properties.” Some acknowledged potential biases include “preferences”¹ for data that included buildings with units with elevated radon data and a preponderance of unit data collected in United States Environmental Protection Agency (U.S. EPA) Radon Zones 1 and 2 (counties with predicted average indoor radon screening levels >4 pCi/L and 2 to 4 pCi/L, respectively), and from 18 states, particularly from Ohio and Illinois. These data preferences explain the greater prevalence of units containing elevated radon levels and higher mean concentrations of radon in the EARTH Study compared to national averages.

The authors of the EARTH Study note that their radon database is, “one of the nation’s largest” as justification for proceeding with analyses despite known biases. However, other large radon studies exist that the authors could have used to better understand and address the representativeness of their data. Although the authors reference an earlier national survey of radon levels in homes by the U.S. EPA (Marcinowski et al. 1994), for a minor point regarding data distribution, they do not acknowledge that the instrumentation used in this earlier study had greater accuracy, longer durations of sampling, and more realistic representation of all U.S. EPA zones than those of the EARTH Study. It would be appropriate for the authors to compare their data with results obtained in this national sample of residences to inform the representativeness (and accuracy) of the EARTH Study data, which the authors acknowledge is limited. A comparison of the compiled EARTH Study data with other datasets could highlight the degree to which the recommendations of the EARTH Study should be restricted by the limits of their data, rather than assuming recommendations are appropriate nationwide.

¹ The EARTH Study authors do not describe how a “preference” for certain data influenced their data collection or processing.

The Neri study recognized the importance of radon prevalence in determining the sampling rates required to reach 95% probability that the test sample for a building would include at least one unit with a high radon concentration. Although the Neri study addressed a less demanding testing objective, i.e., ensuring a high probability that the test sample had at least one unit with an elevated radon concentration, the EARTH Study authors should have been aware that sampling designs based on the hypergeometric distribution would require different sampling rates at different levels of radon prevalence to achieve the same testing objective, rather than adherence to a single recommended rate of sampling.

Despite the EARTH Study authors' recognition that their data are not nationally representative of radon levels, they nonetheless erroneously conclude that, "[f]or the vast majority of multifamily building sizes, all ground floor units in multifamily buildings should be tested for radon." The expansive conclusion that 100% sampling is required for all multifamily housing in the United States is not adequately supported for multiple reasons, including the selection biases manifested in the compiled EARTH Study data. The authors' error—not adhering to the limits of the available data—is propagated in subsequent analyses of cost-benefits and risk, and exacerbates the problem of measurement error, as described below.

The EARTH Study does not account for measurement error

The EARTH Study's analysis presumes that no incorrect decisions about the presence of elevated radon will be made if 100% of ground-floor units are tested (see, e.g., Figure 6). In a statistical analysis focused on measuring the probability of omissions (i.e., Table 13) or decision errors (i.e., Table 14) when relying on sample data, it is important to consider the influence of measurement error. In this context, measurement error refers to the extent to which test instruments may incorrectly gauge radon concentrations. Assessing measurements to be "reliable" according to some metric,² however, is not sufficient to ensure a particular application of the test method will be robust, i.e., insensitive to measurement errors. Even low error rates from a "reliable" method can yield large numbers of errors when testing is conducted thousands of times at the national scale.

Neither the Neri article nor the EARTH Study substantively addresses measurement error.³ The Neri study does, however, conclude that radon testing accuracy requires "further analyses" if testing based on hypergeometric results were to be implemented in a "substantial proportion of multi-family housing in the U.S." Subsequently, the EARTH Study made just such a recommendation for widespread testing in a substantial portion (i.e., 100%) of multifamily housing in the U.S., without any consideration of testing accuracy. The failure to consider measurement error is a serious oversight in the context of the EARTH Study, because of its authors' unqualified advocacy for substantially expanded sampling and testing at the national level. The following discussion and analyses describe sources of measurement error and the

² The EARTH Study calculated a "reliability ratio" for duplicate measurements and found it to be "very high" (p. 17).

³ The Neri article also displays anomalous results in its Figure 1, indicating the probability of identifying units with elevated radon is greater when a smaller percentage of units (10% vs. 25%) is included in the test sample (and high radon occurs at a prevalence of 1 in 15 units). Such a result conflicts with basic principles of statistical inference.

effects of measurement error on rates of false indications and how the number of false indications increases with sample size.

Several devices and protocols are available for measuring the level of radon gas in residential dwellings. All measurement devices have an inherent degree of accuracy that relates to the ability of the device to correctly detect radon concentration as being above or below the 4 pCi/L action level threshold. Some instruments provide greater accuracy than others. The majority (88%) of the EARTH Study radon measurements used activated charcoal detectors (ACDs), while the remaining measurements were made with other devices: alpha-track detectors (ATDs), electret ion chambers (EIC), and liquid scintillation. The typical measurement uncertainty for ACDs is 10-30%, ATDs is 10-25%, and EICs is 8-15% at radon levels of ~5.4 pCi/L.⁴ An interlaboratory comparison study utilizing data from over 10 years of testing found that the systematic measurement error of most instruments issued by professional laboratory services can vary $\pm 10\%$ from the true radiation dose values and that a single dose measurement may have an additional random measurement error of $\pm 15\%$ at high dose concentrations. At lower dose levels of measured concentrations may vary from the actual level by greater than 50% (Beck et al. 2013).

These estimates of radon measurement error are consistent with those reported in the EARTH Study. As noted in the study report, more than 10% of units with side-by-side duplicate measurements with one value ≥ 4 pCi/L (16 of 133 units) had the other value < 4 pCi/L. From data on 932 units with duplicate radon measurements, the reported within-unit variability was 0.06—or, equivalently, a standard deviation of 0.245 in the log radon scale. This level of measurement error implies, for example, that testing of a unit with an actual radon level of 4 pCi/L could plausibly produce a measured value as low as 2.5 pCi/L or as high as 6.5 pCi/L.⁵ Thus, the inherent imprecision of the measurement devices creates the potential for erroneous decisions when they are made by judging the value obtained from an individual test against a numerical threshold.

An additional source of measurement error is the duration of the testing protocols available to the EARTH Study. Most data points reported in the study consisted of samples of 2-3 days duration. Because radon levels fluctuate significantly over time, both on daily and seasonal time scales, and by space use, longer term measurements of 3-12 months are preferred to obtain more representative radon concentration measurements,^{6,7} as in the national residential U.S. EPA survey (Marcinowski et al. 1994).

The appendix to this report numerically demonstrates how the reported measurement error in the EARTH Study contributes to misclassification (false positives and false negatives) of elevated radon levels, which is further exacerbated by regional differences in predicted radon levels by U.S. EPA zone. Simulations reported in the appendix show that 100% sampling will generate significant numbers of false positives, and contrary to the EARTH Study conclusion, testing

⁴ Table 6 (World Health Organization 2009)

⁵ These values correspond to the endpoints of a 95% prediction interval.

⁶ <https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/guide-radon-measurements-residential-dwellings.html#a1>. Accessed July 12, 2021.

⁷ Section 2.1.3 (World Health Organization 2009).

100% of all ground-floor units will not necessarily provide 95% confidence that no units exceed the 4 pCi/L action level due to the occurrence of false negative results.

False indications in the EARTH Study are premised on a binary decision as to whether the radon level in a tested unit is above or below a threshold of concern. This same binary approach was also the focus of the Neri study. Such an approach neglects information in the distribution of the numerical values of the measured radon concentrations. Other approaches using the actual measured concentrations do exist (e.g., American Society for Quality 2013) and may result in lower probabilities of decision error at reduced levels of sampling. Because these methods do not reduce individual test results to simple binary outcomes, their application may produce radon testing protocols that offer equal or greater risk mitigation with less sampling.

The EARTH Study cost-benefit and risk analyses are incomplete

The cost-benefit analysis of lung cancer risk arising from missed detections of high radon levels without a 100% sampling protocol is perfunctory and incomplete. These analyses omit consideration of the lack of national representation of the radon data used in the study, the presence of measurement error in the available data as described above, and key factors related to lung cancer risk.

The EARTH Study radon risk analysis aims to determine the reduction in lung cancer risk achieved by mitigating the residential units in their database with radon concentrations greater than 4 pCi/L that would have been forgone in the absence of a 100% sampling protocol. This analysis failed to consider other important factors affecting lung cancer risk, such as resident demographics, occupational exposure, duration of tenancy, the relative contribution to lifetime radon exposure, or smoking—perhaps the most critical confounding factor—in the evaluation of lung cancer risk. The EARTH Study uses estimates of “15,400 to 21,800 radon related lung cancer deaths per year” derived from the National Research Council (NRC 1999) but does not acknowledge this estimate is strongly affected by smoking habits, with only 2,100 or 2,900⁸ of 11,000 total lung cancer deaths in non-smokers attributed to radon. The NRC also reported that, “Most of the radon-related deaths among smokers would not have occurred if the victims had not smoked.” The NRC report made it clear that smoking should be included in the assessment of radon health risk, but this factor was not considered in the EARTH Study.

The EARTH Study’s estimates of the number of lives saved by mitigating residential units in the study with elevated radon measurements are based on data from a set of properties in which almost half (43%) were assisted living facilities. The demographics (age, health status), personal histories (including history of smoking and occupational exposures), and daily activity patterns of the occupants typical of the assisted living facilities will play a large role in their lifetime risk of developing cancer. Thus, the estimates of lives saved for units in the EARTH Study data are

⁸ The EARTH Study presents these values as a range of uncertainty for radon-related deaths, but this is incorrect and misrepresents the uncertainty in estimates of radon related deaths. The NRC described these two values as alternative central estimates based on different risk models saying, “15,400 *or* 21,800 per year” (emphasis added), not as the range of radon related deaths, “15,400 *to* 21,800” (emphasis added) used in the EARTH Study. The NRC provides a much larger range for uncertainty, “as low as 3,000 or as high as 33,000,” radon-related lung-cancer deaths each year.

likely inaccurate because the radon data are heavily skewed toward assisted living facilities, while the applied risk model parameter values derive from more typical resident demographics and occupancy patterns. Moreover, the EARTH Study authors strongly imply that their calculations can be extrapolated nationwide. As discussed above, the EARTH Study data set is not representative of national radon risk, and such extrapolation is not appropriate.

The lung cancer risk analysis in the EARTH Study does not consider nationwide variation in the risk of radon exposure, such as indicated by the U.S. EPA Radon Zones. The EARTH Study analysis implicitly assumes multifamily housing units in all radon zones will have levels of radon exposure and consequent cancer risk similar to the values calculated from their study data. The EARTH Study risk calculations also implicitly assume constant lifetime exposure to radon at levels for multifamily housing that are estimated from data collected disproportionately from testing of assisted living facilities. The risk calculations conducted by the EARTH Study are based on a series of explicit and implicit model assumptions, some of which are acknowledged, such as spatial and temporal variation, time spent indoors, and particular values of conversion coefficients. Despite recognizing these sources of variation, the EARTH Study authors provide no analysis of the sensitivity of their radon risk calculations and include uncertainty only in the cost of medical treatment for lung cancer. The focus on point estimates in these risk calculations does not allow a full consideration of the variability and evaluation of the relative importance of factors affecting exposure. A probabilistic analysis would be more realistic and useful in a reevaluation of current radon testing practice.

The EARTH Study cost-benefit analysis also assumes that the principal cost associated with 100% sampling is the cost of testing, estimated as approximately \$50 per dwelling,⁹ and the authors weigh this cost against the number of missed detections without 100% sampling. This cost estimation fails to recognize the cost of the potentially large numbers of false positives and associated costs of unnecessary mitigation measures that can reasonably be expected to greatly exceed \$50 per dwelling unit.¹⁰ These unnecessary costs are particularly relevant in areas such as U.S. EPA zone 3, where radon levels are typically lower and Exponent's simulations (see appendix) show up to 25% of positive tests may be erroneous.

The EARTH Study provides an example calculation of the relative cost of a 90% sampling plan compared to a 100% sampling plan for large buildings with 10 or more ground contact units. In the EARTH Study database, these buildings represent 5,000 total ground contact units, and the EARTH Study authors calculate that a 90% sampling plan would "miss" three units with elevated radon compared to a 100% sampling plan. This estimate of three missed units is likely inaccurate due to measurement errors as discussed above. The authors further estimate that the "cost savings" (i.e., the cost of sampling 10% fewer units) of the 90% sampling plan would be a total of \$25,000, or \$8,333 for each of the three units missed. The authors compare this \$8,333

⁹ The EARTH Study uses \$50 as a, "fair estimate" of the cost of sampling per dwelling unit. No explanation of how this \$50 cost is derived is provided and its accuracy or representativeness is unknown and does not appear to consider the multiple types of testing methods represented in the EARTH Study dataset. This \$50 value is repeated herein for comparison purposes only.

¹⁰ The minimum cost of a false positive would be the cost to retest the unit, i.e., the EARTH Study's assumed \$50 testing cost.

per unit cost savings to a per unit lung cancer cost of \$16,800 to support their argument that 100% sampling is cost effective.

However, in simulated testing of a population having a distribution of radon levels comparable to the units in the EARTH Study, Exponent estimated the false positive rate to be 2.5%. Therefore, for a population of 5,000 units, of which 15% (750 units) have elevated concentrations, sampling 100% of units would be expected to yield 106 ($4,250 \times 0.025$) false positives, while reducing the sampling level from 100% to 90% would produce, on average, 10% fewer positive readings and only 95 ($4,250 \times 0.9 \times 0.025$) false positives, reducing the number of misclassified units by 11 ($4,250 \times 0.1 \times 0.025$). To demonstrate the sensitivity of the EARTH Study's cost-benefit calculations to measurement error, we calculate that if the cost of unnecessary mitigation associated with the 11 excess false positives expected from increased sampling is greater than \$2,310 per unit, then no net benefit would be realized from sampling 100% of ground contact units. Neglecting this consideration, the EARTH Study authors cite their cost analysis as the basis for their conclusion in favor of 100% sampling.

Conclusion

Exponent's review of the recently reported evaluations by Neri and by Kitto, et al. (the EARTH Study) finds that the scope of the EARTH Study fails to provide much of the clarification called for in the Neri article to improve existing radon testing recommendations. Although the EARTH Study data from multifamily buildings in which all ground-floor units were tested provide an empirical basis to estimate the correlation of radon concentrations in adjacent units, the EARTH Study does not explicitly address this aspect or its implications for the radon test sample sizes determined by Neri under an unverified assumption of independence. Additionally, because of its requirement for exhaustive sampling, the EARTH Study does not consider adaptive or targeted sampling approaches to radon testing and provides no additional guidance on such questions as which units to test, whether to test multiple structures on the same property, and how to respond (i.e., with further testing or mitigation) to a measured radon concentration at or above 4 pCi/L.

The EARTH Study's recommendation that 100% of ground-contact units of multifamily housing throughout the United States should be tested for radon is based on an incomplete radon sampling dataset that is not representative of the risk across U.S. EPA Radon Zones and is dependent on a statistical analysis that fails to account for the measurement error inherent in radon testing devices. These shortcomings are compounded in perfunctory analyses of the risks and costs of lung cancer from radon exposure relative to the costs of implementing 100% sampling protocols. Importantly, the EARTH Study—which, to our knowledge, has not been published in a peer-reviewed scientific journal—overlooks the potential for large numbers of false positive indications arising from device measurement error and the greatly expanded testing in areas of low radon risk that are poorly represented in the study data. The cost of these false positives and subsequent unnecessary mitigation could be substantial. A more complete probabilistic analysis of radon risk incorporating these issues, as well as others discussed in this report, would more appropriately characterize the tradeoffs between radon risk, health, and costs.

References

American Society for Quality. 2013. Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming, ANSI/ASQ Z1.9-2003 (R2013). Quality Press.

Beck, T., Foerster, E., Buchroder, H., Schmidt, V., and J. Doring. 2013. The Measurement Accuracy of Passive Radon Instruments. *Radiation Protection Dosimetry*, 158(1):59–67.

Kitto, M., Murphy, C., Dixon, S., Wilson, J., Jacobs, D., and J. Malone. 2021. Evaluating and Assessing Radon Testing in Housing with multifamily federal financing (The EARTH Study): FINAL TECHNICAL REPORT and MANUSCRIPT to U.S. HUD for Grant Agreement Number NYHHU0038-17 (p. 30).

Marcinowski, F., Lucas, R., and W. Yeager. 1994. National and regional distributions of airborne radon concentrations in U.S. homes. *Health Physics*, 66:699–706.

National Research Council. 1999. Health Effects of Exposure to Radon: BEIR VI. National Academies Press.

<https://public.ebookcentral.proquest.com/choice/publicfullrecord.aspx?p=3375739>

Neri, A. 2019. Evaluation of percentage-based radon testing requirements for federally funded multi-family housing projects. *Journal of Occupational and Environmental Hygiene*, 16(4):302–307. <https://doi.org/10.1080/15459624.2019.1566735>

World Health Organization (Ed.). 2009. WHO handbook on indoor radon: A public health perspective. World Health Organization.

Appendix: Implications of Measurement Error for Decision Making

The EARTH Study authors undertake a series of statistical analyses to examine the probability that testing ground-floor units at varying levels of sampling will fail to detect the presence of radon levels ≥ 4 pCi/L in one or more units (see, for example, Tables 13 and 14). The implications of measurement error on these analyses when making judgments about individual units on the basis of a single test can be expressed by an operating characteristic curve showing how the probability of a test reading at or above 4 pCi/L will vary depending on the actual radon level in the unit (Figure 1).

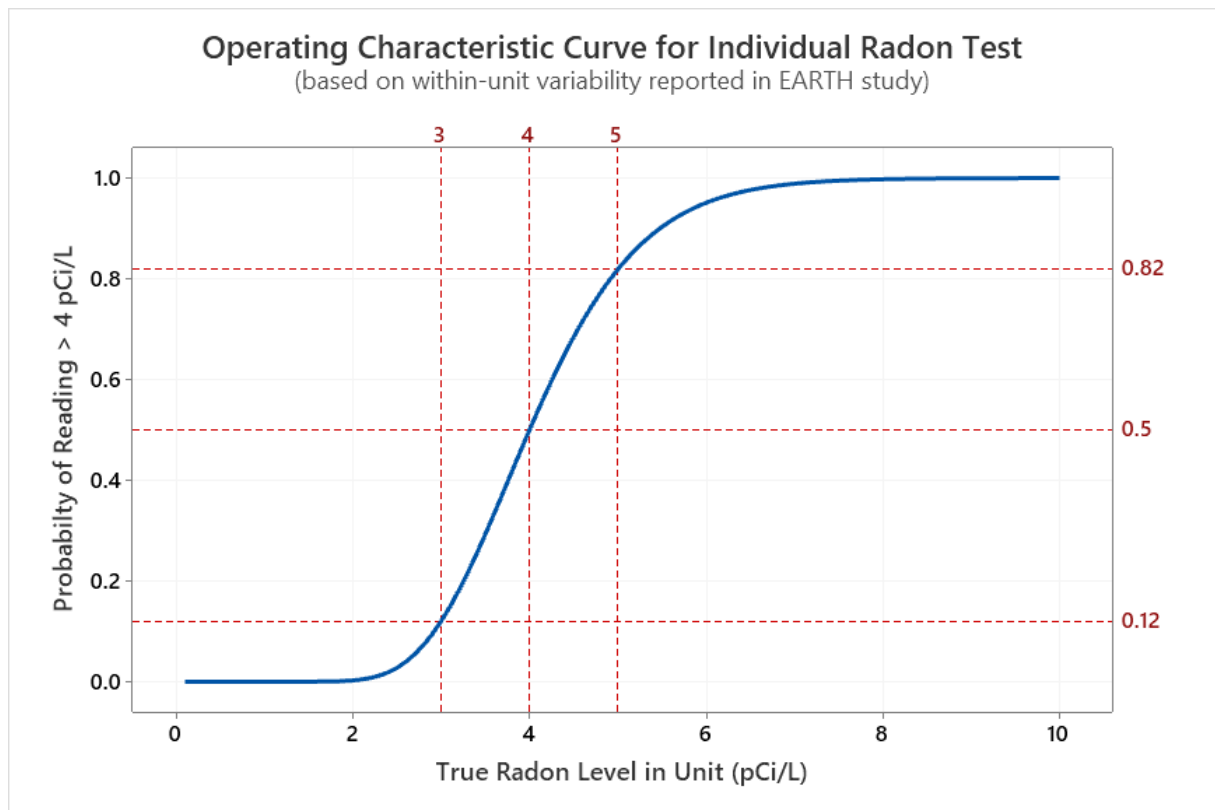


Figure 1. Operating characteristic curve for individual radon tests determined by assuming that the test method is unbiased (in the log radon scale) with an associated standard error equal to the measured within-unit standard deviation (0.245).

In the context of the EARTH Study, test results at or above 4 pCi/L when the true radon level is below 4 pCi/L are false positives; test readings below 4 pCi/L when the true radon level is at or above 4 pCi/L are false negatives. As shown in the above figure, when making a binary decision about whether the unit's radon level is elevated (≥ 4 pCi/L), the reported within-unit variability implies a 12% false positive rate when the true radon level is 3 pCi/L and an 18% false negative rate when the true radon level is 5 pCi/L.

Exponent simulated radon testing of two approximated populations of ground-floor units to demonstrate how applying imprecise test methods on a widespread basis, particularly to such low-risk populations as units in U.S. EPA Zone 3, can generate a considerable number of false indications:

1. A general population with the U.S. EPA-reported average concentration of 1.25 pCi/L and 6% prevalence of units ≥ 4 pCi/L,
2. A low-risk population (corresponding to U.S. EPA Zone 3) with an average concentration of 0.92 pCi/L and 3% prevalence of units ≥ 4 pCi/L (as found in the EARTH Study).

For each of these simulated general and low-risk populations, results from Exponent’s simulated tests of 10,000 units are summarized in Table 1 and Table 2 below.

Table 1. Simulated General Population (U.S. average radon concentration and 6% prevalence of units ≥ 4 pCi/L)

Actual	Test < 4 pCi/L	Test ≥ 4 pCi/L	All Tests
Unit < 4 pCi/L	9,247	119	9,366
Unit ≥ 4 pCi/L	71	563	634
All Units	9,318	682	10,000

In the simulation of the results of testing the general population, about one-sixth of all positive test results (119 of 682, 17%) were false indications. The false positive rate was $119/9,366 = 1\%$, and the false negative rate was $71/634 = 11\%$.

Table 2. Simulated Low Risk Population (U.S. EPA Radon Zone 3)

Actual	Test < 4 pCi/L	Test ≥ 4 pCi/L	All Tests
Unit < 4 pCi/L	9,606	89	9,695
Unit ≥ 4 pCi/L	46	259	305
All Units	9,652	348	10,000

In the simulation of the low-risk population, about one-fourth of all positive test results (89 of 348, 26%) were false indications. The false positive rate was $89/9,695 = 1\%$, and the false negative rate was $46/305 = 15\%$.

The false negative results from these simulations demonstrate that, contrary to the EARTH Study conclusion, testing 100% of all ground-floor units will not necessarily provide 95% confidence that no units exceed the 4 pCi/L action level. For example, in a building with radon concentrations at or above 4 pCi/L in only one unit, that unit has an estimated 18% chance of

being missed, if the unit's true radon level is 5 pCi/L, because of the test yielding a measurement below 4 pCi/L. The probability of decision error at the building level — particularly, missing one or more units with elevated radon levels—will depend on the distribution of radon concentrations among ground-floor units of the same building. As previously noted, the EARTH Study database is not sufficiently representative to provide a reliable national estimate of the probability of a building decision error due to imprecise measurement of radon concentrations.