U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF INSPECTOR GENERAL

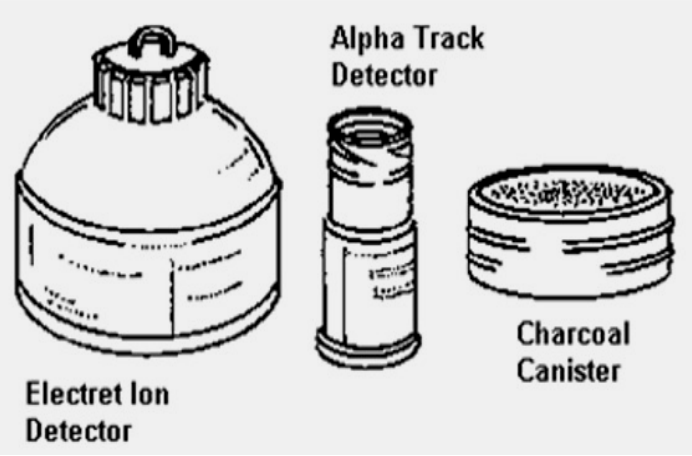
Catalyst for Improving the Environment

Evaluation Report

EPA Does Not Provide Oversight of Radon Testing Accuracy and Reliability

Report No. 09-P-0151

May 4, 2009



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Abbreviations

ASTM	American Society for Testing and Materials
EPA	U.S. Environmental Protection Agency
IRAA	Indoor Radon Abatement Act
NEHA	National Environmental Health Association
NRPP	National Radon Proficiency Program
NRSB	National Radon Safety Board
OAR	Office of Air and Radiation
OCFO	Office of the Chief Financial Officer
OIG	Office of Inspector General
PAR	Performance and Accountability Report
pCi/L	Picocuries Per Liter (of air)
R&IE	Radon Laboratory at the Radiation and Indoor Environments National Laboratory

Cover art: Three types of residential radon testing devices (from left): electret ion detector, alpha track detector, and charcoal canister. (Source: EPA Website, http://www.epa.gov/radon/pubs/physic.html).

U.S. Environmental Protection Agency
Office of Inspector General

09-P-0151
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At a Glance

Catalyst for Improving the Environment

Why We Did This Review

The U.S. Environmental Protection Agency (EPA) estimates that about 20,000 lung cancer deaths each year in the United States are related to indoor exposure to radon. The only way to know whether indoor radon levels are elevated is to test the indoor air. The purpose of this evaluation was to determine how EPA ensures that radon testing devices and radon laboratories provide accurate and reliable data on indoor radon levels.

Background

Radon is a naturally occurring gas that seeps out of rocks and soil into the air in homes from the movement of gases beneath homes. Radon builds up to higher concentrations indoors when it is unable to disperse. Radon attaches to tiny dust particles in indoor air that are easily inhaled into the lungs and can adhere to the lining of lungs.

For further information, contact our Office of Congressional, Public Affairs and Management at (202) 566-2391.

To view the full report, click on the following link: www.epa.gov/oig/reports/2009/20090504-09-P-0151.pdf

EPA Does Not Provide Oversight of Radon Testing Accuracy and Reliability

What We Found

EPA does not perform oversight of radon testing device accuracy or reliability. The 1988 Indoor Radon Abatement Act required that EPA establish proficiency programs for firms offering radon-related services, including testing and mitigation. EPA established and operated proficiency programs until 1998, when it disinvested in these programs. According to Agency representatives, EPA has neither the authority nor resources to ensure radon testing devices and testing laboratories are accurate and reliable. EPA asserts that it shares oversight responsibility with States and industry, including the two national proficiency programs operating under private auspices. However, without oversight, EPA cannot assure that radon testing devices provide accurate data on indoor radon risks or that radon testing laboratories accurately analyze and report radon results.

Recent studies – while not nationwide in scope – have identified problems with the accuracy of radon testing devices. Also, a recent New England study identified problems with the quality of laboratory analyses of radon testing. Nonetheless, a key 2009 EPA publication on the Agency's Website continues to state that radon testing devices provide reliable measurements of indoor radon levels. In its 2009 *A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon,* EPA states:

> ***MYTH:*** *Radon testing devices are not reliable and are difficult to find.*
> ***FACT:*** *Reliable testing devices are available from qualified radon testers and companies.*

However, EPA does not have data within the last 10 years to support that radon test kits or testers are reliable.

What We Recommended

We recommended that the Agency disclose that while radon testing is recommended, EPA cannot provide assurance that commercially available radon testing devices or testing laboratories are accurate and reliable. EPA generally agreed with this recommendation and stated that it will review and revise both its Web-based and printed public materials, as appropriate. However, the Agency did not provide information on how it intends to characterize the accuracy and reliability of radon testing in its public documents. More information is needed to assess whether EPA's planned actions meet the intent of this recommendation. We also recommended that EPA inform Congress that the limitations of reliable testing for radon may negatively affect achieving Indoor Radon Abatement Act goals. EPA agreed with this recommendation and plans to include this in its next Performance and Accountability Report to Congress. The Agency's planned action meets the intent of this recommendation.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
INSPECTOR GENERAL

May 4, 2009

MEMORANDUM

SUBJECT: EPA Does Not Provide Oversight of Radon Testing Accuracy and Reliability
Report No. 09-P-0151

FROM: Wade T. Najjum
Assistant Inspector General for Program Evaluation

TO: Elizabeth Craig
Acting Assistant Administrator for Air and Radiation

This is our report on the subject evaluation conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established audit resolution procedures.

The estimated cost of this report – calculated by multiplying the project's staff days by the applicable daily full cost billing rates in effect at the time – is $384,100.

Action Required

In accordance with EPA Manual 2750, *EPA's Audit Management Process*, you are required to provide a written response to this report within 90 calendar days. You should include a corrective actions plan for agreed upon actions, including milestone dates. We have no objections to the further release of this report to the public. This report will be available at http://www.epa.gov/oig.

If you or your staff have any questions regarding this report, please contact me at (202) 566-0827 or najjum.wade@epa.gov; or Rick Beusse, Director for Program Evaluation, Air and Research Issues, at (919) 541-5747 or beusse.rick@epa.gov.

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Purpose

The purpose of this evaluation was to determine how the U.S. Environmental Protection Agency (EPA) ensures that radon testing devices and radon laboratories provide accurate and reliable data on indoor radon levels. Our evaluation objectives were to determine how EPA ensures that:

- radon testing devices provide accurate data on indoor radon risks, and
- radon testing laboratories accurately analyze and report indoor radon results.

Background

Radon is a naturally occurring gas that seeps out of rocks and soil into the air in homes from the movement of gases beneath homes. Radon builds up to higher concentrations indoors when it is unable to disperse. Radon atoms decay by emitting alpha particles. The decay product is also radioactive and attaches to tiny dust particles in indoor air that are easily inhaled into the lungs and can adhere to the lining of lungs. As this product decays, it emits alpha radiation, which has the potential to damage cells in the lungs. This can disrupt the DNA of lung cells, and can lead to lung cancer. EPA estimates that about 20,000 lung cancer deaths each year in the United States are related to indoor exposure to radon. A 1999 report by the National Academy of Sciences estimated about 15,000 to 22,000 Americans die every year from radon-related lung cancer,[1] or 10 to 14 percent of all persons each year who die from lung cancer in the United States. This makes indoor radon the second leading cause of lung cancer, after cigarette smoking.

In 2005, the U.S. Surgeon General issued a national health advisory warning the American public about the risks of breathing indoor radon. EPA and the Surgeon General recommend testing all homes below the third floor for radon. They also recommended taking mitigation action in homes with radon levels at or above 4 picocuries per liter (pCi/L), EPA's recommended action level. According to EPA, the 4.0 pCi/L action level is not the maximum safe level for radon in the home, since any exposure to radon poses some risk. Instead, the 4.0 pCi/L action level was a decision based on EPA's assessment of technology and cost. The only way to know whether indoor radon levels are elevated is to test the indoor air.

Due to the widespread recognition of health threats from radon exposure in the 1980s and the need for competent radon service providers, EPA established the Radon Measurement Proficiency Program in 1986 to assist consumers in identifying organizations capable of providing reliable radon measurement analysis services. EPA established the Radon Contractor Proficiency Program in 1989 to evaluate the proficiency of radon mitigators in residences and provide information to the public on proficient mitigators. In 1991, EPA expanded the proficiency programs, adding a component to evaluate the proficiency of individuals who provide radon measurement services in the home.

These programs were later consolidated in 1995 to form the National Radon Proficiency Program (NRPP). The authority to establish these programs was provided to EPA through

[1] *Health Effects of Exposure to Radon: Biological Effects of Ionizing Radiation VI*, Committee on Health Risks of Exposure to Radon, Board on Radiation Effects Research, Commission on Life Sciences, National Research Council, National Academy Press, Washington, DC. 1999.

Section 305 of the 1988 Indoor Radon Abatement Act (IRAA). In addition to requiring that EPA assist States with the development of radon measurement and mitigation methods, Section 305 of the IRAA also required EPA to establish a:

> *Proficiency Rating Program - This section also establishes that $1.5 million will be given for EPA to establish proficiency programs for firms offering radon-related services, including testing and mitigation. The program would later be funded through a user-fee system.*

EPA operated the NRPP from 1995 until 1998, when it disinvested in the program. EPA made a one-time "acknowledgment" to both of the existing non-federal national radon proficiency programs in March 2001. These were the National Radon Safety Board (NRSB) program and the National Environmental Health Association's (NEHA's) NRPP. EPA's official acknowledgement of these two proficiency programs ended December 31, 2002.

Scope and Methodology

We conducted our evaluation from May 2008 to March 2009. Our evaluation focused on the Indoor Environments Division within EPA's Office of Air and Radiation, Office of Radiation and Indoor Air, located in Washington, DC. We interviewed program staff and managers from EPA's Office of Radiation and Indoor Air, and obtained and reviewed applicable radon program policies, procedures, and guidance. In addition, we interviewed key indoor radon stakeholders, including representatives of the following non-governmental groups:

- The NEHA's NRPP
- The NRSB
- A calibration laboratory for radon testing devices
- A major supplier of "do-it-yourself" test kits

We reviewed documents on the accuracy of radon testing devices and laboratories, including:

- A January 2008 report, *Blind Testing of Commercially Available Short-Term Radon Detectors*, by Kainan Sun, Gregory Budd, Steven McLemore, and R. William Field
- A February 2008 report, *A Test of Radon Service Providers Available on the Internet*, by J. Chen, R. Falcomer, L. Bergman, J. Wierdsma, and J. Ly
- A July 2006 report, *Pilot Project for the Blind Testing of Certain Passive Radon Test Devices Commonly Used in the New England States*, by C. Juliano and W. Bell
- A September 2008 Consumer Reports article, *Lead and Radon Test Kits - Challenging Choices*

We also reviewed Website information for the two proficiency programs (NEHA and NRSB).

We conducted this evaluation in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the evaluation to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our

evaluation objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions.

Generally accepted government auditing standards require that auditors obtain an understanding of internal controls significant to the audit objectives and consider whether specific internal control procedures have been properly designed and placed in operation. We performed a limited review of management and internal controls as they related to our objectives. We reviewed EPA guidance documents, including the NRPP Handbook dated July 1996 and the NRPP Guidance on Quality Assurance dated October 1997. We did not perform a detailed review of management controls, since EPA asserts that it has no oversight responsibility for the accuracy and reliability of radon testing. We had performed a review of management controls for the overall radon program during a recent evaluation, *More Action Needed to Protect Public from Indoor Radon Risks* (Report No. 08-P-0174), dated June 3, 2008. There were no other prior reports on which to follow up.

Results of Review

Limited Authority and Resources to Assess Accuracy of Radon Testing Devices

EPA currently exercises no oversight over radon testing devices, laboratories, or the privately run proficiency programs. EPA decided to stop operating the NRPP in 1998 after holding public meetings with principal radon stakeholders during a 2-year period on how to privatize the proficiency program. EPA cited three factors that it considered when deciding to stop operating the NRPP:

- Costs/budget issues
- The proper role of the Federal Government
- Maturity of the industry

EPA's decision led to the formation of two privately run radon proficiency programs: the NEHA-NRPP and the NRSB. Both proficiency programs were formed in 1998 and used the same framework EPA had established for its federal NRPP program. The private proficiency programs offer proficiency listing, accreditation, and certification in radon testing and mitigation. Neither of the programs report to EPA nor receive EPA funding. Representatives from both proficiency programs told us EPA provides no oversight of their programs.

EPA initially recognized the two private proficiency programs as equivalent to its previous federal program. This official "acknowledgement" ended December 31, 2002, and has not been renewed. EPA recognizes the two programs by referring the public to them on its public Website. Whether operated by EPA or the privately run proficiency programs, participation by firms offering radon-related services, including testing and mitigation, has been voluntary.

In 2006, EPA offered members of the radon stakeholder community the opportunity to participate in a professionally-facilitated stakeholder dialogue group, a venue for communication and problem-solving. According to EPA, this group has worked to address radon testing device accuracy issues. These radon stakeholders – consisting of industry, State and local agencies,

academia, and EPA – meet periodically to discuss the issues surrounding radon testing as well as possible solutions to issues. There are no published reports provided to the general public from the radon stakeholder meetings.

According to EPA Center for Radon and Air Toxics representatives, it has neither the authority nor resources to ensure radon testing devices and testing laboratories are accurate and reliable. EPA stopped operating the NRPP when its authorization expired and the budgetary impact was considered.

Concerns with Accuracy and Reliability of Testing Devices

When EPA privatized the NRPP in 1998, many radon testing devices were grandfathered (not tested by the private proficiency programs) into the current private proficiency programs. However, according to an NRSB representative, not all of the devices were evaluated prior to being grandfathered in. Further, there are testing devices on the market that are not listed by either proficiency program.

NEHA-NRPP representatives informed us that during the original EPA evaluation process, if several applications were submitted at the same time for similar radon testing devices, EPA would only evaluate one of them but certify all of them. However, NEHA-NRPP believes these devices may not all have had the same accuracy. NEHA-NRPP also informed us there are companies selling devices that may have been modified significantly since they were originally evaluated, but that the companies have never re-submitted the devices for re-evaluation. Because of these concerns, NEHA-NRPP believes that all devices evaluated prior to 2006 should be re-evaluated.

A representative from a calibration laboratory for radon testing devices (one of the larger private laboratories, according to EPA) also had concerns with the accuracy of radon testing devices. These concerns included whether all testing devices on EPA's original approved list were ever evaluated. The representative told us that some devices probably could not pass an evaluation, some devices might not be accurate at high humidity, and staff at some laboratories may not be trained in calibration. The representative also expressed concern that there was no mechanism for re-evaluating devices that were added to the approved list of devices years ago but might not be able to pass now, and suggested periodic re-evaluation of devices.

Both proficiency programs had concerns with consistency of State enforcement of radon testing. While some States require that radon vendors be certified, not all States do. As a result, enforcement options are limited. For example, if a proficiency program decided to take a radon testing device off its list of certified devices, the vendor could still operate in States that do not have certification requirements.

Recent Studies Identified Problems with Accuracy of Radon Testing Devices

Two recent U.S. studies that blind-tested short-term radon detectors commercially available in the United States found significant problems in both electret ion chambers and diffusion barrier charcoal canisters (with and without liquid scintillation). A 2006 study found that devices for five of six companies failed EPA's 25-percent relative error accuracy guideline. A 2008 study

found that radon testing devices for three of seven companies failed the same accuracy guideline, *even under ideal conditions of constant temperature, humidity, and radon concentration* [emphasis added]. The test results suggested systematic bias for the three companies, which merited further investigation. According to the 2008 study, prior to the recent studies, published studies examining the accuracy and precision of commercially available short-term radon detectors were rare. An EPA staff member participated in this study.[2]

Further, a September 2008 Consumer Reports article concluded that long-term devices (both alpha track and digital readout meters) were more accurate when compared against a calibrated standard than short-term devices (charcoal canister). Two short-term devices (charcoal canister) of the seven tested underreported radon levels by almost 40 percent. This exceeds the 25-percent guideline established by EPA.

A 2008 peer reviewed Canadian study of 36 short-term radon detectors available over the Internet found some problems.[3] The Radiation Protection Bureau of Health Canada tested 34 activated charcoal canisters manufactured by 10 companies. Two tests of charcoal canisters were conducted: one with radon concentrations at or near the Canadian action level, and the other at concentrations about twice that level. On the first test of eight companies manufacturing charcoal canisters, three companies (four canisters total) had relative errors equal or greater than 24 percent. On the second test at the higher radon concentration, of the eight companies manufacturing charcoal canisters, three companies (three canisters total) had relative errors equal or greater than 24 percent. Also, in the second test, the results for four detectors (11 percent) manufactured by two companies were declared invalid because of excessive delay in providing test results. The study also tested two alpha track (long-term) detectors. Alpha track detectors had relative errors of 10 and 4.5 percent. The test results showed that online radon testing services could collectively meet Canada's performance requirement (that readings be within +50% and -33% of reference values, 95% of the time); however, the quality of a few service providers needed to be improved.

EPA stated that there are multiple variables that affect the accuracy and precision of radon test results, including:

- The device itself
- The laboratory
- The skills and reliability of the person deploying the test
- The time it takes to mail the test
- A significant randomness factor in the ability of any device to detect radon itself

Nonetheless, the Agency has no radon testing oversight data and these are the best data available.

[2] *Blind Testing of Commercially Available Short-Term Radon Detectors*, by Kainan Sun, Gregory Budd (EPA, Office of Air and Radiation, Office of Radiation and Indoor Environments, National Lab in Las Vegas, NV), Steven McLemore, and R. William Field, June 2008, Volume 94, Number 6. Health and Physics Society.
[3] *A Test of Radon Service Providers Available on the Internet*, by J. Chen, R. Falcomer, L. Bergman, J. Wierdsma, and J. Ly, accepted for publication on 25 February 2008 by Indoor Air 2008.

Recent Studies Identified Problems With Quality of Radon Laboratory Analyses

Concerned about the quality of radon measurements, the New England States' Radon Programs jointly undertook a double-blind study[4] of radon measurement laboratories operating in their States. In this 2006 study,[5] researchers concluded that there are relatively high percentages of laboratories performing radon analysis in the New England States that are unable to successfully analyze proficiency samples. Laboratories analyzing radon gas in the New England States were sent a small number of passive 48-hour test devices for the purpose of estimating analytical precision and accuracy. The test devices were exposed to known conditions in EPA's radon calibration chamber in two batches. A laboratory is considered proficient in radon testing when all of the results in a batch of performance tests are within 25 percent of the reference value. According to this study:

- Six of 14 laboratories (43 percent) were not proficient in radon testing in batch 1.
- Four of 14 laboratories (29 percent) were not proficient in radon testing in batch 2.

The researchers concluded that to maintain an accurate and timely measure of radon testing proficiency, a routine testing program should be established. Although EPA funded this pilot project, the Agency did not provide additional funding for such projects after the pilot project.

EPA Website Provides Assurances Related to Accuracy of Radon Testing Devices Without Sufficient Current Knowledge

EPA has not reviewed the two private proficiency programs since its original acknowledgement of the two programs in 2001. EPA's Website recommends that anyone interested in finding a qualified radon service professional to test or mitigate their home should contact their State radon office or one or both of the two privately-run national radon programs that offer proficiency listing/accreditation/certification in radon testing and mitigation. Similarly, a key 2009 EPA publication on the Agency's Website continues to state that radon testing devices provide reliable measurements of indoor radon levels. In its 2009 radon guide, *A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon,* EPA states:

> ***MYTH:*** *Radon testing devices are not reliable and are difficult to find.*
> ***FACT:*** *Reliable testing devices are available from qualified radon testers and companies. Reliable testing devices are also available by phone or mail-order, and can be purchased in hardware stores and other retail outlets. Call your state radon office for help in identifying radon testing companies.*

However, EPA does not have data within the last 10 years to support that radon test kits or radon testers are reliable. Despite the Agency's disclaimer that it has limited involvement in the radon proficiency programs and its reference to any specific products or services do not necessarily imply its endorsement, EPA lacks sufficient current knowledge of the radon testing and

[4] A "double blind" study is one where both the researcher and participants are not aware of which treatment each participant is receiving.
[5] *Pilot Project for the Blind Testing of Certain Passive Radon Test Devices Commonly Used in the New England States*, by C. Juliano and W. Bell, July 2006.

laboratory proficiency programs to support statements regarding radon testing device accuracy and reliability.

The Director of EPA's Center for Radon and Air Toxics (within the Indoor Environments Division) said that given the fundamentally difficult task of measuring radon in homes, the enormous population exposed, and the reality that citizens are the ones who must choose to act independently to measure, evaluate, and reduce their risk, it is appropriate to sacrifice "some degrees of precision" to promote ease of use, so long as the results of the system achieve necessary risk reduction. He stated that:

> *Even when there is a "false positive," i.e., the reading is above 4.0 while the actual value may be somewhat below 4.0, the decision to fix the home will result in substantial risk reduction. This is true because our national risk estimates – over 20,000 deaths annually – are based on lifetime exposure at the indoor background level of 1.25 pC/L. Mitigations that take place at levels below 4.0 pC/L will result in risk reduction. For this reason EPA's policy is to recommend fixing when the test result is between 2-4 pCi/L (see Citizen's Guide). It is also true that some 'false negative' test results occur, leading the occupant to assume no action is needed when an accurate measurement would indicate otherwise. However, we believe the risk of such a result is acceptable as a matter of public policy, compared to the much greater risk associated with providing no easy and affordable mechanism for owners to test their homes at all.*

The Agency is suggesting that devices that are easy to use, affordable, and of uncertain precision and reliability are acceptable for measuring indoor radon risks. However, EPA does not have recent data on the number of false positives or false negatives that occur, and was not able to provide any studies or any other evidentiary basis within the last 10 years to support its assumptions.

Conclusions

EPA does not have data within the last 10 years to support that radon test kits or radon testers are reliable. EPA has not reviewed the two private proficiency programs since originally acknowledging them in 2001. Several recent studies – while not nationwide in scope – have identified problems with the accuracy of radon testing devices and quality of laboratory analyses.

Both EPA and the U.S. Surgeon General recommend testing homes for radon. However, EPA cannot provide the public with reasonable assurance that radon testing devices and laboratory proficiency programs provide accurate data on indoor radon risks. Further, EPA cannot assure the public that radon laboratories accurately analyze and report indoor radon test results. We believe the lack of assurance also has negative consequences for EPA's efforts to protect the public from indoor radon risks under the IRAA.

Recommendations

We recommend that the Assistant Administrator for Air and Radiation:

1. Disclose to the public that while radon testing is recommended by the Agency and the U.S. Surgeon General, EPA cannot provide assurance that commercially available radon testing devices or radon testing laboratories are accurate and reliable.

2. Inform Congress that the limitations of reliable testing for radon may negatively affect achieving the IRAA goals.

Agency Comments and OIG Evaluation

The Agency said it generally agreed with Recommendation 1. The Agency stated that it will review its Web-based materials and revise them, as appropriate, within 60 days; printed documents will take longer to revise due to printing cycles. However, the Agency did not provide information related to what it will disclose and how it intends to characterize the accuracy and reliability of radon testing in these documents. Additional information is needed as to EPA's planned revisions of public documents, such as whether they will explicitly state that commercially available radon testing devices or radon testing laboratories may not be accurate and reliable. We will need this information to assess whether EPA's planned actions meet the intent of this recommendation. The recommendation will remain open and unresolved until an Agency corrective action plan is completed that provides details on how the Agency will implement the recommendation.

The Agency agreed with Recommendation 2. The Office of Air and Radiation stated that it will work with the Office of the Chief Financial Officer to initiate this update to the Agency's next Performance and Accountability Report to Congress within 90 days of the final OIG report. It plans to use this report to notify Congress that the limitations of reliable testing for radon may negatively affect achieving the IRAA goals. This response meets the intent of our recommendation. The recommendation will remain open until the Agency provides an acceptable action plan that includes a completion date.

The Agency's complete written response is in Appendix A. Details on our evaluation of those comments are in Appendix B.

Status of Recommendations and Potential Monetary Benefits

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in $000s)	
Rec. No.	Page No.	Subject	Status[1]	Action Official	Planned Completion Date	Claimed Amount	Agreed To Amount
1	8	Disclose to the public that while radon testing is recommended by the Agency and the U.S. Surgeon General, EPA cannot provide assurance that commercially available radon testing devices or radon testing laboratories are accurate and reliable.	U	Assistant Administrator for Air and Radiation			
2	8	Inform Congress that the limitations of reliable testing for radon may negatively affect achieving the IRAA goals.	O	Assistant Administrator for Air and Radiation			

[1] O = recommendation is open with agreed-to corrective actions pending
C = recommendation is closed with all agreed-to actions completed
U = recommendation is undecided with resolution efforts in progress

Appendix A

Agency Response to Draft Report

Memorandum

SUBJECT: Comments on the Draft Evaluation Report: EPA Does Not Provide Oversight of Radon Testing Accuracy and Reliability

FROM: Elizabeth Craig
Acting Assistant Administrator
Office of Air and Radiation

TO: Wade T. Najjum
Assistant Inspector General for Program Evaluation
Office of Inspector General

The EPA Office of Air and Radiation appreciates the opportunity to comment on the OIG's draft report *"EPA Does Not Provide Oversight of Radon Testing Accuracy and Reliability,"* (Assignment No. Project No. 2008-0186, March 10). Thank you for your observations on the important public health challenge of reducing indoor radon exposure.

Our response to the draft findings are as follows:

Recommendation 1 - Disclose to the public that while radon testing is recommended by the Agency and the U.S. Surgeon General, EPA cannot provide assurance that commercially available radon testing devices or radon testing laboratories are accurate and reliable.

OAR generally concurs with OIG's recommendation that EPA should not assure the public of greater accuracy than these simple devices have been demonstrated to deliver. The report points to an instance in which we appear to have offered such an assurance. OAR will review its public materials and revise them, as appropriate, within 60 days. Note that this applies to our web-based information; our printed documents will take longer to revise due to printing cycles.

See Appendix B, Note 1, for OIG Response

However, OAR believes the report would benefit from additional information. For example, while OAR acknowledges OIG's main point, that EPA does not oversee a comprehensive national system of quality assurance for the testing and certification of radon measurement devices and laboratories in the United States, the report is misleading without a greater state perspective. Despite their small size, some State programs have substantial competency in the area of radon measurement reliability, and we suggest the OIG report would be considerably more robust if the State program perspective were to be included.

Responsibility for quality control and assurance is shared among EPA, States, private proficiency programs, device manufacturers, and laboratories. The OIG report recognizes that limited resources are a constraint throughout the system, and that is a key insight. The US radon protection system as a whole operates on the basis of high professional commitment and modest resources. Although competent and dedicated, State radon programs are typically very small. Private proficiency programs, field mitigators, device manufacturers, and test labs operate within tight financial margins. The current economic crisis has put additional strain on a system already under daily pressure. Device testing, quality assurance activities, and more exotic system checks, such as blind testing, are especially costly to an industry operating in such difficult market circumstances.

See Appendix B, Note 2, for OIG Response

Further, the report does not acknowledge that different levels of measurement precision are appropriate for different applications. For residential self-testing, devices must not only guide appropriate personal decisions about actions to reduce residential risk, but must also be broadly available, affordable, and easy to use by the non-expert. More accurate measurement is available for specific applications (long-term tests, active devices, etc.) when their greater cost is justified. Cheap, simple devices that build awareness and motivate action are indispensible, even at the price of some scientific accuracy.

See Appendix B, Note 3, for OIG Response

Another important consideration not adequately addressed by OIG is that EPA's recommended action level of 4 pC/L does not demark a bright line between "healthy" and "unhealthy." As EPA acknowledges in our public documents, a great deal of risk persists below the action level. EPA's level is based on practical considerations, such as ease of measurement and the likelihood that standard methods of mitigation will result in substantial risk reduction if undertaken at or above the recommended action level. Since the action level is itself imprecise, the burden on testing to measure precisely against it is not so great as it would otherwise be. In that respect, we note, as does OIG, that the Canadian government recently established a standard of accuracy for measurement of radon in air (-33/+50%) that is significantly broader than the guideline adopted by EPA for use in its former National Radon Proficiency Program (+/-25%). The Canadian action is consistent with EPA's view that precision in measurement is less important than offering a test that is simple, affordable, and effective in driving individual action to reduce high levels of indoor radon.

See Appendix B, Note 4, for OIG Response

Despite such constraints, EPA and the radon community have taken numerous steps to address device accuracy, and the report would benefit from their inclusion. EPA's Radon Laboratory at the Radiation and Indoor Environments National Laboratory (R&IE) plays an active role in assisting the national proficiency programs in their efforts to ensure reliability and

accuracy of the radon measurement industry. For the past several years, the R&IE has provided verification exposures of radon measurement devices for both NEHA and NRSB. The lab also supports performance testing of commercial radon laboratories and calibration of Lucas type cells for the measurement of radon gas. More recently the R&IE Laboratory has begun to support university researchers and State organizations conducting blind testing of commercially available radon measurement devices.

In addition, the stakeholder dialogue group convened by EPA – which is actually a venue for communication and problem-solving and not a "consensus building process" as it is characterized in the report – has worked to address device accuracy. The group has examined QA/QC needs for radon protection, and national consensus groups such as ASTM and the Radon Consortium have subsequently formed committees and begun work on writing and revising quality standards for the industry. The dialogue group continues to discuss opportunities for greater focus and consistency in radon testing and measurement. Also, the annual National Radon Training Conference and International Radon Symposium has scheduled numerous technical sessions and produced several professional papers addressing device accuracy. Finally several parties have undertaken blind testing projects, some of which OIG reviewed. The State of Pennsylvania, for example, has conducted several blind testing studies that were not discussed in the OIG review.

See Appendix B, Note 5, for OIG Response

While such undertakings do not constitute a unified national system of device testing and measurement, they reflect the radon community's shared concern with verifying and improving measurement accuracy appropriate to the application. The renewed attention brought by the OIG to this need is therefore welcome, and OAR believes it will generate even further commitment to continued improvement in a vital area of the radon program.

Recommendation 2 - Inform Congress that the limitations of reliable testing for radon may negatively affect achieving the IRAA goals.

OAR concurs with this recommendation. OIG recommended in a previous evaluation that we use the Performance and Accountability Report to inform Congress of issues raised in that report. OAR will work with OCFO to include this recommendation in that process and will initiate updating the PAR within 90 days of the final OIG report.

See Appendix B, Note 6, for OIG Response

Thank you again for the opportunity to comment on the draft evaluation report. If you have questions, please contact Bill Long, Director for the Center of Radon and Air Toxics, at (202) 343-9733.

Appendix B

OIG Evaluation of Agency Response

Note 1 - We agree with the Agency's commitment to review its public materials and revise them, as appropriate. However, the Agency did not provide information related to what they will disclose, such as whether public materials will explicitly state that commercially available radon testing devices and radon testing laboratories may not be accurate and reliable. Additional information is needed to assess whether EPA's planned actions meet the intent of this recommendation. The recommendation will remain open and unresolved until an Agency corrective action plan is completed that provides details on how the Agency will implement the recommendation.

Note 2 - We do not believe our report is misleading. Our objectives were to determine how EPA ensures that radon testing devices and laboratories accurately analyze and report indoor radon results. We saw no systemic program or process for doing this. While some States may provide oversight activities, as discussed on page 4 of this report, there are variances in State oversight activities. For example, if a proficiency program decided to remove a radon testing device from its list of certified devices, the vendor could still operate in States that do not have certification requirements. Further, as we noted in our June 2008 report, *More Action Needed to Protect Public from Indoor Radon Risks* (Report No. 08-P-0174), radon codes and regulations vary widely between locations, even within States.

Note 3 - The Agency states that our report does not acknowledge that different levels of measurement precision are appropriate for different applications. We do not agree with the Agency's premise. As we noted in our June 2008 report, there is no safe level of exposure to radon gas, and the only way to know whether indoor radon levels are elevated is to test the indoor air. However, testing with inaccurate, unreliable devices may or may not ". . . build awareness and motivate action," as stated in the Agency's response. Device readings that overstate the true level of risk may cause homeowners to take unnecessary actions, and readings that understate the true level of risk may cause homeowners to forego taking needed actions.

Note 4 - We clarified our description of EPA's action level in response to the Agency's concern regarding how we characterized this in the draft report.

Note 5 - We revised the description of the stakeholder dialogue group convened by EPA to state that it is a venue for communication and problem-solving and, according to EPA, has worked to address device accuracy. Regarding the Agency's statement that Pennsylvania has conducted several blind testing studies that were not included in the OIG review, we followed up with the Office of Air and Radiation and obtained two studies conducted by the Pennsylvania Department of Environmental Protection,

Bureau of Radiation Protection.[6] The two studies address the blind testing of laboratories certified to provide radon results in Pennsylvania. These studies do not contradict our conclusion regarding EPA's ability to assure the public about radon test results because these studies also identified instances of inaccurate test results. Also, neither study addresses the accuracy and reliability of radon test kits. We acknowledge that Pennsylvania's Department of Environmental Protection reported improvements in laboratory testing. However, as discussed in Note 2, there are variances in State codes, regulations, and oversight activities. Pennsylvania supports a certified radon testing program, which performs regular inspections of laboratories. As stated in the 2003 study:

> *The higher percentage pass rate for this study may reflect lessons learned and good practices incorporated and better attention to quality assurance procedures. The better attention to good QA [quality assurance] procedures may be due to the fact that this state radon program performs regular inspections of testers and laboratories.*

EPA acknowledges in its response that it does not oversee a comprehensive national system of quality assurance for the testing and certification of radon measurement devices and laboratories in the United States.

Note 6 - The Agency's response meets the intent of our recommendation. The recommendation will remain open until the Agency provides an acceptable action plan that includes a completion date.

[6] Short-Term Electret Ion Chamber "Blind" Testing Program," Lewis, Robert K., Pennsylvania Department of Environmental Protection, Bureau of Radiation Protection, Radon Division, Harrisburg, Pennsylvania, included in the "Proceedings of the 2003 International Radon Symposium - Volume II, American Association of Radon Scientists and Technologists, Inc., October 5-8, 2003; and "Blind Testing of Certified Charcoal Laboratories" by Lewis, Robert K, Pennsylvania Department of Environmental Protection, Bureau of Radiation Protection, Radon Division, Harrisburg, Pennsylvania, June 2005.

Appendix C

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