

## 2002 International Radon Symposium Proceedings

**Cooperative Extension's Contributions to Reducing Radon Levels in the Home:  
Past and Future Collaborations**

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**ABSTRACT**

The purpose of this paper is to describe Cooperative Extension's efforts in reducing radon levels in homes. In 1996, the EPA and the USDA launched a national initiative entitled Healthy Indoor Air for America's Homes to deliver indoor air quality information to the public and built environment professionals through Cooperative Extension. The training manual includes considerable information on radon. The module on radon considers topics such as radon sources, risks, testing, locating help, professional monitoring, and mitigation strategies. Support publications and a video are included.

Based on program impact data from 1996 to April 1, 2002, 122,232 educators and professionals were trained. Additionally, 11,095 consumers had their homes tested and 2,640 had their homes mitigated for radon. Creative strategies included the EPA and Healthy Indoor Air for America's Homes initiation of the National Radon Action Month and 2002 Poster Contest to involve children in radon awareness and risk reduction. The winning poster, and all other materials, will be displayed. Collaboration with AARST will be discussed.

**INTRODUCTION**

The purpose of this paper is to describe Cooperative Extension's efforts in reducing radon levels in homes and to explore possible collaborations between Cooperative Extension and AARST. Cooperative Extension was established in each state by Congress in 1914, and can best be described as the off-campus, informal education arm of the land-grant universities in the U.S. It provides a link between the university and the citizens of each state. As an example, the mission of Colorado State University Cooperative Extension is "to provide information and education, and encourage the application of research-based knowledge in response to local, state and national issues affecting individuals, youth, families, agricultural enterprises and communities in Colorado. We meet that challenge by offering relevant educational opportunities to all Coloradans through our network of county offices" (Colorado State University Cooperative Extension, 2001).

Located on each land-grant university campus are Extension specialists, typically holding a doctorate degree, in a variety of areas such as housing. These specialists produce and disseminate research-based knowledge to off-campus county offices. Most counties in the nation have an Extension office in which agents, typically holding a master's degree, deliver the information provided by specialists to consumers in the form of workshops, newsletters, exhibits and newspaper columns. In addition, county agents respond to questions from consumers on issues such as radon. In performing these tasks, county Extension agents are an excellent source for identifying consumers' concerns and needs for information regarding radon. AARST members can take advantage of county Extension offices to mutually exchange information and to cooperatively develop radon workshops and publications directed at consumers. These efforts should enhance the radon professional's visibility in the local marketplace.

## DESCRIPTION OF HEALTHY INDOOR AIR FOR AMERICA'S HOMES

Cooperative Extension often collaborates with other organizations and government agencies to deliver information to consumers. Such is the case with the topic of indoor air quality. In 1996, the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) launched a national program through Cooperative Extension entitled Healthy Indoor Air for America's Homes (see logo in Figure 1). The program director is Michael Vogel of Montana State University and the governmental partners are Joseph Wysocki of USDA along with Susie Shimek and Dennis Hellberg of EPA. The goal of this program is to deliver basic but comprehensive indoor air quality information to consumers and built environment professionals. The objective of Healthy Indoor Air for America's Homes is to educate consumers about sources, health risks and control measures related to common residential indoor air problems (including radon) and to help consumers reduce their health risks from these problems (Vogel & McMIndes, 1999).

Figure 1: Logo for Healthy Indoor Air for America's Homes

The need for this program was based on research showing that the quality of indoor air can be worse than that of outdoor air. This occurs because many homes are being built and remodeled more tightly without regard to the factors that assure fresh and healthy indoor air. Homes today also contain furnishings, combustion appliances and household products that can result in poor indoor air quality (U.S. Environmental Protection Agency, 1995).

AARST members will be interested in the specific activities included in the Healthy Indoor Air for America's Homes program, which include:

1. A regional workshop to develop the program and learning materials.
2. An indoor air quality program training manual (including both subject matter content and process information) for Cooperative Extension educators. This training manual was developed by Michael Vogel of Montana State University, Marilyn Bode of Kansas State University, Joseph Laquatra of Cornell University, Kathleen Parrott of Virginia Tech, Joseph Ponessa of Rutgers University and Richard Seifert of the University of Alaska in Fairbanks.
3. A national train-the-trainer workshop to train Cooperative Extension specialists from each state to become program managers for their respective states. Currently there are program managers for 43 states plus American Samoa, Puerto Rico, the Virgin Islands and Washington, DC.
4. A train-the-trainer program by state program managers to train county Extension agents.
5. A training program by county agents to educate consumers who are at risk concerning indoor air quality issues and to encourage them to reduce their health risks from indoor air quality problems.
6. A web site, maintained by the program coordinator Barbara Allen of Montana State University, which is updated on a regular basis ([www.healthyindoorair.org](http://www.healthyindoorair.org)).

As part of the program consumers learn to identify possible signs of indoor air quality problems (Healthy Indoor Air for America's Homes, 2001). These include:

- Noticeable lack of air movement.
- Unusual and noticeable odors.
- Stale or stuffy air.

- Dirty or faulty central heating or air conditioning equipment.
- Damaged flue pipes or chimneys.
- Unvented combustion air sources for fossil fuel appliances.
- Excessive humidity.
- Presence of molds and mildew.
- Health reaction after remodeling, weatherizing, using new furniture, using household and hobby products, or moving into a new home.
- Feeling noticeably healthier outside.

**Consumers are also instructed in common sources of air quality problems (Tremblay & Vogel, 1999), including:**

**Moisture and biologicals** such as molds, mildew, dust mites, animal dander and cockroaches from high humidity levels, inadequate ventilation, and poorly maintained humidifiers and air conditioners.

**Combustion products**, including carbon monoxide, from unvented fossil fuel space heaters, unvented gas stoves and ovens, and backdrafting from furnaces and water heaters.

**Formaldehyde** from durable press draperies and other textiles, particle board products such as cabinets and furniture framing, and adhesives.

**Radon** which is a radioactive gas from soil and rock beneath and around the home's foundation, groundwater wells and some building materials. It is a common pollutant found in many homes and has been linked to lung cancer.

**Household products and furnishings** such as paints, solvents, air fresheners, hobby supplies, dry cleaned clothing, aerosol sprays, adhesives, and fabric additives used in carpeting and furniture which can release volatile organic compounds.

**Asbestos** found in most homes more than twenty years old. Sources include deteriorating, damaged or disturbed pipe insulation, fire retardant, acoustical material and floor tiles.

**Lead** from lead-based paint dust created when removing paint by sanding, scraping or burning.

**Particulates** from dust and pollen, fireplaces, wood stoves, kerosene heaters and unvented gas space heaters.

**Tobacco smoke** which produces particulates, combustion products and formaldehyde.

The training manual for this program contains twelve self-guided and self-contained modules consisting of lesson plans, overhead transparencies and videos (Figure 2). There are also consumer self-assessments, marketing and media materials, program record-keeping materials and evaluation tools. Dozens of ideas are provided for program implementation (Vogel & McMIndes, 1999). One of the modules focuses on radon. Almost all of the entire network of over 3,000 county Cooperative Extension offices in the nation has this training manual, and thousands of county agents have been trained at the state level to use the program materials.

Figure 2: Program Training Manual

The module on radon, written by Richard Seifert of the University of Alaska in Fairbanks, considers topics such as radon sources, where to locate help, how radon enters the home, radon risk, testing, professional monitoring and mitigation strategies (Seifert, 1999). Radon professionals can work with county Extension agents to shape the specific programs delivered to consumers in the community using local data. Insights by radon professionals on local construction methods, radon mitigation best practices, and unique radon needs and challenges in that community would be invaluable.

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The learning objectives of the radon lesson module are:

- Radon is known to cause lung cancer in humans over a long period of exposure.
- Radon is present nearly everywhere in small concentrations and is the largest source of radiation exposure for the U.S. population.
- Radon cannot be detected without testing for it specifically because it is invisible, odorless and chemically inert.
- Testing is simple, relatively inexpensive and harmless to do.
- Radon is a manageable risk, and help is available to assist the homeowner.

In addition to the radon module, there are four EPA supporting publications in the training manual: *A Citizen's Guide to Radon* (1993a), *Home Buyer's and Seller's Guide to Radon* (1993b), *Radon: A Physicians Guide* (1993c), and *Building a New Home: Have You Considered Radon?* (1998). The training manual also references a video on radon available from the American Lung Association (1991). To make this information readily accessible to consumers, Healthy Indoor Air for America's Homes (2001) published a thirteen-page booklet entitled *Indoor Air Hazards Every Homeowner Should Know About* (Figure 3). This booklet, available in both English and Spanish, is available at county Extension offices and the Federal Consumer Information Center ([www.pueblo.gov](http://www.pueblo.gov)). The booklet would be useful to the radon professional as a handout for potential customers to educate them on radon as a health risk and the importance of testing and, if necessary, mitigation.

Figure 3: Indoor Air Quality Booklet

### PROGRAM IMPLEMENTATION

Many creative ideas have been applied over the six-year period of the Healthy Indoor Air for America's Homes program's existence. For example, program participants cooperate with EPA in promoting National Radon Action Month in January. This past year, the EPA and Healthy Indoor Air for America's Homes initiated the National Radon Action Month 2002 Poster Contest to increase children's knowledge of radon in the home. "State leads" in participating states promoted the contest to area fifth-grade classes, coordinated educational programs for the schools, collected posters and helped select state winners. They encouraged educators to deliver a lesson on radon, place a radon test kit in the classroom, provide materials to be shared with parents, and assist children in making posters about radon's dangers and solutions. Schools displayed posters in October 2001 during the Healthy Indoor Air for America's Homes' Radon Action Week.

Winners at the state level were forwarded for a national competition. Ian Smith, of Syringa Elementary School in Pocatello, Idaho, won the national contest with a poster depicting a radon test (Healthy Indoor Air for America's Homes, 2002a). The poster can be ordered from the Healthy Indoor Air for America's Homes web site. If this contest is conducted again, it would provide an opportunity for radon specialists and technologists to visit classrooms and share their knowledge with the teachers and students.

**Many of the states involved in the project have developed fact sheets that are available to consumers in print form or on state Cooperative Extension web sites (for example, see Pope, 2000 and Versch & Niemeyer, 2000). Check your local land-grant university's web site to determine if your state has fact sheets or other materials on radon. AARST members might also find it useful to distribute these materials to potential customers as they learn about radon and to clients as they consider radon mitigation options. Most of the radon fact sheets follow a format**

**similar to the following.**

1. Description of what radon is, where it comes from and its health risk. The likelihood of radon in a specific state and how that risk compares to other states is also discussed.
2. Radon testing using short-term detectors and long-term detectors. Information is provided on how to purchase and use test kits.
3. Understanding test results, especially how radon is measured and what radon levels mean. Consumers are instructed to have an experienced radon contractor fix their homes if the radon level is four picocuries per liter or higher.
4. Radon mitigation, including methods (such as sub-slab, drain tile, sump hole and block wall suction) and costs. The method and cost estimate is presented in detail for the most commonly used technique of sub-slab depressurization.
5. Selection of a radon mitigator. Consumers are recommended to contact their local health and human services system or state radon office to locate qualified contactors. It is suggested that in choosing the mitigation method, consumers should consider the radon levels, system operation, structural changes, cost, house size and foundation types.
6. Radon resistant new construction is discussed for those building a new home, with the idea that installation costs are generally much lower during construction and careful planning can allow a variety of strategies to be integrated, insuring the most effective radon reduction system possible. Possibilities include a passive sub-slab or crawlspace depressurization system, foundation barrier techniques, and dedicated intake and/or combustion air for exhaust and combustion appliances.
7. Issues for home buyers and renters, suggesting that they ask if the home has been tested for radon and what the test results showed.
8. Available resources, including:
  - American Association of Radon Scientists and Technologists ([www.aarst.org](http://www.aarst.org))
  - American Lung Association ([www.lungusa.org/air/envradon.html](http://www.lungusa.org/air/envradon.html))
  - Environmental Protection Agency ([www.epa.gov/iag/radon/](http://www.epa.gov/iag/radon/))
  - National Radon Information Line: 1-800-767-7236
  - Radon Fix-It Program of the Consumer Federation of America ([www.radonfixit.org](http://www.radonfixit.org))
  - State Radon Contact

The coordinating office for Healthy Indoor Air for America's Homes at Montana State University publishes a newsletter entitled *Breathing Room*. State activities are highlighted in the newsletter to provide ideas for program managers around the country. Other ways that states and counties disseminate information to consumers include workshops, the distribution of an annual poster "Kids Care about Clean Air" that features a calendar with helpful indoor air quality tips listed for each week of the year (Figure 4) (a poster can be ordered at the Healthy Indoor Air for America's Homes web site), exhibits at county fairs and home shows, newspaper columns, articles in state and county Cooperative Extension housing newsletters and press releases. The coordinating office also maintains the web site. The web site includes an air quality home tour in which consumers can click on a room to discover possible radon problems and remedies. Radon professionals may wish to collaborate in these activities to produce greater visibility regarding local radon problems and to their services. A number of materials can be ordered at the web site, including the training manual.

Figure 4: Kids Care about Clean Air Poster

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One of the unique features of the Healthy Indoor Air for America's Homes (2002b) web site is the identification of myths and facts regarding radon. AARST members and their clients will be interested in what is covered in this web site, including:

**MYTH:** Scientists are not sure radon really is a problem.

**FACT:** Although some scientists dispute the precise number of deaths due to radon, all major health organizations (like the Centers for Disease Control, the American Lung Association and the American Medical Association) agree with estimates that radon causes thousands of preventable lung cancer deaths every year. This is especially true among smokers, since the risk to smokers is much greater than to non-smokers.

**MYTH:** Radon testing is difficult, time-consuming and expensive.

**FACT:** Radon testing is inexpensive and easy—it should take only a little of your time.

**MYTH:** Radon test kits are not reliable and are difficult to find.

**FACT:** Reliable test kits are available through the mail, in hardware stores and other retail outlets. Call your state radon office for a list of test kit companies that have met EPA requirements for reliability or are state certified.

**MYTH:** Homes with radon problems cannot be fixed.

**FACT:** There are simple solutions to radon problems in homes. Thousands of homeowners have already fixed radon problems in their homes. Radon levels can be readily lowered for about \$750 to \$2,500. Call your state radon office for a list of contractors that have met EPA requirements or are state certified.

**MYTH:** Radon only affects certain kinds of homes.

**FACT:** House construction can affect radon levels. However, radon can be a problem in homes of all types: old homes, new homes, drafty homes, insulated homes, homes with basements and homes without basements.

**MYTH:** Radon is only a problem in certain parts of the country.

**FACT:** High radon levels have been found in every state. Radon problems do vary from area to area (Figure 5), but the only way to know your radon level is to test.

**MYTH:** A neighbor's test result is a good indication of whether your home has a problem.

**FACT:** It is not. Radon levels vary from home to home. The only way to know if your home has a radon problem is to test it.

**MYTH:** Everyone should test their water for radon.

**FACT:** While radon gets into some homes through the water, you should first test the air in your home for radon. If you find high levels and your water comes from a well, contact a professional to test your water.

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**MYTH:** It is difficult to sell homes where radon problems have been discovered.

**FACT:** Where radon problems have been fixed, home sales have not been blocked or frustrated. The added protection is sometimes a good selling point.

**MYTH:** I have lived in my home for so long, it does not make sense to take action now.

**FACT:** You will reduce your risk of lung cancer when you reduce radon levels, even if you have lived with a radon problem for a long time.

**MYTH:** Short-term tests cannot be used for making a decision about whether to fix your home.

**FACT:** There is no universal way to test. A short-term test followed by a second short-term test may be used to decide whether to fix your home. Real estate protocol allows for two tests to be simultaneously conducted. The closer the average of your tests is to 4 pCi/L, the less certain you can be about whether your year-round average is above or below that level, thus you might want to retest. Keep in mind that radon levels below 4 pCi/L still pose some risk. Radon levels can be reduced in most homes to 2 pCi/L or below.

This web site provides valuable verification of radon facts that radon professionals can use to enhance their credibility with potential customers.

### Figure 5: Radon Zone Map

Based on Healthy Indoor Air for America's Homes program impact data from 1996 to April 1, 2002, an estimated 122,232 educators and professionals have been trained by the national program. Other audiences included parents, children, child care providers, health department nurses, social workers, and school principals. Additionally, as a direct result of this program 11,095 consumers had their homes tested for radon and 2,640 consumers had their homes mitigated for radon after attending workshops. The numbers are most likely higher, as follow-up of behavior from workshop participants can be difficult to fully track. This program demonstrates the potential gains that can be accomplished when local radon professionals work collaboratively with Cooperative Extension.

### FUTURE COLLOABORATION WITH AARST

As the program continues to expand, efforts are underway for greater cooperation with radon professionals and organizations. This raises the question: How can Healthy Indoor Air for America's Homes and AARST collaborate in the future? A starting point is to look up your county Extension office in the county government section of the telephone directory. Often the family and consumer sciences agent is the radon contact person. Ask what radon programs are in place, how you might help and determine if you can be listed as a contact for consumers with radon problems in their homes.

Contact at the state level can be made by going to the Healthy Indoor Air for America's Homes web site which contains names, addresses, telephone numbers and email addresses for each state program manager. Ask the same questions as identified regarding the county Extension office. Many state program managers will welcome

the opportunity to learn more about AARST and to develop contacts with radon specialists and technologists in their states.

Collaboration between AARST and Cooperative Extension will result in more comprehensive and accurate radon information delivered to consumers. On the business side, better educated consumers will be more likely to contact radon professionals for testing and mitigation, thereby generating new business. On the visibility side, this collaboration will lead to increased recognition of AARST as the leading professional organization concerned with radon's health impact as well as radon testing and mitigation strategies. Relations with local government officials and recognition of the importance of radon professionals will also improve.

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Figure 1



Figure 2

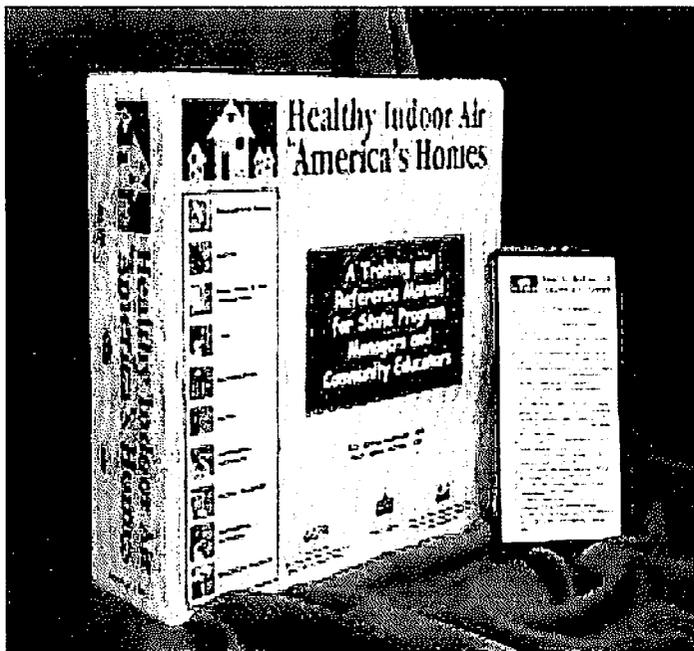


Figure 3

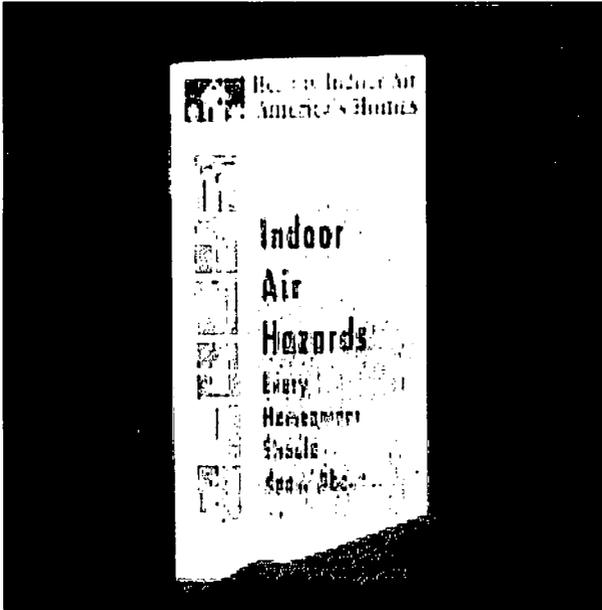
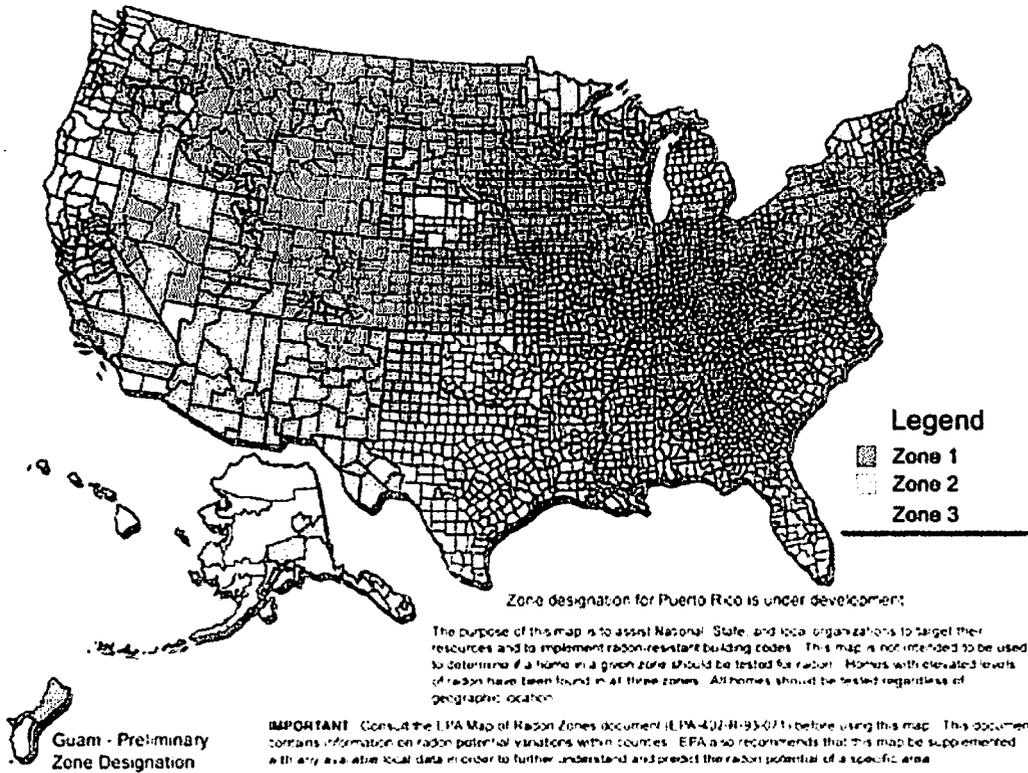


Figure 4

A large, detailed flyer for the "National Home Indoor Air Quality Conference and Exhibition" held in October 2002. The top headline reads "Kids Care about clean indoor air all year!" with a small cartoon character. Below this, it says "Discover the Rewards of Children's Health". The central text includes "National Home Indoor Air Quality Conference and Exhibition" and "October 2002". There are several logos, including EPA and NIAQ. The flyer is divided into several sections with text and graphics, including a list of topics and speakers. At the bottom, it says "Healthy Indoor Air America's Homes" and provides contact information for the National Home Indoor Air Quality Conference and Exhibition, including a website and phone number.

Figure 5

### EPA Map of Radon Zones



Source: [www.epa.gov/iaq/radon/zonemap.html](http://www.epa.gov/iaq/radon/zonemap.html)