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RADON

From Insulation Contracting to Radon Mitigation

by Danny R. West

As the definition of "house doctor" has evolved over the past ten years and the field of energy services has grown more sophisticated, many contractors have expanded the services they offer their clients. Here's the story of one insulation contractor who has found a niche in radon testing and mitigation.

In the winter of 1985, like most energy-related contractors—especially insulation contractors—I was looking for a way to diversify my company and expand my business. With the elimination of the energy tax credits, the insulation retrofit market had experienced a rapid decline.

While exploring the various possibilities for expansion, I read an article in a trade magazine describing "house doctoring," a way of providing energy services using a blower door in combination with an infrared camera. After much research, I decided to purchase a blower door. A week of very intense training was included with the purchase.

During that week, the trainers discussed indoor air quality at length. They devoted many hours to the subject of radon gas, and discussed the opportunities to expand one's business to include radon mitigation in homes. Like most people in attendance, I was unfamiliar with the radon problem, which had just hit the news. Through the training session, I learned that radon is a naturally occurring radioactive gas, a byproduct of the natural decay of uranium. You cannot see it, smell it, or taste it. Radon is normally found in high concentrations in soils and rocks containing uranium, granite, shale, phosphate, and pitchblende, and is also found in soils contaminated with certain industrial wastes, such as the byproducts of uranium and phosphate mining.

According to the U.S. Environmental Protection Agency (EPA), radon is the second-leading cause of lung cancer, exceeded only by cigarette smoking. EPA's estimate is that approximately 5,000–30,000 people die annually because of exposure to elevated levels of radon.

Danny R. West is president of Insul-Tech, an energy services and radon mitigation company based in Columbus, Ohio. He is also president of the North American Radon Association.

Radon Training by EPA

The U.S. Environmental Protection Agency (EPA) sponsors radon testing and mitigation courses around the country periodically, which can help house doctors add radon testing or mitigation to their black bag of diagnostic and therapeutic tricks.

The Radon Measurement Proficiency (RMP) program evaluates the proficiency of radon testing firms. The Radon Contractor Proficiency (RCP) Program is a training program for radon mitigators; it includes a four-day course called "Radon Technology for Mitigators," that includes training, an examination, mitigation guidelines, and continuing education. The course informs contractors about all facets of radon and mitigation techniques. Passing the examination and meeting other program requirements qualifies the student for inclusion in the national RCP list. Successful participation in the RCP and RMA also meets certification or licensing requirements in some states and local jurisdictions.

The RCP program calls for continuing education that is meant to expand skills and ensure the radon contractor keep up with the state of the art in this rapidly developing field.

Training by Region

RCP training courses are offered by three regional centers:

- **Midwest**—the Midwest Universities Radon Consortium. Contact Bruce Snead at the Kansas State University Engineering Extension. Tel: (913)532-6026.
- **East**—Rutgers University in New Jersey. Contact Alan Applebee. Tel: (201)932-2551.
- **West**—Colorado State University. Contact Jim Young. Tel: (303)491-7742.

The EPA has two helpful phone numbers: the radon hotline—(800)SOS-RADO(N)—and the public information number—(202)382-2080. The public information office provides information about the RCP.

After analyzing the issue and discovering that less than 100 firms nationally were involved in the radon industry, I decided to participate in the EPA's Radon Measurement Proficiency Program (see box on p. 31). I purchased 25 charcoal packets and started offering radon testing to the public. From what I learned about radon mitigation, I realized that the knowledge and experience that I had gained insulating houses would be invaluable in mitigating radon. Part of mitigation involves sealing the home, and the understanding of air flow patterns in buildings I gained through house doctoring would be very helpful. Knowing how to use a blower door also would come in handy, since we use the blower door and smoke guns for sealing radon entry routes and for simulating winter conditions in summer, when the pressure differential caused by the stack effect is not as strong. Also, if a house is very tight, the best solution might be to pressurize the basement, and the blower door can simulate how this mitigation technique would work.

The Industry Takes Off

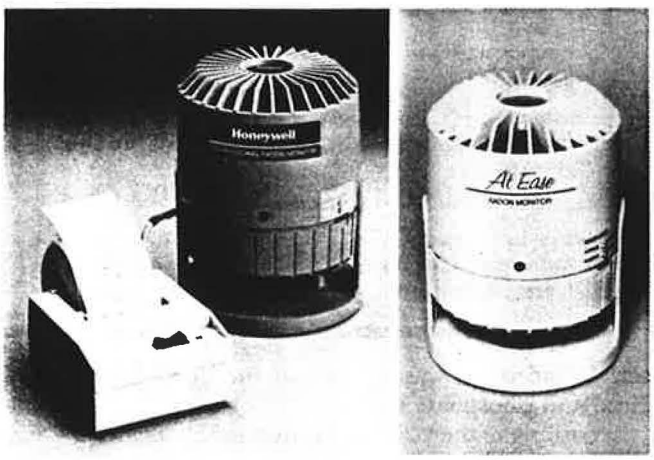
Recently, three years after attending Round 1, I completed Round 6 of the Radon Measurement Proficiency Program. During this round, several thousand firms nationwide participated, which demonstrates the rapid growth of the radon industry in the past four years.

In my opinion, the growth has happened too fast. Today, the market is flooded with "overnight radon experts" expecting to get rich at the expense of a frightened public. Fortunately, several states have passed radon licensing and certification bills. Florida, New Jersey, Pennsylvania, and several other states have legislation pending to regulate the radon industry.

Columbus, Ohio, is the only municipality in the nation that now requires radon testers to be certified and mitigators to be licensed. The city developed the requirements to handle the problem of non-contractors calling themselves radon experts without knowing anything about radon or building science. Now, since people must be licensed, bonded contractors to do radon work, at least they have some experience in building and have liability insurance to provide some accountability.

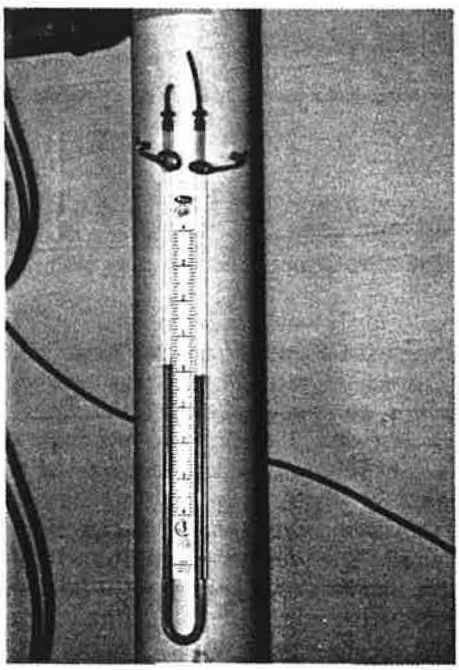
Columbus's tester certification requirements are: attendance at the EPA course "Radon Technology for Mitigators," and participation in the latest round of the Radon Measurement Proficiency Program. To be a licensed mitigator, the same prerequisites apply and a contractor's license is also required. In addition, all testers and mitigators must pass a test administered by the Columbus Health Department. The city's aggressive position helps assure that all radon mitigators are properly trained and adequately insured.

The EPA now has a national program for the radon mitigator called the Radon Contractor Proficiency Program (see box). The requirements include attending the Radon Technology for Mitigators course, passing an exam, and taking continuing education. According to the program's mitigation guidelines, before I can mitigate a home, I must first review and assess the quality of any previous radon measurements made by the homeowner or testing firm and determine if the measurements were made in accordance with the EPA protocols. The homeowner should always be informed of the limitations of a screening measurement and advised to conduct confirmatory measurements.



Honeywell

The digital radon monitor is designed to provide continuous short and long-term readings, through the utilization of a silicon detector, and microcomputer technology to store and analyze data.



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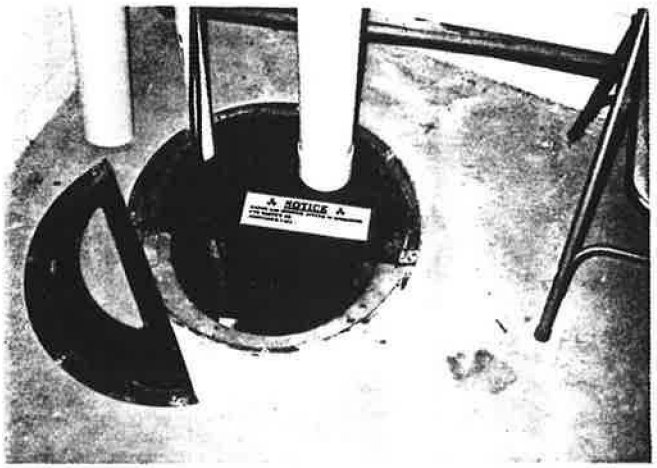
This U-tube manometer monitors the amount of static pressure maintained on the total system as a result of the operation of the centrifugal duct fan.

In the Midwest, the most popular mitigation technique is the subslab depressurization system. To draw suction from under the slab, the system can take advantage of an existing sump crock or can penetrate the slab. Interior drain tiles collect water to empty into the crock, providing an excellent pathway to draw from.



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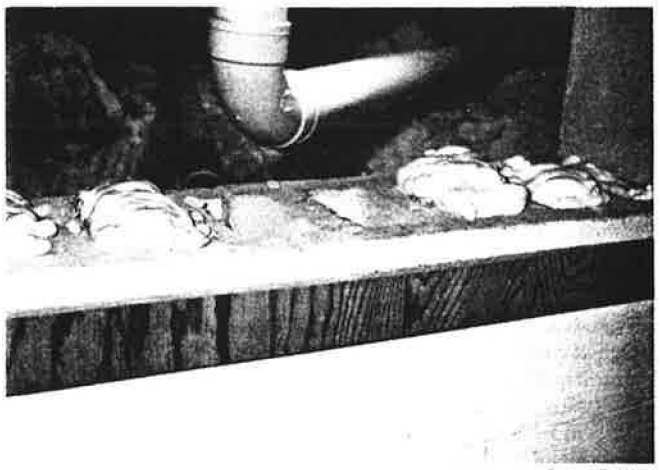
This installed subslab system utilizes the existing sump crock to draw radon gas from under the slab.

Of course, no work is without potential problems. We have learned to always check the floats to make sure they are not binding before we seal up the sump pit. We've also found that since we seal in excessive humidity, it is important to replace any high-motored sumps with submersibles to avoid corrosion and the eventual failure of the sump system.

Another important mitigation action is to seal the slab or crawl floor as completely as possible. Without proper sealing of the radon entry routes, static pressure cannot be maintained under the slab and the potential exists for the backdrafting of a combustion furnace or water heater.



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Hollow core blocks at the entrance to the crawl space were foamed to eliminate introduction of radon gas.

In crawl spaces, a perforated pipe is installed on the ground, covered with a six-mil polyethylene membrane sealed to the walls. If part of the building is on slab, the pipe is then connected to the vertical pipe extending from the sump or subslab penetration from the slab side, and a fan draws the soil gas outside. It is advisable to exhaust the gas above the roof line to prohibit reentering the house via open windows or vents (see Figure 1).

We have been successful in reducing radon levels to no more than 4 picoCuries per liter (pCi/l) in more than

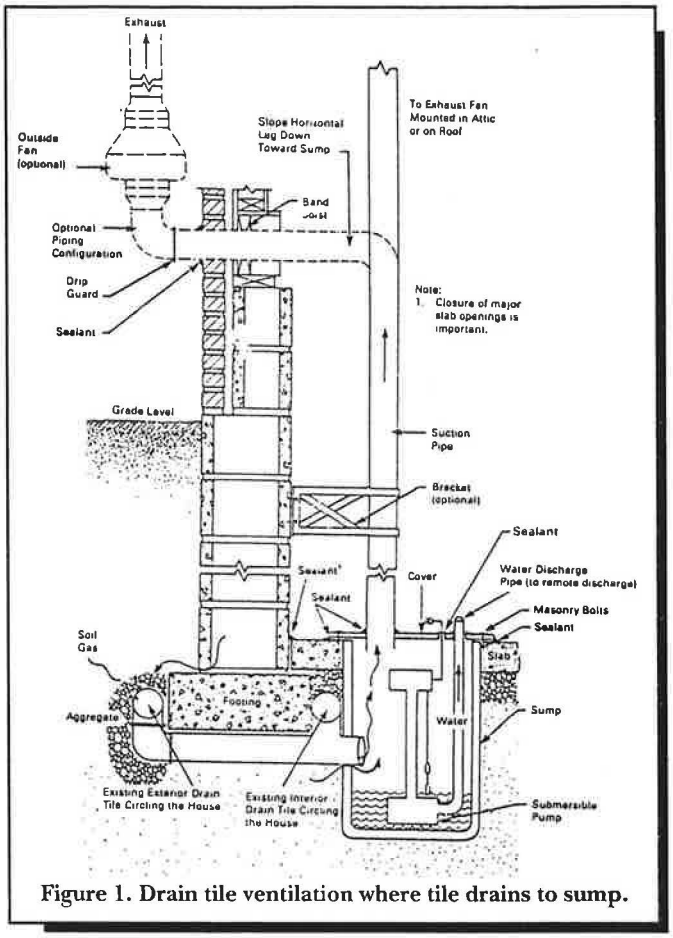

Figure 1. Drain tile ventilation where tile drains to sump.

600 dwellings. (Four pCi/l is the EPA maximum average annual exposure level—see *HE*, Sept/Oct '87, p. 8.) Radon reduction in some homes, however, is more difficult than in others.

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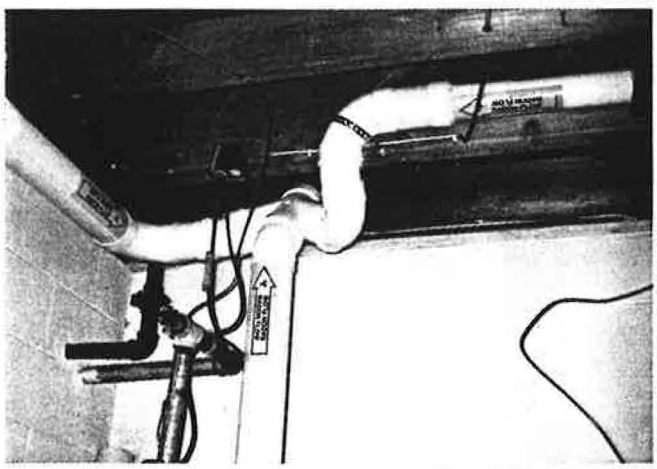
Installed on the floor of a dirt crawl space is a 3" perforated PVC pipe covered with .006 mil polyethelene.

Our most difficult house was located in Newark, Ohio. What made this house unique was that the homeowner had connected all of the down spouts to the drain tiles. Not knowing this, we installed a subslab depressurization system, only to discover that the fan drew suction through the down spouts. This condition made creating a negative pressure under the slab virtually impossible. We tried installing traps in the down spouts in an attempt to pull suction from under the slab, but that was still unsuccessful. So we decided to pressurize the basement. This approach worked: it reduced the radon level from 30 pCi/l to below 4 pCi/l. (This is not standard EPA recommended practice; but it was not a standard house.)

It is not uncommon in Ohio to find levels in excess of 100 pCi/l. These houses present a special challenge. But after a well-thought out system is in place, sometimes involving a combination of techniques, it is very rewarding to read the continuous monitor print out and see the obvious decrease in radon levels (see Figure 2).

The Doctor Who Cures All Ills

Established weatherization professionals already have the hand tools, including smokesticks and caulk guns, that are needed in the radon business. The large tools can require more of an investment: a jackhammer ($1,600) or core drill ($2,600–3,000) and testing equipment such as radon sniffers ($2,000–3,000) or continuous monitors ($1,000–3,000). Of course, when first entering the field, all of this equipment can be rented. The radon testers from laboratories and charcoal canisters can be purchased for $15 including lab fees. The canisters are adequate for



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The PVC is then connected to the exhaust manifold (shown above) which is the collection point for the sub-slab system.

diagnostic and post-mitigation testing, but require more time to get the results from the primary laboratories.

Another reason energy services professionals make good radon mitigators is the experience they have from making structures energy-efficient. Mitigators should know how

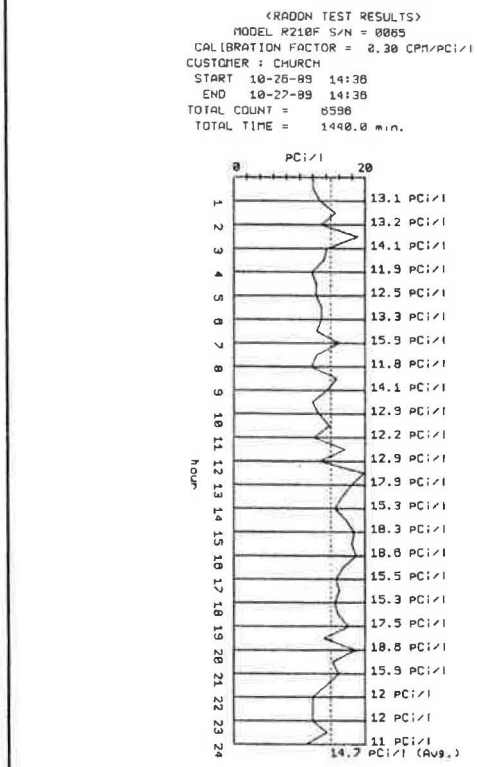

Figure 2. An example of a print-out from a radon test.

the system will affect the energy consumption of the building. The reality is that to reduce a radon level at the expense of energy and comfort will ultimately result in a very unhappy customer.

There is much radon work to be done, and the industry needs trained professionals to help reduce the major health threat radon poses today. ■

Further Reading

Here are some publications for further reading on the topic of radon testing and mitigation. Contact: National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Tel: (703) 487-4600.

- Radon Reduction Techniques for Detached Houses ($28.95)
- Application of Radon Reduction Methods ($21.95)
- Interim Protocols for Screening and Follow-up Radon and Radon Decay Product Measurements
- Radon Reference Manual
- Indoor Radon and Radon Decay Products Measurement Protocols

The following booklets are available at no charge through the U.S. Environmental Protection Agency, Public Information Center PM211B, 401 M St. SW, Washington, DC 20460.

- Radon Reduction in New Construction
- A Citizen Guide to Radon
- Radon Reduction Methods — A Homeowner's Guide
- Removal of Radon From Household Water