

# Understanding Radon in Crawl Space: What Homeowners Need to Know

## Why Crawl Spaces Are a Hidden Pathway for Radon

When I first started working in radon mitigation, I assumed basements were the main problem. And they are, no question. But over the years I have learned that homes with crawl spaces present a different kind of challenge. The soil beneath a crawl space is often exposed or only loosely covered, which means soil gas, including radon, can move freely into the living space above. The issue is that radon in crawl space environments behaves differently than in a full basement, and the solutions need to match that reality.

Radon is a radioactive gas that comes from the natural breakdown of uranium in soil and rock. It moves up through the ground and into the air. When it gets trapped inside a home, especially in lower levels or crawl spaces, it can build up to levels that pose a radon health risk. The EPA recommends action when radon levels reach 4 picocuries per liter or higher. But even lower levels can add up over time. For homeowners in St. Louis, where the geology includes limestone and shale formations that can produce radon, understanding the specific behavior of radon in crawl space conditions is the first step toward protecting your family.



## The Difference Between a Basement and a Crawl Space

A basement is a finished or unfinished room with a concrete floor and walls. A crawl space is typically a shallow, unfinished area under the first floor, often with a dirt floor or a thin layer of gravel. Because crawl spaces are not meant for living, they are easy to ignore. But the air in a crawl space is directly connected to the air in the rooms above through gaps, floor joists, and utility penetrations. If radon enters that crawl space, it can migrate upward just as easily as it would from a basement.

The main difference is access. In a basement you can seal cracks in the slab and install a sub-slab depressurization system fairly directly. In a crawl space you are often working in tight quarters, sometimes with only 18 inches of clearance. You cannot stand up, let alone run a jackhammer. That changes the approach. The goal is still the same, to create a pressure difference that pulls radon from beneath the house and vents it safely above the roofline, but the method has to be adapted for the space constraints.

## Testing: The First Step You Cannot Skip

Before any mitigation work begins, you need a reliable radon test. I recommend starting with a short-term radon detector placed in the lowest lived-in level of the home, but also consider testing the crawl space itself. Many people skip the crawl space test because they do not spend time there. But the concentration of [radon in crawl space](#) air can be much higher than in the living area, and that high concentration can drive the levels upstairs. A professional test from a company like Air Sense Environmental will give you a clear baseline. They use continuous monitors that record readings over several days and provide a report you can trust.

If the test shows elevated levels, the next step is figuring out what kind of mitigation system will work. In a crawl space, the most common approach is active soil depressurization. That means creating a suction point under the house, usually by installing a sealed sump hole or a collection mat on the soil, and running a pipe from that point to a radon fan mounted outside or in the attic. The fan creates a vacuum that pulls soil gas from beneath the crawl space and exhausts it safely away from windows and doors.

## **Sealing the Crawl Space: A Critical but Often Overlooked Step**

One of the biggest mistakes I see is people thinking a fan alone will solve the problem. It will not, not completely. The fan needs a sealed envelope to work efficiently. If the crawl space has a dirt floor, the first step is to lay a polyethylene vapor barrier over the soil. This heavy plastic sheeting blocks moisture and radon from rising directly into the crawl space air. The seams need to be overlapped and sealed with tape, and the edges need to be fastened to the foundation walls. Any tears or gaps defeat the purpose.

After the vapor barrier is down, you go around the perimeter and seal every penetration. That means caulking around pipes, wires, and ductwork that come through the floor. Even small gaps around a plumbing vent stack can let radon in. I have seen homes where a single unsealed hole near a crawl space access hatch was responsible for half the radon reading on the main floor. It does not take much. Foundation repair may also be needed if there are cracks in the concrete stem walls or if the sill plate has rotted. Sealing is not glamorous work, but it makes the mechanical system far more effective.

## **How Active Soil Depressurization Works in a Crawl Space**

Once the crawl space is sealed, the next step is to install the depressurization system. In a typical setup, a contractor will dig a small pit in the crawl space floor, the sealed sump hole, and place a perforated pipe or a collection bucket in it. That pit is then connected to a PVC pipe that runs up through the crawl space and out through the rim joist or a sidewall. The pipe connects to a radon fan, usually mounted on the exterior of the house or in an unconditioned attic space. The fan runs continuously, pulling air from beneath the vapor barrier and venting it above the roofline.

The fan creates a negative pressure zone under the house. That negative pressure prevents radon from being pushed into the crawl space by the natural pressure of the soil. Instead, the soil gas is captured at the suction point and exhausted outside. For this to work, the system has to be balanced. If the fan is too strong, it can pull conditioned air out of the house, increasing energy bills. If it is too weak, it will not overcome the natural pressure of the soil. A good installer knows how to size the fan and the piping for the specific conditions of the crawl space.



**Verification and Long-Term Monitoring**

After the system is installed, the work is not done. The next step is post-installation verification. This usually involves a second radon test in the living area to confirm that levels have dropped below the EPA action level. But verification also includes checking the system itself. A manometer, specifically a U-tube manometer, is installed on the pipe to show that the fan is running and maintaining the correct pressure. The manometer has a colored liquid inside a clear tube. When the fan is off, the liquid sits level. When the fan is on and the system is sealed, the liquid shows a steady difference between the two sides of the tube. That simple visual check tells you the system is working.

I always tell homeowners to check the manometer once a month. If the liquid levels out or shows no difference, something is wrong. It could be a fan failure, a blockage in the pipe, or a seal that has broken. Catching it early keeps the system effective. Most mitigation system warranty plans cover parts and labor for the first few years, but routine checks are your responsibility. A quick glance at the U-tube manometer takes ten seconds and can save you from months of undetected radon exposure.

## **Common Questions and Practical Concerns**

People often ask me whether a radon mitigation system will affect their home's resale value. The short answer is yes, but in a good way. A home with a documented, working radon system, including post-installation verification results, is more attractive to buyers, especially in areas like St. Louis where radon is a known concern. The presence of a system shows the home has been cared for and that the radon health risk has been addressed. Sellers who disclose a prior radon test and a mitigation system often close deals faster than those who do not.

Another common question is cost. The price of mitigating radon in crawl space environments tends to run a bit higher than basement systems because of the labor involved. Crawling through tight spaces, sealing irregular surfaces, and running vent piping through rim joists takes time. But the investment is small compared to the potential health cost of long-term radon exposure. The EPA estimates that radon causes thousands of lung cancer deaths each year in the United States. It is the second leading cause of lung cancer after smoking. For non-smokers, it is the leading cause.

I also get asked whether a do-it-yourself approach works. Sometimes, for a very simple system in a dry crawl space with good access, a handy homeowner can install a basic sub-slab depressurization system. But most crawl spaces are not simple. The risk of getting the fan size wrong, missing a seal, or failing to achieve proper negative pressure is high. A professional company like Air Sense Environmental brings experience with dozens of crawl space installations. They know how to troubleshoot when the soil is wet, the space is tight, or the foundation has quirks. They also carry the proper liability insurance and offer a mitigation system warranty that protects you if something fails.

## **Final Thoughts on Crawl Space Radon**

Radon in crawl space situations is a problem that can be solved, but it requires a methodical approach. Test first, seal thoroughly, install a properly sized active soil depressurization system, and verify with both a radon detector and a manometer. Ignoring the crawl space because it is out of sight is a mistake that can affect the air quality in your entire home. If you live in St. Louis or anywhere with similar geology, take the time to find out what is under your floor. The peace of mind is worth the effort, and the health benefits are measurable.