

Tips for use of the **ATSDR Home Alterations and Vapor intrusion** fact sheet template:

- **Key audience:** The key target audience for this fact sheet is owners and occupants of buildings near areas with soil gas or groundwater contamination exceeding vapor intrusion comparison values. Indoor air sampling may have shown chemical vapor intrusion to be inactive in the past. However, building alterations could cause a future increase of indoor air concentrations from vapor intrusion.
- **Continuing recommendations for responsible parties:** Responsible parties must maintain full responsibility for continued monitoring of chemicals in indoor air and soil gas at susceptible buildings. The responsible parties are also responsible for continued monitoring and cleanup of the full vapor intrusion pathway (soil gas and groundwater).
- **Radon monitoring is a voluntary personal choice:** Keep in mind that radon is a natural chemical on people's personal property. \$200 may be cost-prohibitive for many households. Our purpose is to provide information to receptive communities on things they can do to protect their health. Some devices have a location setting, so it could be shared amongst households. Provide stress management resources along with this fact sheet.
- **Adding site-specific information:** *Italicized and yellow highlighted* text marks places in the fact sheet where site-specific information is required. We must replace these *italicized and highlighted* areas with site-specific information before the fact sheet is used.
- **Being consistent:** If this fact sheet is used at a site, we need to be consistent in our recommendations between this fact sheet and any site Health Consultations, Public Health Assessments, or other agency approved documents. Include this fact sheet in your usual clearance process for health communication materials.
- **Providing assistance with radon monitoring:** State radon programs may have health educators that can work with people to advise them on the purchase and use of continuous radon monitors and in interpreting their results. Explore a partnership with any such programs and see if they are ok with us providing their contact information in the fact sheet.
- **Seeking opportunities for follow-up:** Attempt to identify whether or not any responsible parties or other stakeholders may be willing and able to provide follow-up testing for chemical vapor intrusion if radon increases following necessary or reasonable home alterations. Add contact information for any such stakeholders to the fact sheet. NOTE: *This fact sheet may be of limited use without willingness of stakeholders to provide follow-up indoor air testing for chemicals.*
- **Focusing on radon changes:** Radon is usually present in indoor air to some extent. High levels of radon at any given time in indoor air may or may not correlate with high levels of chemicals from vapor intrusion, i.e. indoor air levels depend on source location and strength, which may be different for radon and chemicals. However, all else equal, an increase in indoor radon after a home alteration likely indicates an increased pressure differential or new pathway, and thus an increased potential for chemical vapor intrusion.

HOME ALTERATIONS AND VAPOR INTRUSION

Home alterations can affect the air quality in your home. Learn how!

Sometimes chemicals from contaminated soil and groundwater can evaporate into the air inside of homes. This process is called “vapor intrusion.”¹

These types of chemicals have been found in certain areas around **SITE XXX**. Public health investigations found that vapor intrusion was not occurring at levels of concern in **20XX** ([add link to report](#)).

However, if you decide to renovate, some changes could affect vapor intrusion and air quality in your home.

Be aware of possible air quality changes.

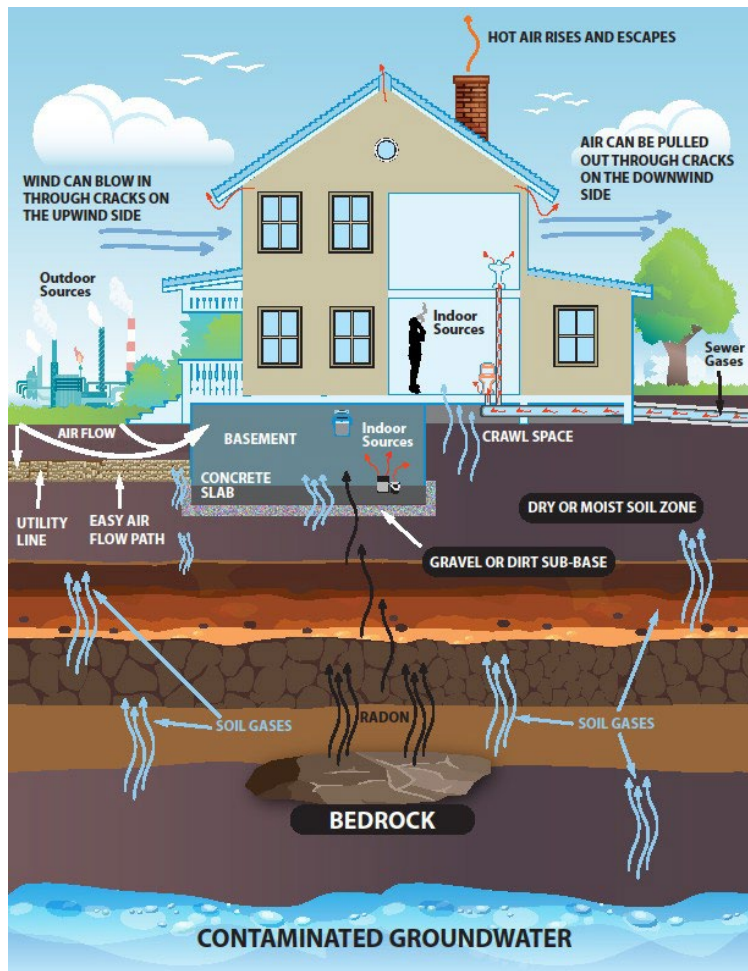
- The effect of alterations is often hard to predict.
- Measuring radon levels in your home before and after alterations can help you know how these changes may affect the air in your home. (See “6 Steps to Help You Monitor Radon” on page 2.)
- If your home was previously sampled for vapor intrusion, resampling may show if the vapor intrusion has increased.

These home alterations may change the quality of indoor air in your home.

- Changing heating and air conditioning
- Installing windows and doors with tighter seals
- Paving surfaces near the home (porches or driveways)
- Making changes to basement or crawl space slabs
- Changing foundations, wall joints, plumbing, or utility entry points
- Installing a sump pump or French drain
- Using exhaust fans or installing ridge vents

Radon monitoring² can show changes in vapor intrusion.

- Monitoring radon changes in indoor air is one way to show that air flow or ventilation patterns have changed. These changes in air flow patterns may cause soil gases to move indoors, while ventilation changes may lessen how much fresh outdoor air’s pulled in.



- Radon is a natural measure of soil gas movement into homes and is typically present in indoor air. Radon sampling does not provide air measurements for individual chemicals indoors. Radon sampling can help determine the need for more in-depth chemical vapor intrusion investigation to assess chemicals that could affect people’s health.
- While radon is present in most soils, chemicals in the **xxx site** are from specific source areas. For chemicals to move indoors, the source must find a pathway to the indoor air. Because radon and chemicals may be concentrated in different areas beneath buildings, indoor air radon monitoring is not a substitute for chemical monitoring. Low radon levels do not necessarily mean low chemical levels in indoor air, or vice versa. This fact sheet is focused on changes to radon levels in indoor air, which may indicate an increase in soil gas intrusion into buildings.

¹ If you wish to learn more about vapor intrusion see: https://www.atsdr.cdc.gov/docs/atsdr_vapor_intrusion.pdf.

² Radon is a naturally occurring gas in rocks, soil, and groundwater that seeps into buildings through cracks and gaps in the flooring.



National Center
for Environmental Health
Agency for Toxic Substances
and Disease Registry

A continuous radon monitor may help.

- You can buy a continuous radon monitor from your local hardware store or online for about \$200 or more.³
- Continuous monitors read both short-term and long-term radon levels. And they provide continuous radon measurements over hours, days, weeks, and months.
- Single-use test kits are cheaper, but more difficult to interpret because radon measurements vary from hours and days up to seasons.

6 Steps to Help You Monitor Radon

1. Following your device's instructions, begin monitoring at least several weeks before home alteration to see changes over time. Keep windows and doors closed as much as possible during monitoring.
2. Note and record how the levels change with the weather.
3. Continue monitoring your home after your alteration.
4. Compare your radon levels for at least a few weeks before and after the alteration to see if there is a noticeable difference beyond those due to the weather.
5. If you see an overall increase in radon, that may mean that more other chemicals are getting into your home.
6. Contact your state radon education program to help you interpret your results (*insert state radon website*).⁴ You can also discuss your results with an environmental health professional from the *XXX site*.

Dealing with the potential for environmental contamination, especially within one's home, is stressful. ATSDR's fact sheet "Coping with the stress that environmental contamination can cause" shares more information on this normal reaction and steps you can take to cope:

<https://www.atsdr.cdc.gov/docs/factsheet/ATSDR-Stress-Fact-Sheet.pdf>.

The recommendations in this fact sheet in no way remove the responsibility for monitoring and cleaning up chemical contamination from the responsible party (*XXX site*). The radon monitoring recommendations herein are part of an overall effort to increase awareness of radon and its potential health effects, while highlighting that the additional information gained may be useful for evaluating the chemical vapor intrusion pathway.

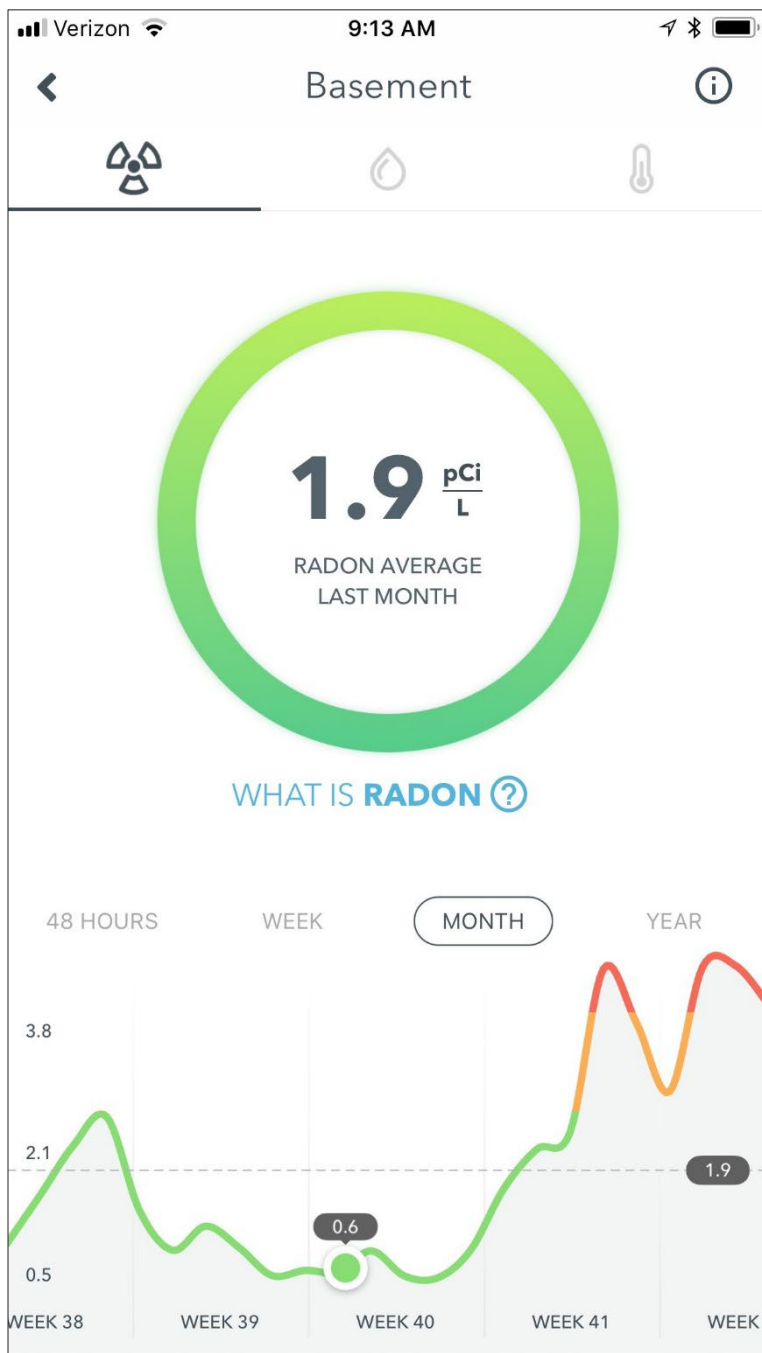
For More Information

Visit <https://www.cdc.gov>

Call 1-800-CDC-INFO

Visit https://www.atsdr.cdc.gov/docs/radoninthehome_508.pdf

Insert link to the site-specific PHA, technical document(s), and/or program phone number for finding out about contamination in the area.



³ ATSDR does not endorse or recommend products.

⁴ While naturally-occurring, radon is a leading cause of lung cancer. In *XXX County*, average levels are *X* picoCuries per liter of air (pCi/L) and *X* in five homes are greater than 4 pCi/L. The U.S. Environmental Protection Agency recommends taking actions to reduce radon in indoor air if levels are greater than 4 pCi/L.

SVI Conceptual Model Figure Alt Text: Contaminated groundwater vapors rise around bedrock and through drier soil into a house. Soil gases and radon move in through the slab, utilities, and crawl space. Sewer gas moves in through plumbing fixtures. Indoor sources include smoking and commercial products. A gravel or dirt sub-base and different soil layers affect flow. Upwind air blows into the house and air is pulled out on the downwind side. Hot air rises and escapes through upper levels.

What is Radon Figure Alt Text: A smart-phone application shows data from a continuous radon monitor. The monitoring shows a natural increase from 0.5 to 5 picoCuries per liter during 3 weeks of unusually hot weather followed by a cold front. Understanding continuous monitoring results during normal weather patterns is necessary to tell the difference between normal and home-alteration-induced changes.