

# INDOOR AIR QUALITY: Reducing Health Risks and Improving the Air You Breathe

This chapter identifies where indoor air problems come from and what can be done to eliminate them. Health hazards related to air quality can be serious, but many opportunities exist for action. This chapter covers the following:

1. Identifying and Controlling Potential Sources of Air Quality Problems
  - Combustion by-products, such as smoke, nitrogen dioxide, and carbon monoxide
  - Building materials, including carpets, wood products, and paints
  - Household products and chemicals, such as cleaning solvents, adhesives, gasoline, and paint strippers
  - Biological contaminants like mildew, animal dander, and dust mites
  - Radon, a radioactive gas
2. Ventilating Indoor Air
  - Ventilation
  - Air cleaning

Completing this chapter will help evaluate risks to your home's air quality and give tips for reducing those risks.

### *Why should you be concerned?*

Clean air is a precious asset—fresh, full of oxygen, clean-smelling, and without harmful pollutants. If you are like most people, you spend at least half of your life inside your home. The air in many modern American homes, however, may not be fit to breathe. It can be more polluted and dangerous to your health than outdoor air. If your home has poor air quality, it may be simply annoying or unpleasant, or it may lead to serious health problems.

### *What are the signs of trouble?*

It is not always easy to detect poor air quality. Although you can smell paint vapors and see smoke, many harmful pollutants, such as deadly carbon monoxide gas, are invisible and odorless. Common health problems, such as irritated eyes and nose, headaches, dizziness, tiredness, asthma, viral infections, and respiratory diseases may be due to substances in the air you breathe. Some serious effects

of poor air quality, like lung cancer, may take many years to develop. People react differently to contaminants depending on their age, sensitivity, health status, and type and length of exposure.

## **PART 1—Identifying and Controlling Potential Sources of Air Quality Problems**

Finding the source—or sources—of pollutants should be your first step. Addressing problems at the source is usually the most cost-efficient and effective approach. If you do nothing else, dealing with the most troublesome sources can lead to better health for everyone who breathes the air in your home. Poor air quality is usually not the result of a single pollutant. Reducing health risks to you and your family may require several actions.

### *Which sources exist in your home?*

In addressing the problem of indoor air pollution, you need to think in terms of a specific pollutant, such as formaldehyde or carbon monoxide. You also have to track down the physical source of the pollutant—a furnace or damp crawl space, for example. This chapter cannot cover all possible pollutants and their sources, but it calls attention to the most common types and provides a starting point for investigation and action.

## **Part 1a—Combustion by-products: what precautions are you taking?**

### *Fuel-burning appliances*

Airborne combustion by-products come from oil and gas furnaces; wood and coal stoves; fireplaces; kerosene and gas space heaters; gas ranges, cooktops, and water heaters; and automobile exhaust (Figure 9.1). Pollutants include carbon monoxide, nitrogen and sulfur oxides, formaldehyde, and tiny breathable particles. These by-products should be vented to the outside to prevent accumulation indoors. Never use unvented space heaters, gas stoves, or other combustion equipment in an enclosed room.

Carbon monoxide (CO)—an odorless, colorless gas—is a pollutant of special concern because it can kill. Symptoms of exposure such as headaches, dizziness, and nausea may be mistaken for other causes. A malfunctioning furnace or blocked flue pipe can result in fatal CO levels. Another dangerous source of CO is using a charcoal grill indoors.

CO detectors look and operate much like smoke detectors. Some experts recommend CO detectors be installed in all homes that have combustion appliances. However, the detectors will not replace good maintenance of your heating system.

To determine the safety of your combustion appliances, call the dealer or a service professional for expert assistance. Yearly inspection of the equipment and chimney or flue is recommended for most heating systems. Like your car, your furnace needs cleaning and tune-ups to stay in good condition. Even a well-running system can become a hazard if the chimney or flue becomes blocked and gases cannot escape.

In addition, be alert for backdrafting. This occurs when the indoor air pressure is lower than outdoor air pressure, which causes combustion gases to be pulled back into the living space instead of being fully exhausted to the outside. Backdrafting is more likely in well-sealed, energy-efficient homes, especially when exhaust fans are in use. (See Chapter 10, "Heating and Cooling Systems," for more information.)

### Tobacco smoking

Smoke from cigarettes, cigars, and pipes contains a wide range of throat and lung irritants, as well as hazardous and cancer-causing chemicals. A smoky home environment puts everyone at risk, not just the smoker.

### Assessment 1a—Combustion by-products

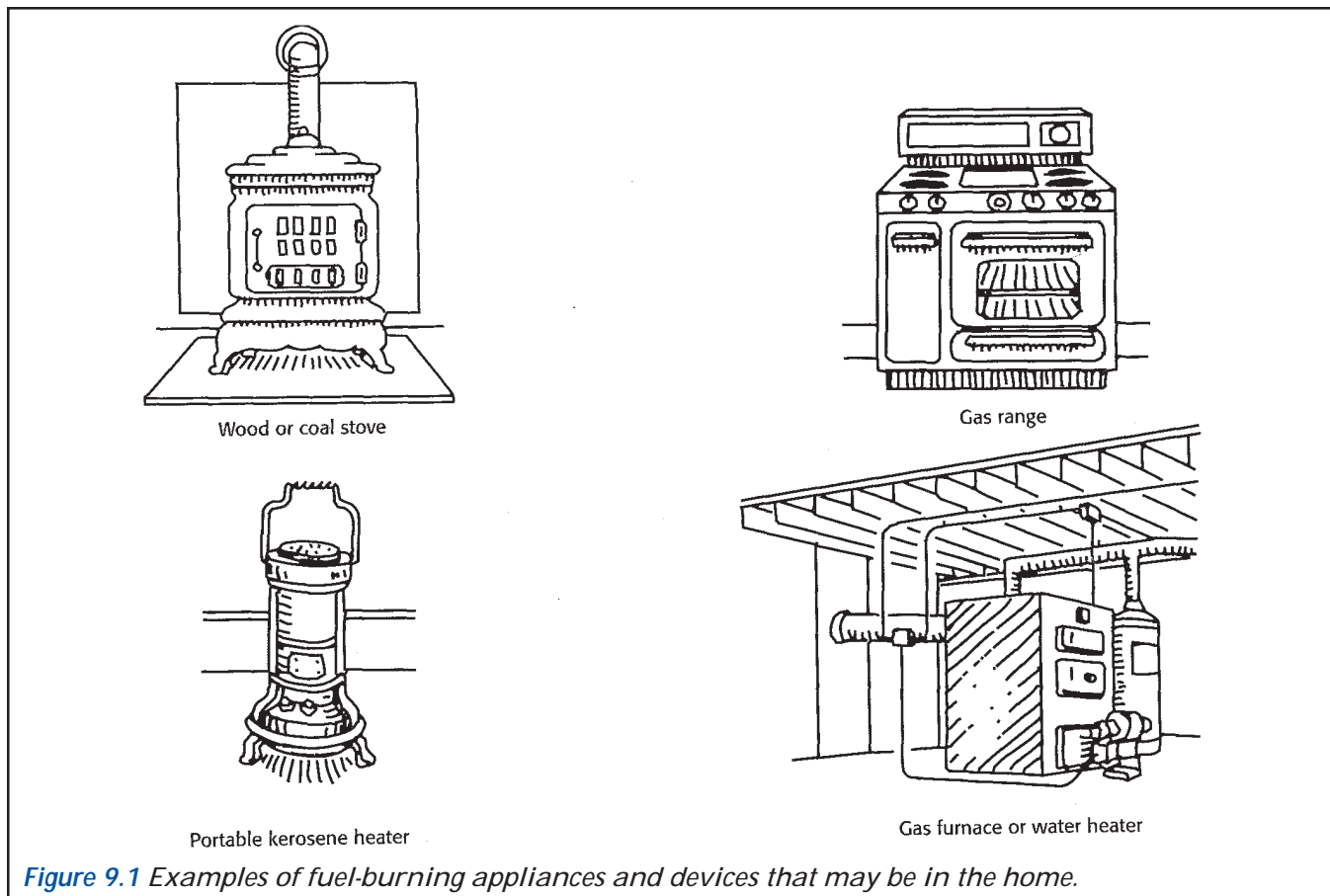
Use the assessment table on the following page to rate your risks related to combustion by-products. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits.

### Responding to risks

Your goal is to lower your risks. Turn to the Action Checklist on page 96 to record the medium- and high-risk practices you identified. Use the information above to help make plans to reduce your risks.

### Part 1b —Which building materials, wood finishes, and home furnishings might be affecting your indoor air?

Many products used to build and furnish a home can pollute indoor air. Four of the most common types are discussed here: pressed wood products; carpet; paint, varnish, and other surface finishes; and asbestos. Especially when some of these materials are new, they can release hazardous emissions



## ASSESSMENT 1a—Combustion By-products

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
<b>Combustion appliances, venting</b>	All combustion appliances are vented directly to the outside.	Unvented gas or kerosene heaters are used only in open spaces with a partially open window.	Kerosene or gas space heaters are frequently used in closed rooms.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
<b>Maintenance of combustion appliances, chimneys, and flues</b>	Chimneys, flues, gas/oil furnaces, wood stoves, and other combustion appliances are inspected and cleaned at least once a year.	Chimneys, flues, gas/oil furnaces, wood stoves, and other combustion appliances have been inspected only once or twice in the past five years.	Chimneys, flues, and combustion devices are not inspected, or inspection record is unknown.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
<b>Carbon monoxide detectors (only in homes with combustion appliances)</b>	A carbon monoxide detector is properly installed and the battery is tested weekly (if applicable).	A detector is installed, but the battery is not tested regularly (if applicable).	No carbon monoxide detector is installed.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
<b>Tobacco smoking</b>	Tobacco smoking is not permitted in the home.	Smoking is permitted occasionally, but only in areas well-ventilated to the outside.	Frequent smoking causes smoky indoor air	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

such as formaldehyde and other volatile organic compounds into the air. High temperatures and humidity can worsen the problem. Air pollutants can also come from old or deteriorating materials, such as asbestos.

### Pressed wood products

Pressed or manufactured wood products made from wood chips or sawdust are widely used in home construction for flooring, sheathing, shelving, and cabinets. Furniture, too, is often made of manufactured wood products. The primary concern with pressed wood products is formaldehyde, which is used in the glues that hold these materials together. Formaldehyde will off-gas, or be released into the air, especially when a product is new. Some individuals are very sensitive to formaldehyde.

Sealing the surface of a wood product, especially the edges, will reduce formaldehyde emissions. Manufactured wood products that are formaldehyde-free or have low formaldehyde emissions (such as exterior-grade products) are available.

### Carpet

New carpets can release volatile chemicals from carpet backing, padding, and fibers, as well as from the finishes that give carpeting its antistatic and

soil-release properties. The carpet industry is working to reduce these emissions; the Carpet and Rug Institute (CRI) now tests carpets for emissions (Figure 9.2). Carpets of any age can act as a trap or sponge for chemical and biological pollutants carried in the air or tracked in from outside. Damp, dirty carpet is a breeding ground for biological pollutants. Carpets require regular vacuuming and cleaning.

### Paint, varnish, and other surface finishes

Products used to finish, protect, and beautify materials in the home are potential sources of indoor air pollutants because they contain volatile organic compounds (VOCs). Products that are oil-, solvent-, or alkyd-based release more harmful vapors than water-based products. If you are not sure about a particular product, check the product label. If instructions on the label say to clean up with soap and water, then the product is water-based.

Provide lots of extra ventilation when finishes are newly applied, or apply finishes outside the home and wait until they are dry to bring the finished product inside. If individuals in the home are bothered by fumes, then the occupants should leave the building before it is closed up. The interior temperature should be raised to more than 80°F, which

accelerates off gassing. After several hours, the temperature can be reduced and the building opened up to air out. This procedure may be repeated if fumes are still noticeable.

Lead, a highly toxic substance, was once a common ingredient in household paint. Many homes still have lead-based paint. Lead dust can be released into the air as the paint wears or during renovations. See Chapter 6, "Lead In and Around the Home," for more information.

### Asbestos

Until about 1980, asbestos was widely used in building materials to give strength, increase heat insulation, and provide fire resistance. It was used in roof and siding shingles, floor tiles, soundproofing materials, insulation around pipes, heating ducts and flues, and decorative finishes. When asbestos products get old, they can become crumbly and disperse tiny fibers into the air. If you breathe asbestos particles over time, they can accumulate in your lungs and lead to serious respiratory problems.

### Assessment 1b—Building products and furnishings

Use the table on the following page to identify risks related to building product emissions and asbestos. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits.

### Responding to risks

Your goal is to lower your risks. Turn to the Action Checklist on page 96 to record the medium- and high-risk practices you identified. Use the recommendations above to help reduce your risks.

### PLANNING TO INSTALL A NEW CARPET?

For better air quality, try to:

1. Choose a carpet that is certified by CRI as a lower-emissions carpet.
2. Ask the carpet dealer to unroll the carpet and leave it in a well-ventilated area for at least twenty-four hours before it is brought to your home.
3. Plan to install the carpet at a time of year when you can provide extra ventilation by opening windows during and for several days after installation.
4. Arrange for chemically sensitive persons to be out of the house for the first few days after the new carpet is installed.
5. Thoroughly vacuum the old carpet before removal to minimize dust and biological pollutants in the air.

### Part 1c—Biological contaminants: how do they affect indoor air?

Your house is home to many organisms. Some are wanted, like pets, but many are uninvited. Biological contaminants come from living or once-living organisms. They include mainly animal hair, dander, saliva, and feces; molds and other fungi; dust mites; insect residues; pollen; and microscopic organisms. These can cause odors, damage household materials, lead to allergic reactions, and cause infectious diseases and respiratory problems. Each person has a different sensitivity to these contaminants.

Biological pollutants are found in every home and cannot be eliminated completely. Their growth and quantities can be controlled, however, by keeping surfaces clean and moisture levels low (see sidebar on the following page). Many biological contaminants will increase in damp or humid spaces. Good maintenance practices can control moisture and reduce the need for chemical products like pesticides and disinfectants—both of which could add other pollutants to the air.

### Dust control

Household dust includes some biological contaminants that are common allergens. Animal dander is shed from skin, hair, or feathers. Dust mites are microscopic insects, and their feces—the primary allergen—are easily airborne. Regular cleaning, including dusting with a treated cloth, damp cleaning, and laundering bedding with hot water, is needed to control these contaminants.

Regular vacuum cleaning may help control dust, but some particles are so small that they pass through cleaner filters and become airborne. Vacuums with high efficiency (HEPA) filters and central vacuum systems reduce the airborne dust generated by vacuum cleaning. (Figure 9.3).

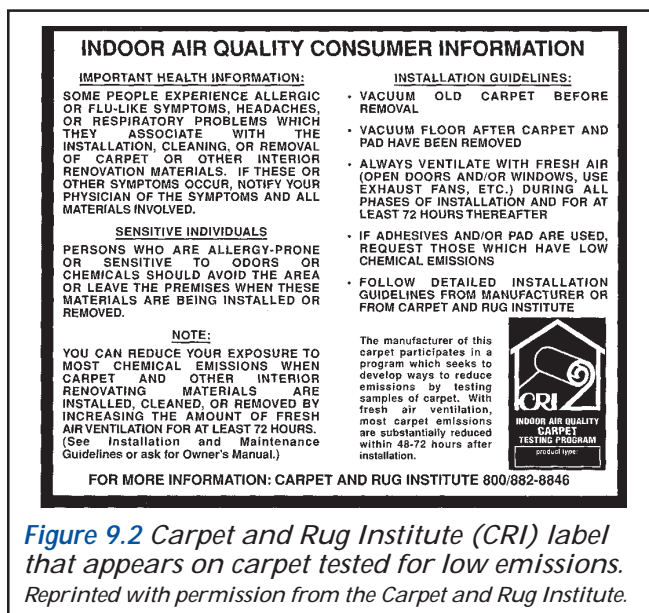
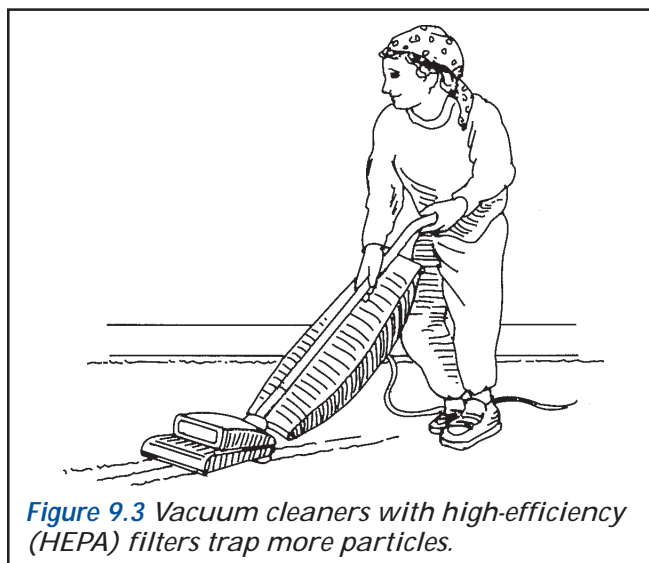


Figure 9.2 Carpet and Rug Institute (CRI) label that appears on carpet tested for low emissions. Reprinted with permission from the Carpet and Rug Institute.

## ASSESSMENT 1b—Building Products and Furnishings

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
<b>New building materials, paints, varnishes, and furnishings</b>	Low- or no-emission furnishings, building materials, paints, and varnishes are selected. New items are given adequate ventilation or sealed.	New furnishings, building materials, paints, and varnishes are given increased ventilation.	There is no attempt to select low-emission products and ventilation is inadequate.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
<b>Carpet</b>	Low-VOC carpet is selected and aired before and during installation. Carpet is vacuumed regularly using a vacuum cleaner with a high-efficiency filter; spills are cleaned immediately.	New carpet is installed without ventilation.	Old carpet is poorly maintained.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
<b>Asbestos (in homes built before the 1980s)</b>	Asbestos is present but safely encased and isolated. Areas with asbestos are checked regularly.	Asbestos is present and intact but located in high-traffic areas.	Asbestos-containing material is in poor shape and crumbling. People are exposed to the dust and fibers.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

If dust-related allergies are a particular problem, limit use of carpeting, upholstered furnishings, and “dust catchers” such as window blinds and knick-knack displays. Follow recommended procedures for dust control, and keep sleeping areas as allergen-free as possible.



**Figure 9.3** Vacuum cleaners with high-efficiency (HEPA) filters trap more particles.

### TIPS FOR CONTROLLING MOISTURE IN THE HOME

- Prevent standing water, such as in basements or the drip pans of refrigerators and air conditioners.
- Fix leaks and seepage problems immediately.
- Make sure rainwater drains away from your house.
- Use a vapor-proof ground cover (such as 4- to 6-mil plastic) in enclosed crawl spaces.
- Use fans that exhaust to the outside when bathing, showering, or cooking.
- Vent all combustion appliances to the outside.
- Use dehumidifiers and/or air conditioners to remove excess moisture in warm, humid weather.
- Avoid oversized air conditioners.
- Limit use of humidifiers.
- Limit houseplants.

### DO NOT MIX

Never mix household chemical products unless the label directions specifically instruct you to do so, as additional toxic chemicals may be released into the air through chemical reactions. The results can be deadly!

#### Assessment 1c—Biological contaminants

Use the table below to identify risks related to air pollution from biological sources. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits.

#### Responding to risks

Your goal is to lower your risks. Turn to the Action Checklist on page 96 to record the medium- and high-risk practices you identified. Use the recommendations above to help make plans to reduce your risks.

#### Part 1d—Household chemical products and radon

##### Household chemical products: what types of air quality problems do they cause?

You may use a variety of potentially hazardous chemical products in your home—for maintenance, cleaning, personal grooming, and hobbies. Some products, such as those from spray cans, can release chemicals or particles into the air during use. Others emit chemicals as the product dries or cures (such as glues and caulking) or from off-gassing as the product ages (plastics and air fresheners, for

example). Potentially hazardous products include furniture waxes, paint strippers, adhesives, some cleaning products, disinfectants, degreasers, cosmetics, and hobby supplies.

Products having petroleum distillates or other volatile organic compounds (VOCs) create more unhealthy emissions than water-based products. Many “everyday” household products such as chlorine bleach, ammonia, boric acid, and deodorizers may generate indoor air pollutants if used improperly. Some household products contain pesticides and other toxic chemicals and require special precautions. See Chapter 5, “Managing Hazardous Household Products,” for more on this topic.

#### Reducing the hazard from household products

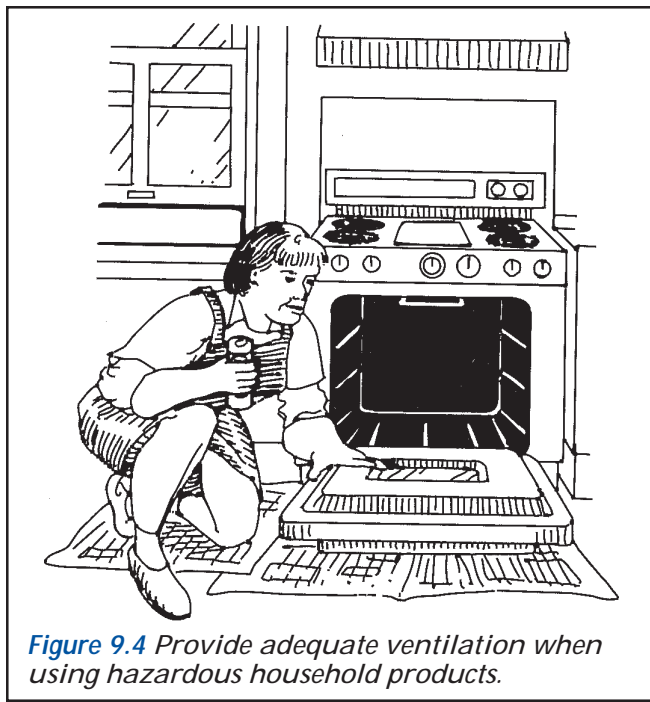
Choose the least hazardous product and the smallest amount that will do the job. Always follow label directions and provide adequate ventilation (Figure 9.4). To avoid having to store hazardous products, buy only the amount you will need, then use it up. Give away leftovers to those who can use them, or properly dispose of household chemicals that are not needed. You can reduce the need for many household chemicals by practicing preventive maintenance, such as giving quick attention to spills and stains or promptly removing food wastes to control odors and pests.

#### Radon: Is it present in your home?

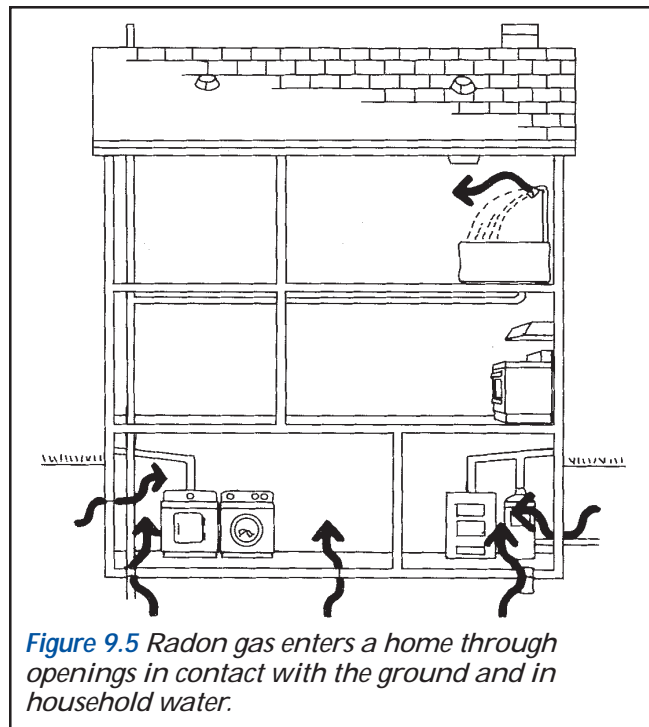
Radon is a naturally occurring radioactive gas found in rocks and soil in many areas. It enters the home through cracks and openings in contact with the ground—in a basement, for example (Figure 9.5). Radon is invisible, has no odor, and causes no

#### ASSESSMENT 1c—Biological contaminants

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Dust control	House is cleaned regularly. No furry pets are kept in the home. Little or no carpeting is in the home.	Furry pets live in the home, but the house is cleaned regularly.	Pet hair and dust are allowed to accumulate in living and sleeping areas. House is mostly carpeted and carpet is poorly maintained.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Moisture control	No evidence of condensation in high moisture areas or seasonally. Excess moisture is vented to the outside.	Evidence of condensation in high moisture areas or seasonally. Exhaust fans are sometimes used.	Damp air is not exhausted. Crawl space does not have a ground cover or vents. Leaks, drips, or standing water are in, around, or under the house.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High



**Figure 9.4** Provide adequate ventilation when using hazardous household products.



**Figure 9.5** Radon gas enters a home through openings in contact with the ground and in household water.

immediate symptoms or health effects. It is, however, a cause of lung cancer. Smokers are especially at risk if radon is present.

Different parts of the country have different levels of radon. The Kansas Department of Health and Environment (KDHE)/Environmental Protection Agency (EPA) state survey of 1997 showed that 1 in 4 Kansas homes has the potential for elevated levels of radon. You should take this potential threat seriously. Because every home is built differently, even neighboring homes can have very different levels. The only way to find out about radon in your home is by testing. Although no level is considered safe, the generally recommended maximum level of radon in residential housing is 4 picoCuries per liter (pCi/L) of air .

### Radon testing and treatment

Look for radon test kits that say “meets EPA requirements.” An inexpensive screening test that lasts four to seven days and costs \$5 to \$10 can give a rough idea of how much radon is present. The test should be conducted when windows and doors are closed. If a high level of radon is found, a second long-term test (at least 3 months’ duration) is recommended to give more accurate information about radon in the home.

If an unsafe level of radon is verified by the second test, there are a variety of things you can do to reduce radon. These involve either plugging the leaks—such as caulking cracks in basement walls—or changing ventilation patterns of your home so that radon isn’t drawn inside. Check with KDHE, your county K-State Research and Extension office, local contractors, or health agencies for advice.

A trained and certified radon mitigator can be invaluable in helping reduce radon in your home. If you plan to sell your home, check local laws to see if radon testing and treatment are required.

### Assessment 1d—Household products and radon

Use the table below to identify risks related to household chemical products and radon. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits.

### Responding to risks

Your goal is to lower your risks. Turn to the Action Checklist on page 96 to record the medium- and high-risk practices identified. Use the recommendations above to help make plans to reduce your risks.

## PART 2—Ventilating Indoor Air

Removal or reduction of pollution sources is the first priority in improving air quality in your home. The second priority is to dilute the concentration of air pollutants through increased ventilation of the home.

Even in homes with few sources of contamination, ventilation is needed, especially during seasons when windows and doors are kept shut. Many homes “leak” air, which may help maintain freshness but wastes energy. Newer homes tend to have tighter construction, which makes it easier for pollutants to build up to dangerous levels. Tight homes also may be susceptible to humidity problems.

## ASSESSMENT 1d—Household Products and Radon

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
<b>Household products and chemicals</b>	Products with hazardous vapors are avoided or used only outdoors or indoors with proper ventilation and safety precautions. Hazardous products are not stored in the home.	Products with hazardous vapors are used indoors without ventilation. Only short periods of exposure occur.	Products with hazardous vapors are used indoors with some ventilation. Long periods of exposure occur. Hazardous products are stored in the home.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
<b>Radon</b>	A radon test was conducted properly and the radon level is below the threshold for action.	Radon is present at or near the threshold for action.	Radon is present in excess of acceptable levels—or—radon level is unknown: no testing has been done.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

### How well is your house ventilated?

Use your nose and eyes to help evaluate indoor air quality. Be aware of persistent odors of chemicals, mildew, or tobacco smoke. Steamy windows in cool weather indicate high levels of moisture in the home. (See “Tips for Controlling Moisture in the Home” on page 91.) Lingering odors of grease and food may mean that your kitchen needs more ventilation.

Home ventilation is usually measured in air changes per hour (ACH). This is a measure of how many times per hour the volume of air in your home is replaced with outdoor air. Many factors can affect the ACH rate, including structure of the home; weather; opening or closing of doors and windows; heating, cooling, and ventilating equipment; and use of fans.

A blower door test administered by a professional is needed to adequately measure ventilation rates in your home. A blower door consists of a large fan mounted in a frame that is temporarily installed in an outside doorway. The fan forces air into or out of the home. Pressure readings obtained from the test help in calculating air leakage and the ACH rate. The test can also help determine where leakage is occurring.

Increasing the ventilation rate of your home will reduce the concentration of air pollutants. Exhaust fans in kitchens and bathrooms are helpful, as long as adequate replacement air is available. Some ventilation equipment can increase ventilation while conserving energy. For example, a heat recovery ventilator removes “stale” air from a house and brings in fresh air. The incoming fresh air is warmed by heat removed from the outgoing air. If you suspect the ventilation in your home is inadequate, consult an energy professional.

### NOTE

Remember that air filters and cleaners are of limited use in solving indoor air quality problems. If poorly maintained, they could actually contribute to air quality problems. Effectiveness of filters and air cleaners depend on several things:

- contaminants removed from the air
- how much air passes through the device
- kinds of airborne particles in your air
- where the unit is located in relation to the source of pollutant
- regular maintenance of the system

### What about air filters and air cleaners?

Air filters in your heating/cooling air circulation system need to be inspected regularly and replaced or cleaned when dirty. Dirty or clogged filters will limit efficiency of the equipment. Standard air filters on heating and cooling equipment will remove only the largest dust particles. Other high-efficiency filters are more effective and will remove particles such as dust, smoke, pollen, and some micro-organisms. Gases will generally go right through air filters.

There are several types of air cleaners, based on the different ways they clean the air. Mechanical filters are made of fibers or pleated filter papers that trap small particles as air passes through. Solid sorbent cleaners—such as activated carbon or charcoal—can capture gaseous pollutants.

Electrostatic air cleaners use an electrical field to attract charged airborne particles; ion generators are used to give particles a charge that makes them

## ASSESSMENT 2—Ventilating Indoor Air

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
<b>Air freshness</b>	Indoor air usually smells clean, in all seasons. Extra ventilation is provided as needed.	Air sometimes has an odor or mustiness, especially during certain times of the year.	Air nearly always smells musty, damp, acrid, smoky, heavy, or like “chemicals.”	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
<b>Ventilation</b>	House is well-ventilated. Exhaust fans are used in the kitchen and bathroom.	“Leaky” house gives some uncontrolled ventilation.	House is poorly ventilated. No kitchen/bath exhaust fans are used.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

“stick” to surfaces in the home. Ion generators can increase the ozone (a lung irritant) levels in indoor air. The issue of ozone exposure as a result of these devices is under study. In general, KDHE does not recommend ozone generators for use around people. While appropriate to remove smoke odors after a fire, no one should be in the building during operation of an ozone generator.

### Assessment 2—Ventilating indoor air

Use the table above to identify risks related to air freshness. For each question, indicate your risk level in the right-hand column. Although some choices may not correspond exactly to your situation, choose the response that best fits.

### Responding to risks

Your goal is to lower your risks. Turn to the Action Checklist on page 96 to record the medium- and high-risk practices you identified. Use the recommendations above to help make plans to reduce your risks.

## ACTION CHECKLIST

Go back over the assessment tables and find the high and medium risks you identified. Make sure they are recorded in the checklist. For each medium and high risk listed, write down improvements you plan to make. Use recommendations from this chapter and other resources to decide on an action you are likely to complete. A target date will keep you on schedule. You do not have to do everything at once, but try to eliminate the most serious risks as soon as you can. Often it helps to tackle inexpensive actions first.

## For More Information

### Radon testing

Check the test kits at hardware and building supply stores, or contact your local or state health department, your county K-State Research and Extension Office, or private testing laboratories.

### Resources

- Kansas radon information phone number: 1 (800) 693-5343. The operator can provide written brochures and lists of EPA-certified individuals qualified to install radon remediation systems.
- Indoor Air Quality Information Clearinghouse (IAQ INFO). Call toll-free (800) 438-4318, Monday–Friday, 9:00A.M. –5:00P.M. EST. Or write to them at PO Box 37133, Washington, DC 20013–7133. Ask for their list of currently available documents.
- Clean Air Council, (215) 567-4004, 135 South 19th Street, Philadelphia, PA 19103. Call for information on services, where to get more information, and testing procedures.
- American Lung Association. Contact your local organization or call (800) LUNG-USA toll-free.
- Carpet and Rug Institute, Indoor Air Quality Testing Program, (800) 882-8846 toll-free or (706) 278-3176. Or write PO Box 2048, Dalton, GA 30722–2048.

### Publications

#### Bulletins available from your county K-State Research and Extension office:

- *Protect Your Family from Second-hand Smoke.* MF-2351.
- *It's In the Air.* MF-2230.
- *Cleaning to Reduce Indoor Air Contamination.* MF-2102.
- *Controlling Mold Growth in the House.* MF-2141.
- *Radon Results Give Reasons to Test.*
- *Radon Testing Options for Homeowners.*
- *Radon Levels Can Be Reduced.*
- *Radon in Home Buying and Selling.*
- *The Inside Story: A Guide to Indoor Air Quality,* a 36-page, illustrated publication by the U.S. Environmental Protection Agency. Identifies problems and control methods for indoor air pollutants including radon, tobacco smoke, lead, and household products. Applies to all regions of the United States. Cost is \$44 per

package of 25. Order from Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250-7954, or fax your order to (202) 512-2250. Mention order processing code #3136. Single copies can be requested from the Indoor Air Quality Information Clearinghouse (see contact information above under "Resources").

- *Household Care Products and Indoor Air Quality* (pamphlet). Free single copies are available from Chemical Specialties Manufacturers Association, Attn. CTIF, 1913 Eye Street NW, Washington, DC 20006. Product order number is CP-6.

## Kansas Home\*A\*Syst Helps Ensure Your Safety

This *Kansas Home\*A\*Syst* handbook covers a variety of topics to help homeowners examine and address their most important environmental concerns. See the complete list of chapters in the table of contents at the beginning of this handbook. The end of each chapter lists resources and other useful information. For more information about topics covered in *Kansas Home\*A\*Syst*, or for information about laws and regulations specific to your area, contact your county K-State Research and Extension Office.

Contact the Kansas Farm\*A\*Syst/Home\*A\*Syst office at Biological and Agricultural Engineering,

Seaton Hall, Manhattan, KS 66506-2917; phone: (785) 532-5418. Web page: [www.engg.ksu.edu/enggext/ppi/homeasyst](http://www.engg.ksu.edu/enggext/ppi/homeasyst); or the National Farm\*A\*Syst/Home\*A\*Syst Office at B142 Steenbock Library, 550 Babcock Drive, Madison, WI 53706-1293; phone: (608) 262-0024; e-mail: <HOMEASYST@MACC.WISC.EDU>.

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## Action Checklist

### Indoor Air Quality: Reducing Health Risks and Improving the Air You Breathe

Write all high and medium risks below	What can you do to reduce the risk?	Set a target date for action
Sample: Chimney and furnace not given a "tune-up" for several years.	Call heating/cooling expert to inspect, clean, and tighten the system.	One week from today: Sept. 1

*Kansas Home\*A\*Syst*, an environmental risk-assessment guide for the home, is a cooperative project of the Pollution Prevention Institute, K-State Research and Extension Service, Kansas Department of Health and Environment, U.S. Environmental Protection Agency, and the Environmental Department, Conservation District, and Natural Resources Conservation Service of Johnson County, Kansas, and Johnson County/K-State Research and Extension Office.

Illustrations used in this publication are taken from *Home A Syst: An Environmental Risk-Assessment Guide for the Home* developed by the National Farm\*A\*Syst/Home\*A\*Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Permission to use these materials was granted by the National Farm\*A\*Syst/Home\*A\*Syst Office.

Special thanks are due to all those who so graciously reviewed the materials. They are listed at the end of each chapter. It is appropriate to also acknowledge the staff of the national Farm\*A\*Syst/Home\*A\*Syst office who originally coordinated development of the original materials at the University of Wisconsin–Extension.



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