

My Radon Workbook

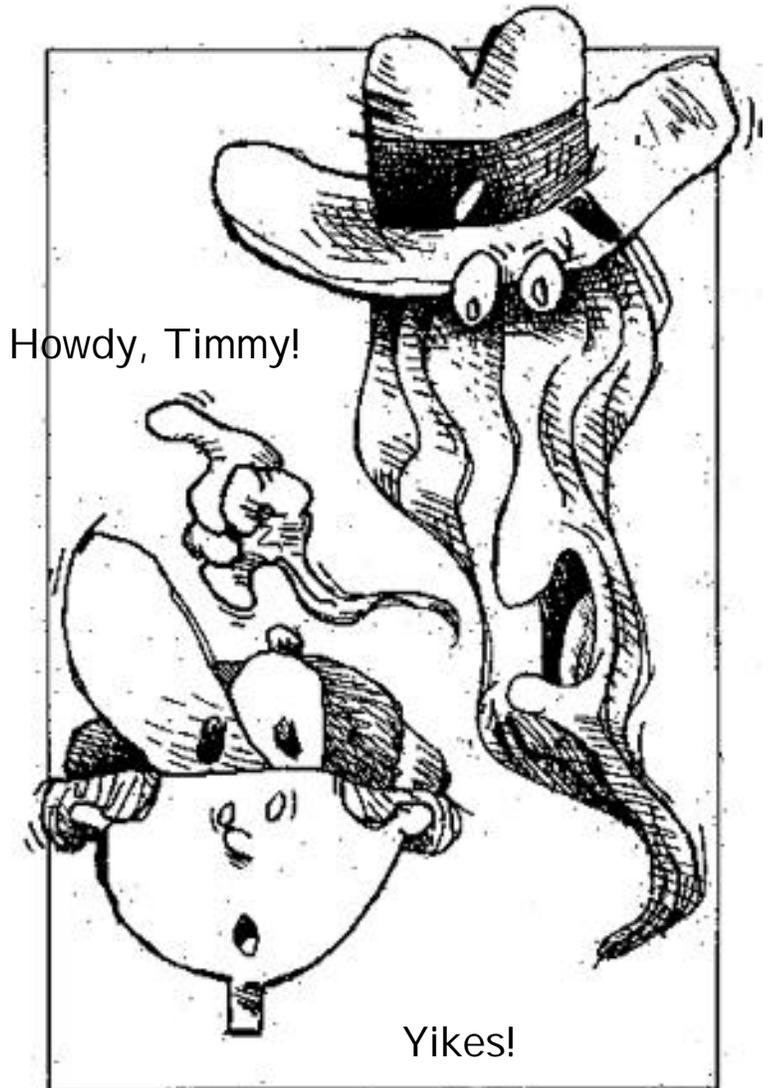
Objectives

- To encourage you to test your home for radon
- To encourage you to talk to others in your community about testing for radon
- To encourage action to lower high radon levels in your home

You will learn:

- Where radon comes from
- How radon gets into houses
- The risks presented by radon decay products
- How to test for radon
- How to prevent radon from entering your house
- Alabama facts about radon

Radon is an odorless, colorless, tasteless gas that is found in nature. It can accumulate in many homes and other buildings and can be a health hazard for you and your family. To fully understand how radon gas can be a problem, we will have to travel several billion years back in time!



Does Alabama Have a Radon Problem?

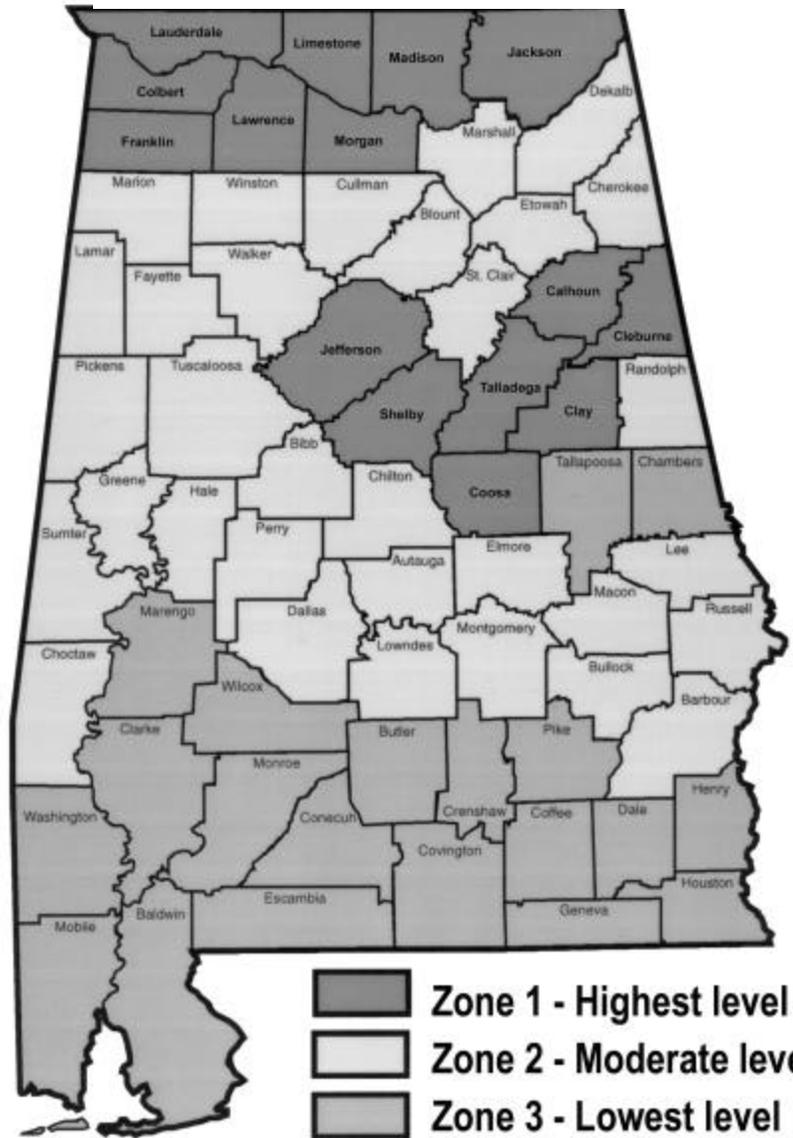
Alabama Radon Zones

Alabama has 15 counties that have been identified as having among the highest levels of radon in the country. Madison and Colbert counties have the greatest problems. Other counties identified with problems include Calhoun, Clay, Cleburne, Coosa, Franklin, Jackson, Jefferson, Lauderdale, Lawrence, Limestone, Morgan, Shelby and Talladega.

County agents located at the County Extension System offices listed below have more information.

Program County Extension Offices

- Clay - (256) 354-5976
- Cleburne - (256) 463-2620
- Colbert - (256) 386-8570
- DeKalb - (256) 845-8595
- Franklin - (256) 332-8880
- Jefferson - (205) 325-5342
- Lauderdale - (256) 760-5860
- Lawrence - (256) 974-2464
- Madison - (256) 532-1578
- Marion - (205) 921-3551
- Morgan - (256) 773-2549
- Shelby - (205) 669-6763
- Talladega - (256) 362-6187



All other Alabama counties -

Alabama Department of Public Health 1-800-582-1866
 Susan Roberts, Auburn University (334) 844-3686

Words to Think About

Below are some words scientists use when they talk about radon gas. Can you pronounce all the words?

Alpha Particle: A small particle emitted when radioactive elements go through a process called radioactive decay.

Charcoal Test Kit: A flat metal can or foil bag that contains special charcoal that can measure radon concentration.

Curie: Radioactivity is expressed in units called curies, after Marie and Pierre Curie, who were pioneers in the field. A curie is a measure of the number of atoms disintegrating per second in radioactive material.

Detector: This is a name for the tool used to measure the amount of radon gas in a room. The charcoal test kit is a type of detector.

Liter: This is a unit of measurement used to describe an amount of gas or liquid. One liter is about equal to one quart. For example, an empty one-quart milk container holds about one liter of air.

Lung Cancer: This is a disease that may be caused if you breathe elevated levels of radon for a long time.

Mitigation: Mitigation is the process of getting the radon gas out of a house or room. A person who works to get radon out of a house or school is called a mitigator.

Picocurie: This is a very small unit of radiation measurement. It is written pCi. The number of radon particles in one liter of air in a room is measured this way. The U.S. Environmental Protection Agency has suggested that there should be no more than 4 picocuries of radon gas per liter (4 pCi/l) of air in a room. This number is obtained by using a detector.

Radon: A colorless, odorless, tasteless gas that occurs in nature. It is produced by the radioactive decay of uranium and radium in the earth's crust.

Test (measurement): When a detector is placed in a room to measure the amount of radon in the room, it is called a test.

The Radon Word Search

Find the hidden words in the RADON WORD SEARCH below.

P A R X B I G B R P W K M D C
A J A L P H A L G X A F Q H E
R B Q F R A O F A K V S A B V
T N M H A E I C S B Q R G F X
I T K X D A V Q A L C M G L Z
C H R J O H M V C O P K U H C
L Y J E N O I T A I D E M E R
E T R N C G O L J V F N H H O
B D Y Z U N N D E T E C T O R
C M I T I G A T I O N D I U O
C O P A M Z M C T W I J J S T
K S D R T Y L T G K Z E R E I
S E E L S Y O W D N I C E R N
A P M Y E U F I P C U W S H O
E S R E T S I N A C E L D U M

Find these radon words:

ALPHA

HOUSE

PARTICLE

CANISTER

LUNG CANCER

RADON

DETECTOR

MITIGATION

TEST

GAS

MONITOR

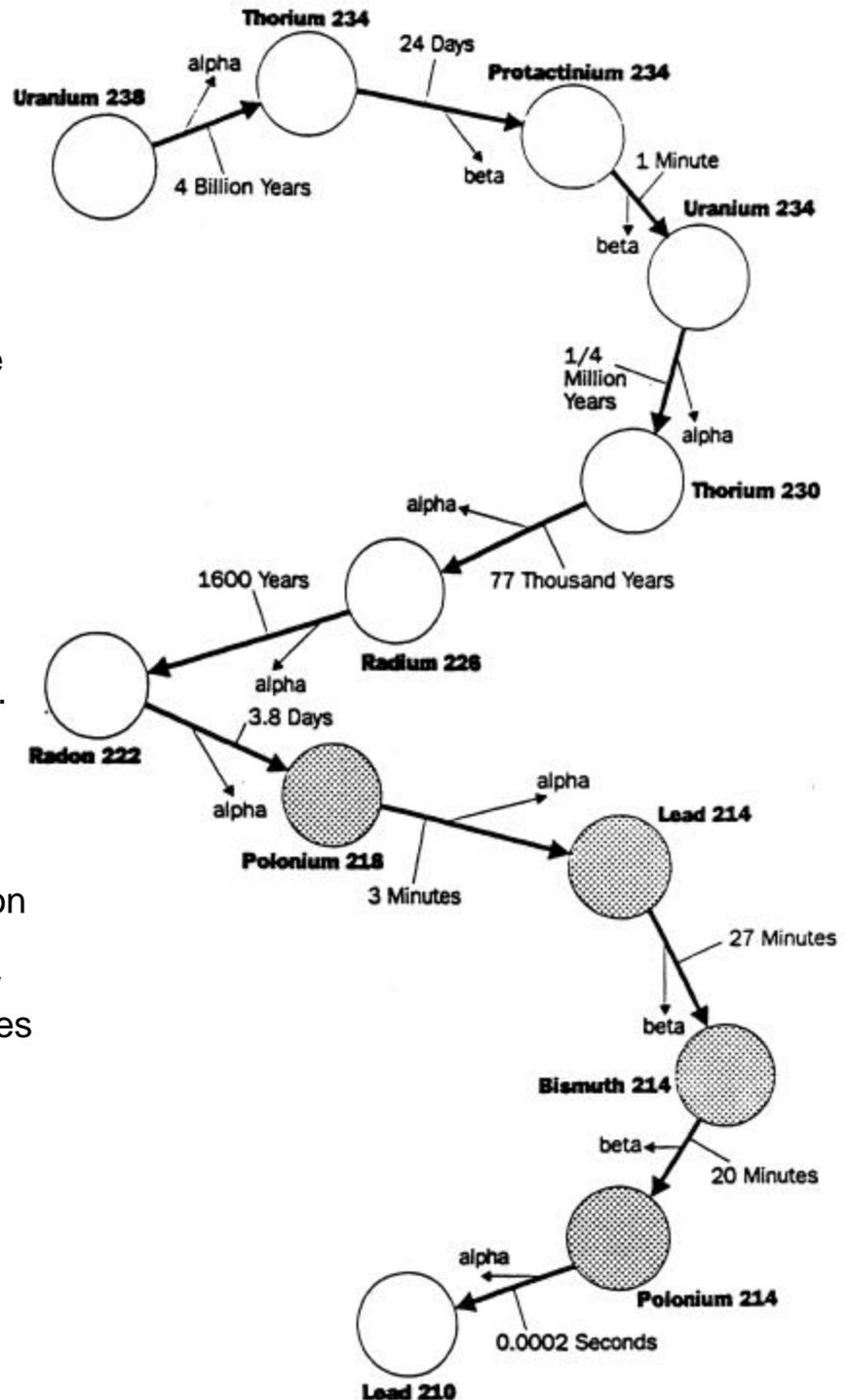
Uranium: Where It All Begins

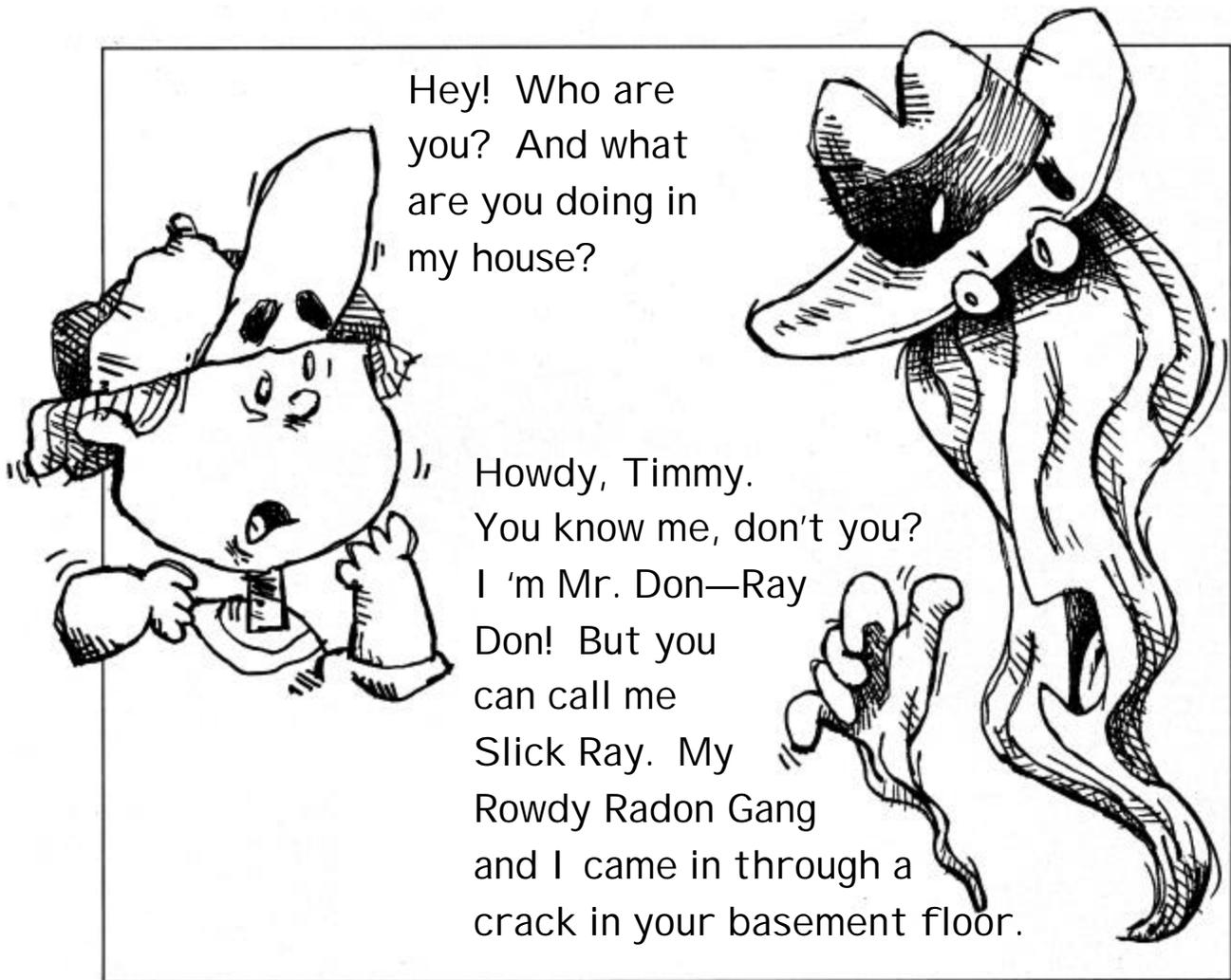
Radon is a product of a lengthy process that begins with uranium, a radioactive element that was present when the earth was formed and is still present today in most rocks and soils.

Uranium, like other radioactive elements, goes through a process called radioactive decay. When uranium decays, radium is formed.

Radium also undergoes radioactive decay, producing radon gas. When radon gas decays, radon decay products are produced.

The chart to the right shows the radioactive decay process of uranium. The shaded circles in the chart are the decay products of radon gas. As you can see, these radon decay products release high-energy alpha particles. These alpha particles can be very harmful to people.





Radon Decay Products:

Bad News for Our Lungs

Radon gas is an inert gas—which means it doesn't do anything. We inhale and exhale most of the gas without causing harm to our lungs. However, radon decay products are particles and can attach themselves to furniture, TV sets, and more importantly, to dust or other particles in the air.

When we breathe, radon decay products, whether they are attached to dust or by themselves, may become trapped in our lungs. As radon decay products continue to decay, they release alpha particles which emit small bursts of energy. These small bursts of energy can damage lung tissue and possibly lead to lung cancer.

Although scientists still cannot predict health risks, many agree that it is best to reduce exposure to radon decay products. Our risk of developing lung cancer from exposure to radon depends on two factors:

1. The radon decay product concentration in the air we breathe, and
2. The length of time we spend breathing air containing radon decay products.

In general, the risk becomes greater as the concentration of radon decay products and the amount of time we are exposed to them increase.

Does My House Have a Radon Problem?

Not all houses or buildings, even those in the same area, have the same radon level. In fact one house may have a low level that is considered acceptable while the house next door may have an unacceptably high level. The only way to find out what the radon level is in your house is to test for it. We will be learning about testing for radon later in this workbook.

Radon! We learned about you in school! You're not good to be around!

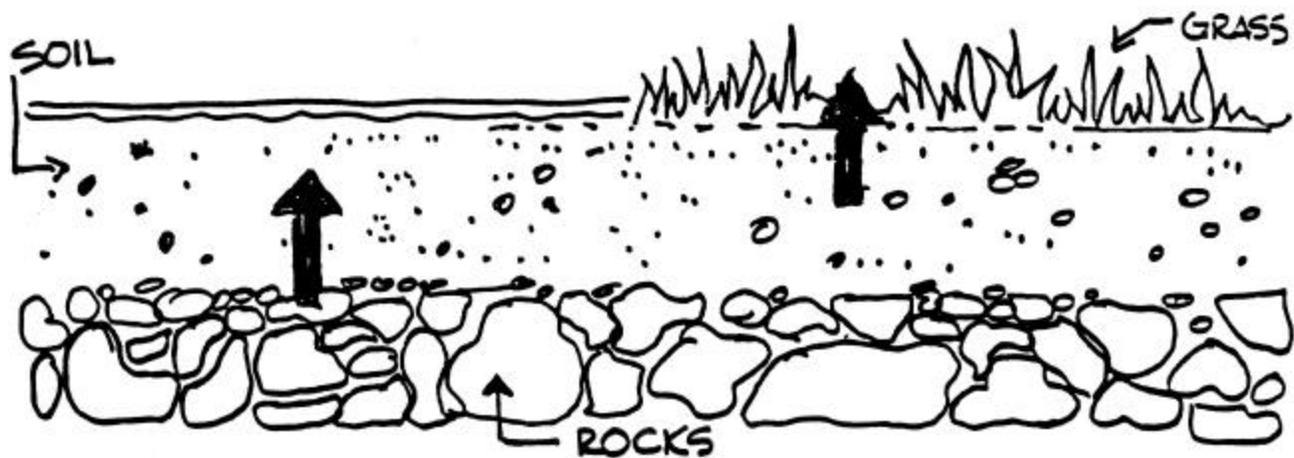


What You Can Do:

- Design a bulletin board at your school, local grocery, or hardware store. Make sure that it gets people's attention with a message that makes them want to test their homes for radon.
- Make a radon poster to display in a place that many people will notice. Use the poster to tell many people about the health problems related to radon levels in their homes.

How Could Radon Get Into My House?

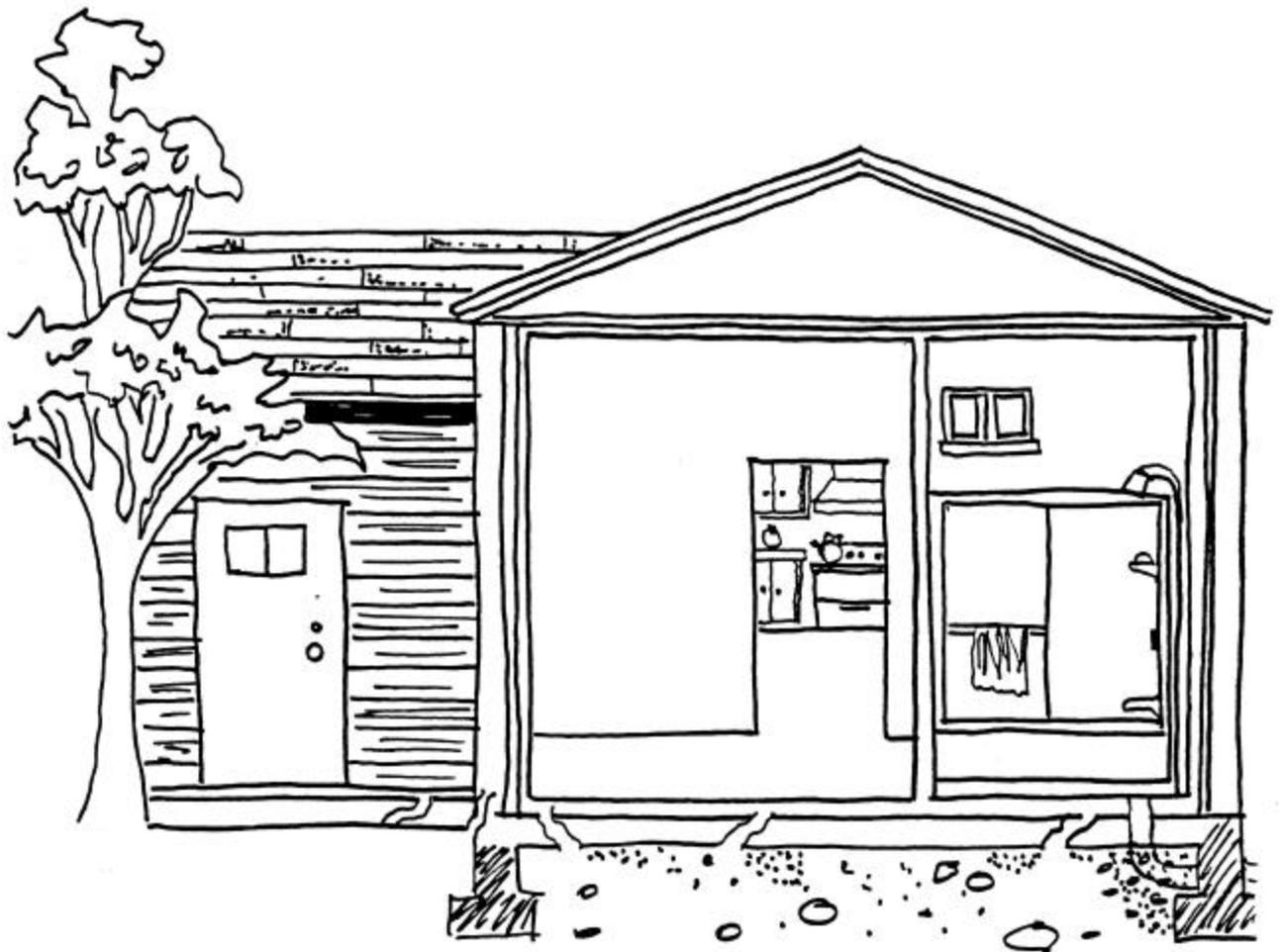
Because radon is a gas, it moves through small spaces in the soil and rock on which our houses are built (look at the illustration below). Radon can seep into a house through dirt floors, crawl spaces, cracks in concrete floors and walls, sumps, joints, and tiny cracks or pores in hollow block walls.



Radon can also be pulled into a house when fans and dryers pull air out of the house, creating negative air pressure. When a negative air pressure is created, air and radon gas from outside the house are drawn into the house. Weather conditions may also influence radon entry. When the temperature is colder outside than inside your house, the warmer indoor air is lighter and tends to float upward. This air movement creates a negative air pressure in the lower part of the house, drawing air and radon gas inside.

Radon usually mixes with air as it moves up a building and thus becomes less concentrated. Radon measurements made in basements are usually higher than those made on the first floor. Radon measurements made on the second floor and above may be even less than those on the first floor, depending on the heating and cooling system in the building, air movement, and other factors.

Look at the house below. Can you find places where the radon gas could enter the house? When you find them, draw a circle around the spot.



How is Radon Concentration Measured?

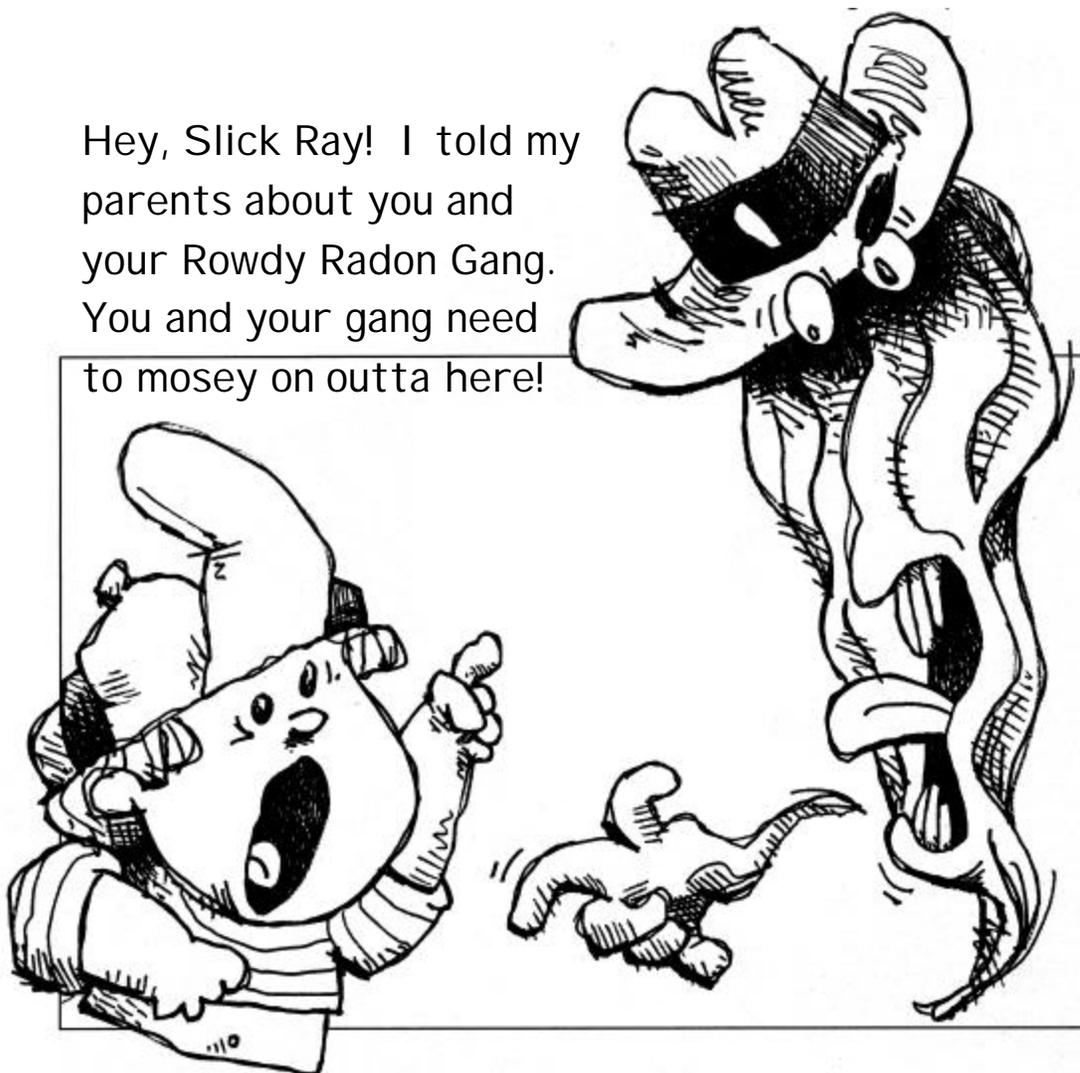
While radon decay products pose the actual health threat, it is easier and less expensive to measure the radon gas concentration in a home.

Radon gas is commonly measured in picocuries per liter of air (pCi/l). This measurement tells us the number of radioactive disintegrations per second in one liter of air (a liter is about a quart). The United States Environmental Protection Agency (EPA) has established a guideline of 4 pCi/l of annual average radon exposure as an acceptable health risk.

What's a "Curie?"

Radioactivity is expressed in units called curies, after Marie and Pierre Curie, who were pioneers in the field. A curie is the measurement of the number of atoms disintegrating per second in radioactive material. One curie is equal to 37 billion disintegrations per second. If the amount of radioactivity is small, scientists use a picocurie, which is one trillionth of a curie, or .037 disintegrations per second.

Hey, Slick Ray! I told my parents about you and your Rowdy Radon Gang. You and your gang need to mosey on outta here!



How Can I Measure the Radon Concentration in My House?

You will need a special test kit designed to measure radon levels. These inexpensive and easy-to-use kits can be found in most hardware stores and drug stores. The Alabama County Extension offices also have low-cost kits available for purchase. The most popular commercially available radon kits are the charcoal canister, liquid scintillation vial and the alpha track detector.

Charcoal test kits are often used for making short-term measurements of four to seven days, with liquid scintillation test kits taking two to four day measurements.

Because radon levels change from day to day depending on weather conditions or other factors, long-term tests are more reliable in measuring the amount of radon to which your family is being exposed. Long-term measurements are usually made with alpha track detectors, which can be used for 3 to 12 months.

Each kit reports measurements in picocuries of radon gas per liter (pCi/l) of air. Most radon test kits will provide information with your results to help you understand the test measurement.

Winter is the best time to test for radon because levels may be at their highest when the house is closed up tightly. To get the most accurate measure of your family's exposure to radon, you should place the testing device in the lowest part of the house where your family regularly spends time, such as a family room or bedrooms.

The only way to be sure your home is free of radon gas is to test for radon. Radon can be detected using a relatively inexpensive test kit. When testing for radon, it is very important to follow the test kit instructions carefully.



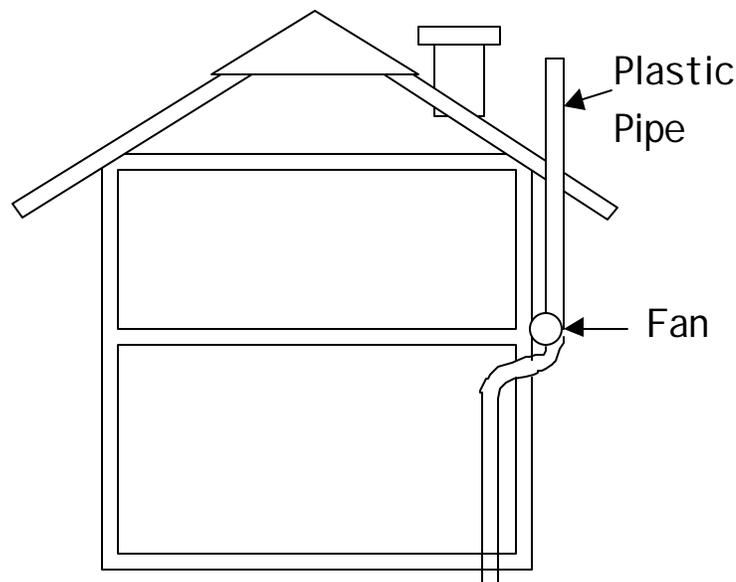
What if my house has a high radon level?

There are several ways to lower the radon level in your house. One method is to seal with caulk all cracks and holes in the walls and floors of the lowest levels of the house to keep the radon from entering. If, after sealing all cracks and holes, the radon level is still high, your family may need to hire a person who is trained to lower radon levels in houses and buildings. This person is called a “radon mitigator.”

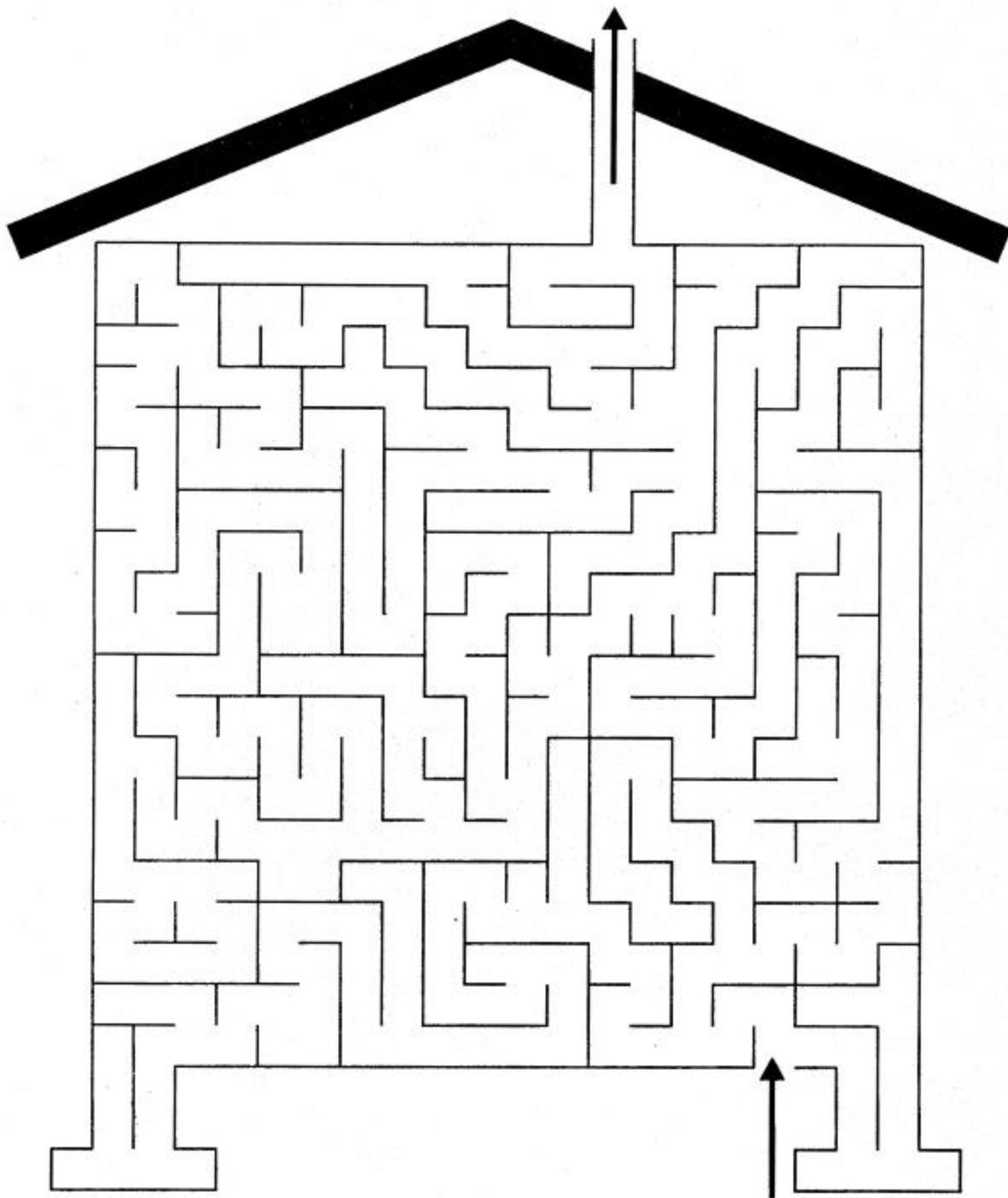
The mitigator’s job is to seal off radon entry points, or remove the radon gas after it has already entered. Because of special methods and skills involved, it is recommended that your family use only certified mitigators to fix your home!

To remove radon from your house, the mitigator may install a plastic pipe that extends upward through the roof, so that the radon can go up the pipe and exit into the outside air where it is quickly diluted (look at the illustration below). The pipe is usually hidden in a wall or a place where it cannot easily be seen. Often, a small fan is placed in the pipe to help move the radon outside.

Remember, radon levels can be reduced in your home, making it a safer place to work and play.



The Great Escape



Radon gas particles are trapped under the house. Can you be the mitigator and help them safely escape into the atmosphere so they will not get trapped in the house?

Radon Word Scramble

Unscramble the words, write them in the spaces to the right, and figure out who to call when you have a radon problem. If you have trouble figuring out what the words are, look at the “Words to Think About” or “The Radon Word Search.”

RNIAUUM	_____	<input type="checkbox"/>
STANICRE	_____	<input type="checkbox"/>
MTAO	_____	<input type="checkbox"/>
GATNIIMOTI	_____	<input type="checkbox"/>
GNUL ARCCEN	_____	<input type="checkbox"/>
ORADN	_____	<input type="checkbox"/>
ECETTORD	_____	<input type="checkbox"/>
IOCCPUIER	_____	<input type="checkbox"/>
TRIPCELA	_____	<input type="checkbox"/>

Who do you call when you have a radon problem? Take the letters from the boxes on each line and write them in the boxes below.

You call a !

In Review

Radon is a gas which you cannot see, feel, smell, or taste that is produced by nature. If someone told you they saw a radon cloud, would you believe them?

Answer: _____

Radon can get into your house through cracks in the floor or basement walls. It can also get in through drains in the floor or through the openings around pipes. How do you stop radon from entering though these areas?

Answer: _____

Houses can be tested for radon. What are two commonly used types of detectors that are used to show if there is radon in your house?

Answer: _____

There are several ways that can be used to get radon out of a house. What is one of the simplest ways to get radon out of a house?

Answer: _____

Radon can make you sick. What part of the body can get sick?

Answer: _____

What is the name of the disease?

Answer: _____

Acknowledgements

This booklet was adopted from the 4-H Radon Project Book (41A-0100) developed by the University of Kentucky Cooperative Extension Service. An additional source was “The Radon Student Activity Book” of the Arizona Department of Real Estate. These booklets were developed and produced by the above organizations using information provided by the U.S. Environmental Protection Agency. These organizations strive to provide accurate, complete, and useful information. However, neither the agencies, nor other persons contributing to or assisting in the preparation of this booklet — nor any person acting on behalf of these parties — make any warranty, guarantee, or representation (express or implied) with respect to the usefulness or effectiveness of any information, method, or process disclosed in this material or assumes any liability for the use of — or damages arising from the use of — any information, method, or process disclosed in this material.

This version of the booklet was revised April 2002 and was originally adapted from “My Radon Workbook,” prepared by the Virginia Cooperative Extension and recommended and modified for use in Alabama by Barbara Mobley, Dr. Jacquelyn Robinson and Frank Bell.



Issued in furtherance of Cooperative Extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, and other related acts, in cooperation with the U.S. Department of Agriculture. The Alabama Cooperative Extension System (Alabama A&M University and Auburn University) offers Educational programs, materials, and Equal opportunity employment to all people without regard to race, color, national origin, religion, sex, age, veteran status, or disability.

My Radon Record

Name _____

Name of my teacher _____

Answer the following questions:

1. What is Radon?

2. Why is it dangerous to breathe air with high levels of radon?

3. How can Radon enter a home?

4. What should you do if your home has high levels of radon?

5. How can you make your neighborhood and community more aware of the health risk associated with breathing elevated levels of radon?

Did you:

Yes No

- Talk to your parents or guardians about testing your home for radon?
- Test your own home for radon?
- Encourage action if high levels of radon were found?
- Talk to others in your neighborhood about testing for radon?



Issued in furtherance of Cooperative Extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, and other related acts, in cooperation with the U.S. Department of Agriculture. The Alabama Cooperative Extension System (Alabama A&M University and Auburn University) offers educational programs, materials, and Equal opportunity employment to all people without regard to race, color, national origin, religion, sex, age, veteran status, or disability.