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 homes
• The risks presented by radon decay products
• How to test for radon
• How to prevent radon from entering your house
• Nevada 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!
Nevada has nine counties that have been identified as Zone 1 counties, those having the greatest chance for having elevated radon levels. Nevada Zone 1 counties are: Carson City, Douglas, Eureka, Lander, Lincoln, Lyon, Mineral, Pershing, and White Pine. Seven counties are identified as having a moderate chance for elevated radon levels are Zone 2 counties. They are Churchill, Elko, Esmeralda, Humboldt, Nye, Storey and Washoe. Zone 3 homes have the least chance of having elevated radon, but even homes in Zone 3 areas can have elevated radon levels.

For more information about radon in your county, contact your local Cooperative Extension office, or call:

Nevada Radon Hot line
1-888-RADON10 (1-888-723-6610)

Carson City/Storey County - 775-887-2252
Churchill - 775-423-5121
Clark - 702-222-3130
Douglas - 775-782-9960
Elko - 775-738-7291
Eureka - 775-237-5326
Humboldt - 775-623-6304
Lander - 775-635-5565
Lincoln - 775-726-3109
Lyon - 775-463-6541
Mineral - 775-945-3444
Northeast Clark - 702-397-2604
Northern Nye/Esmeralda - 888-723-6610
Southern Nye - 775-727-5532
Pershing - 775-273-2923
Washoe - 888-723-6610
White Pine - 775-293-6599
Words to Think About

Below are some words scientists use when they talk about radon gas. Can you pronounce all of 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 radioactive disintegrations 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.
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.
Hey! Who are you? And what are you doing in my house?

Howdy, Timmy. You know me, don’t you? I’m Mr. Don — Ray Don! But you can call me Slick Ray. My Rowdy Radon Gang and I came in through a crack in your basement floor.

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.
How Can Radon Make Me Sick?

To see where radon can make you sick, use a colored pencil or crayon to connect the dots that have a letter next to them (A, B, C, and so on). Then connect the dots that have a number (1, 2, 3, and so on).
Radon! We learned about you in school! You’re not good to be around!

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.

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 rocks 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 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 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.

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

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.
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 home-improvement stores, but University of Nevada Cooperative 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. Liquid scintillation and charcoal canister test kits are used for making short-term measurements of two to four days.

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 bedroom.

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. 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 before it enters the family’s living space. 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.
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

VICTORAADIE

STET

GATNIIMOTI

GNUL ARCCEN

ORADN

ECETTORD

IOCCPUIER

TRIPCELA

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
**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: ___________________________

Name some ways that radon gets into a house: _______________________
___________________________
___________________________

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: _______________________
___________________________

What is the process to get radon out of a house called?

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 March 2002 and was originally adapted from “My Radon Workbook,” prepared by the Virginia Cooperative Extension, later modified by the Alabama Radon Program and recommended and modified for use in Nevada by Susan Howe, Program Director, Nevada Radon Education Program.

For more information, contact the Nevada Radon Education Program at 1-888-RADON10 (888-723-6610) or visit the Radon in Nevada website at www.RadonNV.com.
Name _________________________________   Date ________________
Name of my teacher_______________________  School ______________

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?

________________________________________________________________________

Can 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?