Activity 3: Indoor Radon Levels

Objectives

Students will:

- Learn about types of radon testing.
- Analyze radon testing data.
- Compare the data with the Environmental Protection Agency's (EPA) recommendations.
- Recommend whether to fix the radon levels based on the average indoor radon level.

Next Generation Science Standards

The concepts in this activity can be used to support the following science standards:

- ESS2. Earth's Systems.
- ESS3. Earth and Human Activity.

Materials and Resources

- *Radon: Teacher Background Information*.
- *Vocabulary Materials*.
- *Radon Testing* image.
- Computer and projector to display the *Radon Testing* image.
- *Radon Testing Worksheet* (one per student, pair or group) and teacher answer key.
- Radon test kit information:
  - *Where Can I Get a Radon Test Kit?*: http://www2.epa.gov/radon/find-radon-test-kit-or-measurement-and-mitigation-professional#where

Time

30-45 minutes, not including optional activities or extensions.

Vocabulary

- Ionizing radiation
- Radiation
- Radon
- Uranium

Directions

1. Start with a vocabulary activity if students are not familiar with radon and the terms used in this activity.

2. Explain that radon is a radioactive gas that comes from the decay of uranium in rock and soil. Human activities, such as uranium mining, can increase the risk of radon exposure. During the mid-1940s to 1970s, the U.S. was in a race with the Soviet Union to develop and test nuclear weapons. Nuclear power was also introduced during this time. Thousands of uranium mines were in operation, primarily in the Western part of the U.S., and nuclear testing was taking place in the West and in Alaska.

   When the demand for uranium decreased, uranium mines and testing areas were abandoned; leaving contaminated soil and water with high radon levels.

   Radon is a threat to health because it tends to collect inside homes and buildings, sometimes to very high levels, and can cause lung cancer. Any home or building may have a radon problem, including new and old homes, well-sealed and drafty homes, and homes with or without basements. On average, one out of every fifteen U.S. homes has a problem.

3. Ask students how they can test radon levels in their home. Students should be able to state that they can purchase a test kit or have a professional test their home for radon. Radon testing is necessary because we cannot detect radon by smell or sight. Students can visit *Where Can I Get a Radon Test Kit?:* http://www2.epa.gov/radon/find-radon-test-kit-or-measurement-and-mitigation-professional#where.

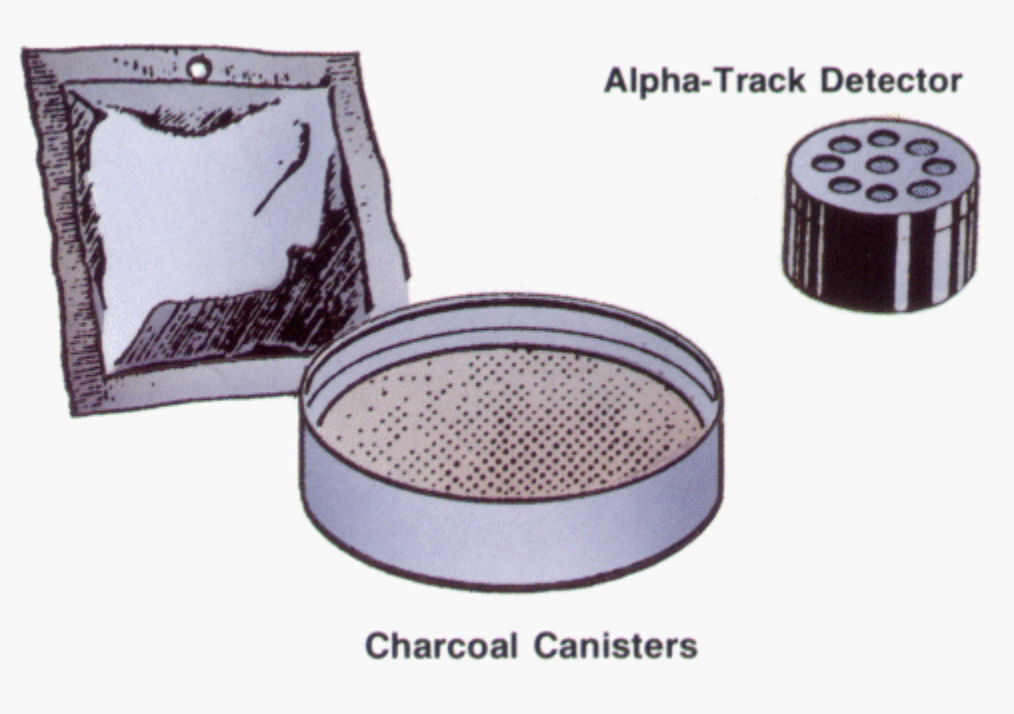
4. Display the *Radon Testing* image. Explain that there are short-term and long-term testing options. Short-term tests remain in a home for 2 to 90 days, depending on the device. Long-term tests remain in your home for more than 90 days. A short-term test is less likely than a long-term test to tell you your year-round average radon level so you may want to follow up with a second short-term test to confirm the results of the first. Short-term charcoal canister tests are left in the home for 2 to 7 days to capture radon levels whereas long-term alpha track detectors can be left in the home for 90 days to a year.

5. Distribute the *Radon Testing Worksheet*. Have students completed the worksheet and share their responses. The *Radon Testing Teacher Answer Key* is provided.

6. Conclude by discussing the importance of testing homes for radon.

7. Optional activities or extensions:
   - Contact your state radon program or the regional EPA office and see if it has radon data from your area that can be charted and analyzed by students.
   - Determine if you can get radon test kits and the analyses paid for so that each student can test their home for radon. Have students compile and analyze the data.
   - Have students create posters, raps, videos or other media messages to stress the importance of radon testing.
   - Have students create posters for the National Radon Poster Contest: www.sosradon.org/poster-contest

Radon Testing Devices



Radon Testing Worksheet

Name: _____ Date: _____

The lower the radon levels in your home, the lower your family's risk of lung cancer. The amount of radon in the air is measured in picocuries per liter (pCi/L). The U.S. Environmental Protection Agency (EPA) recommends fixing your home if the results of one long-term test or the average of short-term tests show radon levels of 4 pCi/L or higher. You may also want to consider fixing if the level is between 2 and 4 pCi/L.

Review the test results for each home. Calculate the average of each pair of readings and determine whether the homeowner should consider fixing the home.

Home A:

Winter reading	Summer reading
3.5 pCi/L	1.0 pCi/L

Average radon level: _____

Does this home's radon level need to be fixed? Explain your answer.

_____

_____

_____

Home B:

Reading during rainy season	Reading during dry, windy weather
5 pCi/L	10.0 pCi/L

Average radon level: _____

Does this home's radon level need to be fixed? Explain your answer.

_____

_____

_____

When testing your home for radon, why is it important to get a year-round average radon level?

_____

_____

Radon Testing Teacher Answer Key

Name: _____ Date: _____

Home A:

Winter reading	Summer reading
3.5 pCi/L	1.0 pCi/L

Average radon level: **3.5 + 1 = 4.5 / 2 = 2.25 pCi/L**

Does this home's radon level need to be fixed? Explain your answer.
Answers may vary. This homeowner may want to consider lowering the indoor radon level, especially since the reading was higher during the winter.

Home B:

Reading during rainy season	Reading during dry, windy weather
5.0 pCi/L	10.0 pCi/L

Average radon level: **5 + 10 = 15 / 2 = 7.5 pCi/L**

Does this home's radon level need to be fixed? Explain your answer.
This homeowner should definitely consider lowering the indoor radon level. It is well above EPA's action level of 4 pCi/L or higher.

When testing your home for radon, why is it important to get a year-round average radon level?
Radon levels tend to vary from day to day and season to season. For example, rainfall may slow radon's movement through soil so that less gets into the home. In dry periods radon has an easier time moving to the surface through cracks and crevices. Weather extremes when homes are closed and heat and air conditioning are turned on, or windy weather may lead to a lower pressure in the home which creates a vacuum and draws radon in from a higher pressure area in the soil under the home.