



Ohio Department of Health, Bureau of Environmental Health and Radiation Protection, Radon Licensing Program

School Radon Testing Checklist

Purpose: This checklist has been prepared to provide school employees with instructions on how to properly test for the presence of radon in schools.

Background

- Radon is a naturally occurring radioactive gas that can cause lung cancer. It comes from the natural breakdown of uranium which is found in soil and rock all over the United States. Radon travels through soil and enters buildings through cracks and other holes in the foundation.
- Radon is colorless, odorless, and tasteless. Therefore, the only way to know whether an elevated level of radon is present in any room of a school is to test.
- EPA's investigations of radon in schools were initiated in 1988 with a study of schools in Fairfax County, Virginia. As the result of a nationwide survey of radon levels in schools, it is estimated that nearly one in five U.S. schools have at least one ground contact room with short-term radon levels above 4 pCi/L; the level at which the EPA suggests mitigation.
- It is recommended that all schools nationwide be tested for radon. EPA estimates that more than 70,000 schoolrooms in use today have high short-term radon levels.

Initial Approach

- Meet with the school's facility manager to obtain a small floor plan of the building and to discuss school structure and dynamics. If the school is currently under renovation or renovations are planned for the near future you should postpone testing until renovations are completed. Also, meet with school's principle or superintendent to discuss testing protocols and required communication with students, parents, and staff
- Conduct a walk through inspection to determine testing areas and record the information on the floor plan of the building.
- The school administration should conduct an informational meeting with representatives of parent and teacher organizations to provide an overview of the scheduled radon

testing. The individual responsible for conducting radon testing should attend to address any questions or concerns. Experience has shown that proactive pre-testing communication with parents and staff about why testing is required and what will be done if/when elevated levels are found minimizes post-testing concerns.

- Two weeks prior to the scheduled radon testing, the school administration should notify parents of students and staff with a letter informing them of the scheduled radon testing (See Attachment A template).

A Citizen's Guide to Radon pamphlets can be obtained on the web at <http://www.epa.gov/radon/pubs/citguide.html>. An electronic version can be emailed for distribution to staff and hard copies can be printed for distribution to parents.

Initial Testing

Placement of Testing Devices:

Number of Test Kits Needed

- Obtain a sufficient number of short term, passive test devices to conduct initial radon testing in all frequently occupied rooms that come in contact with the ground within the school. In other words, the lowest occupied level will be tested unless the school is built into a hillside in which case upper floors may need to be tested as well. Frequently occupied rooms are usually classrooms, offices, laboratories, cafeterias, libraries, and gymnasiums. Areas such as rest rooms, hallways, stairwells, elevator shafts, utility closets, and storage closets need not be tested. Use the attached work sheet to calculate the number of test kits required (See Attachment B work sheet).
- Duplicates and blanks should accompany all testing activities to provide assurance of the quality of the measurements.
 - Duplicates are pairs of detectors deployed in the same location, side-by-side, and 4 inches apart for the same measurement period. They shall be placed in **10%** of all measurement locations in a school building.
 - Blanks are used to determine whether the manufacturing, shipping, storage or processing of the detector has affected the accuracy of the measurements. Blanks are unwrapped but not opened and immediately rewrapped at the end of the exposure period. The number of blanks shall be **5%** of the detectors deployed or 25 whichever is less.

Duplicate and blank testing devices must be shipped and labeled in the same manner as the other testing devices so that the analytical laboratory cannot distinguish them. For example, a test device is placed in Room 233 accompanied by a duplicate test device. The location name marked on the tracking sheet for the first device is "Room 233" while the location name marked on the tracking sheet for the duplicate device is "Room 233D". In other words, a duplicate location name of "Duplicate of Room 233" is not acceptable.

Blanks should be named in a similar way, such as “Room 233B” as opposed to “Blank of Room 233”.

- Spikes should be included in one testing activity per month to measure accuracy of the normal analytical process of radon measurement. Count the total number of test devices placed in all of the schools where testing has occurred or is planned for the designated month. The number of spikes should be **3%** of the detectors deployed during that month with a maximum of 6 spikes per month.
 - Spikes are used to measure accuracy. Ask your device manufacturer for a spiking service referral and use a private radon chamber (laboratory). Bowser-Morner, Inc. of Ohio is an example of a company that provides this service.

Spikes are test devices sent to a spike service laboratory for spiking in a radon chamber. The test devices will be exposed in the chamber at a certain level that will be provided by the spike service laboratory. The test devices should be exposed in the chamber for the same amount of time you plan on conducting testing in your designated school. The spiked test devices should be shipped via overnight delivery to arrive in time to include in your sample shipment.

Like duplicates and blanks, the spiked test devices must be shipped and labeled in the same manner as the other testing devices so that the analytical laboratory cannot distinguish them. The spiked test devices should be named so as to be recognized by the tester but blind to the lab.

Test Conditions Needed:

- Testing should be preceded by 12 hours of closed building conditions.
- Testing should be conducted:
 - under closed conditions for a minimum of 48 hours,
 - during the coldest months of the year (November 1-March 31),
 - and during weekdays while school is in session with HVAC systems operating normally.
- Testing should **not** be conducted:
 - during abnormal weather conditions such as major storms or high winds
 - during structural changes to a school building and/or the renovation
 - or replacement of the HVAC system.

How to Test:

- All school rooms must be tested on the same start date. Test kit identification numbers, locations, and start date/time will be recorded on a device tracking sheet (See Attachment C Radon Testing Data Log).
- Use a brightly colored warning sheet to hang with or place underneath the test device (See Attachment D example).
- Test devices must be placed:
 - away from any drafts, vents, appliances (e.g. computers, projectors, etc),
 - 20 inches above the floor,
 - 3 feet away from any exterior doors or windows,
 - 12 inches away from any exterior wall,
 - 4 inches away from other objects,
 - away from heat, areas of high humidity, out of direct sunlight, and where they are least likely to be disturbed.

The devices should be left in place for three or four days to ensure optimum results (Testing should take place over at least 2 days/48 hours, but shall not exceed 7 days.)

Place the detectors every 2,000 square feet for larger spaces.

Retrieval of Testing Device:

- Retrieve all testing devices from each location in the school building on the same day and complete the device tracking sheets by marking down the end date/time. Make comments if the devices appear to have been tampered with or if windows are found to be open instead of closed.
- Make photocopies of the tracking sheets to keep as a record of the testing event.
- Package all testing devices neatly and securely so as to ensure proper shipment. Mail devices to the analytical laboratory immediately after retrieval or the next morning at the latest. Be sure each shipment parcel contains a copy of the tracking sheets.
 - Overnight or two-day delivery is preferred for out of state labs
 - Communicate with the analytical laboratory to inquire about preferences for shipping methods and to provide the lab with a schedule of your planned testing activities

Interpretation of Initial Results

- Review the results of the initial testing and highlight any results that are at or above 4.0 pCi/L.
- Compare the duplicate results by calculating the Relative Percent Difference (RPD).

$$RPD = \frac{|Initial\ Result - Duplicate\ Result|}{Average\ of\ Both\ Results} \times 100$$

If results over 4.0 pCi/L differ by 25% or more, the data quality should be questioned. In this case, you should call the processing laboratory to investigate the situation further and notify the school administrator that a few results are in question; therefore, the room associated with the questionable duplicate may need to be retested.

- Check to be sure that the blank results are at or near 0.0 pCi/L to ensure accuracy of the device. If they are not, call the analytical laboratory and/or test device supplier to investigate further and notify the school administrator that the problem is being investigated.
- Check to be sure that the spike results are accurate by calculating how close the measured value is to the target value. Calculate the Individual Relative Error (IRE)

$$IRE = \frac{(Target\ Value - Measured\ Value)}{Target\ Value} \times 100$$

The calculation should be + or - 25%. If the measured value is way off from the target value, investigate further and notify the school administrator that the problem is being investigated.

- Obtain additional short-term test devices for follow-up testing in rooms with radon results at or above 4.0 pCi/L. Don't forget to include additional QA/QC measurements (duplicates, blanks and spikes).
- Provide a summary of initial test results to the school administration.
- If initial test results are over 100 pCi/L, the school administration should notify parents and staff as soon as possible, but no later than one week after results have been received.

→ **EPA does not recommend that schools use a single short-term test as the basis for determining whether or not action needs to be taken to reduce radon levels. A follow-up measurement to confirm an initial short-term measurement of 4.0 pCi/L or higher should be conducted before making such a decision.**

Follow-Up Measurements

- Follow-up testing (when needed) should start within one month after receiving the initial test results. Follow-up testing must be made in the same location and under the same conditions as the initial measurement.

Interpretation of Follow-Up Test Results

- Take action to reduce the radon level if the average of the initial and follow-up measurement is 4.0 pCi/L or more.
- Provide school administration with a complete report that includes all testing related documentation, results and interpretations.
- Recommend that school administration hire a radon mitigation professional licensed by the Ohio Department of Health to reduce elevated radon levels identified through testing. The ODH list of licensed professionals can be accessed on the web at: <http://publicapps.odh.ohio.gov/publicinfo/publicinfov7.aspx?item=69>
This list contains both active and inactive licensees so be sure to check the license expiration date. If you have any questions about the list, call the ODH Radon Licensing Program at 614-752-4425.

Completion and Reporting

- For data collection purposes, please fill out and sign the ODH *School Radon Testing Report Form* (See Attachment E form). The signed form should be mailed to the following address:

Attn: Radon Licensing Program
Ohio Department of Health,
Bureau of Environmental Health and Radiation Protection
246 N. High St. – 7th Floor, 35 Bldg. - Radon
Columbus, OH 43215-0118

- School administrators should notify parents and staff of radon testing results in a brief summary as soon as possible but no later than one month after follow-up test results are received. If elevated radon levels exist, the notification should include the school's plan to reduce the level. A copy of all testing documentation should be kept in the main office of the school for parents, staff and ODH inspectors to views.

For more information or technical guidance, please contact the Ohio Department of Health, Bureau of Environmental Health and Radiation Protection, Radon Licensing Program at 1- 800-523-4439 and ask for the Radon Licensing Program.

ATTACHMENT A

Date:

Dear Parents and Staff:

The administration of the (insert name of school) would like to provide you with notification that initial radon-in-air testing will be conducted during the week of (insert dates).

School personnel will be conducting the radon testing in accordance with established U.S. Environmental Protection Agency testing protocols. To test for radon in air, small devices containing charcoal will be placed in each of the occupied rooms that are in contact with the ground. These devices will be left in place for between three and five school days. You will be informed of radon test results and interpretations as soon as possible. In the event that high radon levels are found, steps will be taken to correct the problem using methods suggested by the U.S. Environmental Protection Agency.

Radon can be a problem in your home as well. Prolonged exposure to radon can contribute to an increased risk of lung cancer. The United States Surgeon General has warned that radon is the number one cause of lung cancer among non-smokers.

Radon is an invisible, odorless and tasteless gas, with no immediate health symptoms, that comes from the breakdown of uranium inside the earth. It can get into any type of building – homes, offices and schools – and build up to high levels. But you and your family are more likely to get your greatest exposure at home because that's where you spend most of your time each day.

Testing is the only way to know if you and your family are at risk from elevated levels of radon. The Ohio Department of Health, the U.S. Environmental Protection Agency and the U.S. Surgeon General recommend testing all homes for radon. A Citizen's Guide to Radon pamphlet can be obtained on the web at <http://www.odh.ohio.gov/odhprograms/rp/radlic/radon.aspx>.

For additional information contact:

Ohio Department of Health, Bureau of Environmental Health and Radiation Protection, Radon Licensing Program at 1-800-523-4439 and ask for the Radon Licensing Program, or on the web at <http://www.odh.ohio.gov/odhprograms/rp/radlic/radlicg/radonlic1.aspx> or <http://radon.utoledo.edu>.

ATTACHMENT B

School Radon Testing Program Work Sheet for Determining the Number of Test Kits Needed

Item 1. Number of frequently occupied rooms less than 2,000 square feet in contact with the ground:

Item 2. List rooms that exceed 2,000 square feet and their size estimate, then divide by 2,000 to calculate the number of test kits needed for each large room:

		A= Size Estimate (in square feet)	B= Divide A by 2,000 square feet to get value for B	C= Round B up to a whole number
	Large Rooms			
<i>(For Example)</i>	<i>Gymnasium</i>	<i>13,491</i>	<i>13,491 / 2,000=6.7455</i>	<i>7</i>
1				
2				

Item 3. Add up all values in the C column to calculate how many additional tests kits are needed:

Item 4. Add Items 1 and 3 to determine the amount of test kits needed not including duplicates, blanks and spikes:

D= _____

Item 5. Take the value figured in Item 4 and multiply it by 0.10 to calculate the number of duplicates needed (Round up to the nearest whole number):

E= _____

Item 6. Take the value figured in Item 4 and multiply it by 0.05 to calculate the number of blanks needed (Round up to the nearest whole number):

F= _____

Item 7. Take the value figured in item 4 and multiply it by 0.03 to calculate the number of spikes needed.

G= _____

Item 8. Add up the values in Items 4,5,6 and 7 to figure out total number of test kits needed:

D + E + F + G = _____

**ATTACHMENT C
RADON TESTING DATA LOG**

School Name: _____
 Building Name: _____

School Address: _____
 City, State, Zip: _____

Device Placement Performed by: _____
 Device Retrieval Performed by: _____

Weather conditions during the testing: _____

Test Kit #	Room #/ ID	Placement	Start Date	Start Time	Stop Date	Stop Time	Floor	Comments

ATTACHMENT D
Radon Measurement in Progress

**This notice is posted in accordance with
Rule 3701-69-07 of the Ohio Administrative Code.**

**Tampering with a radon measurement will invalidate
the measurement.**

**Removal of this notice, except by the licensed Radon
Professional named below, is considered tampering.**

Date: _____

Location: _____

**Name of Licensed Radon Professional
(print):** _____

**Name of Licensed Radon Professional
(signature):** _____

Ohio License Number: _____

Contact Numbers: Cell _____
Office _____



SCHOOL RADON TESTING REPORT FORM

2015 - ATTACHMENT E

STATE OF OHIO DEPARTMENT OF HEALTH BUREAU OF ENVIRONMENTAL HEALTH AND RAD PROTECTION RADON LICENSING PROGRAM

For data collection purposes, please submit the following form to the Ohio Department of Health, Bureau of Environmental Health and Radiation Protection, after providing a final written report of radon measurement activities to school administration. Submit form to the Radon Program at the address listed below.

Attn: School Radon Testing Program
Ohio Department of Health,
Bureau of Environmental Health and Radiation Protection
246 N. High St. – 7th Flr. 35 Bldg. Radon Licensing
Columbus, OH 43215-0118

Name of School:

Address:

(Street, town, zip code)

Dates of Testing:

**Name of school employee(s)
who conducted testing:**

Please provide the following summary information:

Total no. of rooms tested:

No. of rooms re-tested:

**Total no. of rooms where
average results were
at or above 4.0 pCi/L:**

Highest result found:

I hereby certify that radon measurement activities were carried out in accordance with the Ohio Administrative Code 3701-69-07 Appendix A and Appendix B. The name and license number (if applicable) of the person conducting the testing _____

Signature of Responsible School Administrator

Date