

EPA MEASUREMENT STRATEGY FOR SCHOOLS

If a school decides to use a short-term test during initial measurements, EPA recommends the two-step approach described below.

Step 1 Initial Measurements

Take initial measurements using a short-term test. Short-term measurements should be made in **all frequently occupied rooms in contact with the ground** to provide a quick test of whether or not high radon concentrations are present.

All rooms should be tested simultaneously.

- Do a follow-up test in every room with a short-term, initial test result of 4 pCi/L or greater (**See Step 2**).

Step 2 Follow-up Measurements

All follow-up measurements in a school should be conducted simultaneously. Follow-up measurements should be made in the same locations and under the same conditions as the initial measurements (to the extent possible, including similar seasonal conditions and especially HVAC system operation). This will ensure that the two results are as comparable as possible.

- Use a short-term, follow-up test if results are needed quickly. The higher the initial short-term test result, the more certain you can be that a short-term test should be used rather than a long-term follow-up test. In general, the higher the initial measurement, the greater the urgency to do a follow-up test as soon as possible. For example, if the initial short-term measurement for a room is several times the EPA's radon action level (e.g., about 10 pCi/L or higher), a short-term follow-up measurement should be taken immediately.
- Use a long-term, follow-up test to better understand the average radon level for a school year.

When a room's initial result is only slightly elevated above 4 pCi/L (e.g., between 4 and 10 pCi/L), a long-term follow-up measurement -preferably taken over the entire nine month school year - is appropriate. The result from such a test may best represent the average radon concentration for the school year in that room. A long-term test should be conducted over the school year immediately following the completion of initial measurements.

Appendix F provides a list of steps to take during a radon-testing program. These steps are not intended to be all-inclusive. However, they may serve as guide through the process of radon testing in a school.

Interpreting Test Results

- If a short-term, follow-up measurement was used, take action to reduce the radon level if the average of the initial and follow-up measurement results is 4 pCi/L or more.

- If the result of a long-term, follow-up measurement is 4 pCi/L or more, take action to reduce radon levels.

Schools can reduce radon levels by proceeding with *diagnostics* and *mitigation*. Diagnostics involve the evaluation of radon entry points and the identification of the appropriate radon reduction technique. Mitigation is the design and implementation of a radon reduction system. *Reducing Radon in Schools: A Team Approach* (EPA 402-R-94-008) will assist schools with the mitigation process. To receive this document, call your State Radon Contact or EPA Regional Office (See **Appendix A and B**). For more information on reducing radon concentrations in schoolrooms see **SECTION III**.

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 pCi/L or higher should be conducted before making such a decision. Indoor radon levels depend upon a number of variables and can fluctuate significantly from day to day. Short-term tests (particularly tests of 2 to 5-days) may in some cases reflect an unusual peak in the radon concentration thus indicating a need for remedial action which may not be necessary. In addition, EPA studies have shown that the averaging of two such short-term measurements reduces the possibility of misrepresenting the average radon concentration.

Retesting

In addition to initial and follow-up measurements, EPA recommends that schools retest sometime in the future especially after significant changes to the building structure or the HVAC system. Suggested times for retesting are as follows:

- If no mitigation is required after initial testing (e.g., all rooms were found to have levels below 4 pCi/L), retest all frequently occupied rooms in contact with the ground sometime in the future. As a building ages and settles, radon entry may increase due to cracks in the foundation or other structural changes.
- If radon mitigation measures have been implemented in a school, retest these systems as a periodic check on any implemented radon reduction measures.
- If major renovations to the structure of a school building or major alterations to a school's HVAC system are planned, retest the school before initiating the renovation. If elevated radon is present, radon-resistant techniques can be included as part of the renovation.
- Retest after major renovations to the structure of a school building or after major alterations to a school's HVAC system. These renovations and alterations may increase radon levels within a school building.

C. WHAT ROOMS TO TEST

EPA's research in schools has shown that radon levels often vary greatly from room to room in the same building. A known radon measurement result for a given classroom cannot be used as an indicator of the radon level in adjacent rooms. Therefore, EPA recommends that schools conduct initial measurements in *all frequently occupied rooms in contact with the ground*.

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 (Note: these areas may be important areas for diagnostic testing if elevated radon is found). EPA studies indicate that radon levels on upper floors are not likely to exceed the levels found in ground-contact rooms. Testing rooms on the ground-contact floor is sufficient to determine if radon is a problem in a school.

Recommendations for Specific School Designs

Slab-on-Grade Design: Measure only frequently occupied rooms in contact with the ground. **Open-Plan or Pod Design:** If sections of a pod have moveable walls that can physically separate them from other sections, measure each section separately. If moveable walls are absent or inoperable, measure the pod as one room placing detectors every 2000 square feet.

Crawl Space Design: If classrooms are above an enclosed crawl space, measure rooms directly above the crawl space.

Basement Design: In addition to measuring all frequently occupied basement rooms and rooms with a floor or wall with ground-contact, measure all rooms that have no ground-contact but that are directly above a basement space that is not frequently occupied.