Radon in Schools
Joseph Laquatra and Lorraine Maxwell

Radon is a naturally occurring radioactive gas produced from the decay of uranium, which is present in soil all over the world. Radon enters buildings through connections to soil. When breathed, radon damages lung tissue, and long-term exposure can lead to lung cancer. In fact, the U.S. Surgeon General estimates that radon is second only to cigarette smoking as a cause of lung cancer in the United States.

Children in schools are particularly vulnerable to radon's effects. By high school graduation, a student has spent at least 14,000 hours breathing the air inside school buildings (Etkin and Vogt, 1996). Children are more sensitive to air pollution than adults. They breathe more air relative to their body weight than adults do and are more likely to breathe through their mouths than adults, which bypasses the nasal cavity's protective functions.

Radon Testing
Because radon is colorless, odorless, and tasteless, the only way to know if a building is contaminated is by conducting a specialized test. But testing for radon in schools is simple and inexpensive. Testing kits may be available free in your county. Contact your county health department for information about local radon testing programs. Or school administrators can hire an environmental specialist to test for radon.

Radon is measured in picocuries per liter (pCi/L). The U.S. Environmental Protection Agency (EPA) has set 4 pCi/L as the action level for radon. Outdoor air typically has radon concentrations of about 0.4 pCi/L (Etkin and Vogt, 1996). The EPA set 4 pCi/L as the action level based largely on the ability to easily reduce high concentrations to that level, not because 4 pCi/L is considered to carry no risk. Any exposure to radon can damage lung tissue, but lowering the concentration reduces the health risks.

Mitigation
When a building tests at 4 pCi/L or higher, mitigation measures are recommended. The most effective radon mitigation system is a sub-slab ventilation system (also called sub-slab depressurization). This ventilation system consists of plastic pipe installed beneath the concrete slab at the lowest level of the building. The pipe extends from the soil under the building to the roof. An exhaust fan in the pipe pulls the radon gas from the soil and directs it out of the building. In addition to the pipe, joints in the slab and joints between the slab and walls are sealed with a caulking compound. All cracks are also repaired. These sealing techniques maintain the integrity of the ventilation system.

In short, instead of letting the gas slowly seep into the building where it can build up to dangerous concentrations, the building is sealed and the radon is pumped out into the open air where it will be dispersed.

What to Do
Indoor air quality can be a difficult issue for school districts. Many schools faced protracted problems with asbestos mitigation. But radon testing and mitigation is much more straightforward. A competent professional can treat a building for radon quickly and inexpensively.
The first step is to begin a community dialogue. Ask your school administrator or other appropriate official if your school has been tested for radon. If not, this may be a topic for discussion at a PTA meeting or through another appropriate channel of community involvement.

If your school has not been tested for radon, an environmental consultant can help evaluate the air quality. It is important to find a consultant who has experience specifically with radon. Ask whether indoor air quality is a major area of work for the consultant. Many environmental consultants advertise expertise in indoor air quality when, in fact, such work is a recently added or minor sideline of theirs. These consultants might not be best able to assess your situation.

Before choosing a consultant, ask how information will be presented to you. It is important to work with a consultant who will be able to communicate with school officials, parents, teachers, health workers, and others in the community. If an air quality consultant returns a dense report with incomprehensible charts, the community will not be well served.

Ask potential consultants for samples of reports from previous jobs and contact previous clients. Contact other school districts in your region and ask if others have experience with radon or other indoor air quality issues—these contacts can often provide excellent, practical advice and recommendations. Contact your county Cooperative Extension educator and your county health department for more information on radon, as well as radon testing and mitigation.

These web sites offer more information:
- www.epa.gov/afag/radon/frpubs/schoolirn.html
- www.epa.gov/children/air.htm

Summary

Radon is a radioactive gas that occurs naturally underground. It can seep into buildings and cause lung tissue damage and eventually lung cancer.

- Radon forms during the decay of uranium, found in rock and soil across the United States. When radon continues to decay in the lungs, it releases small bursts of tissue-damaging radiation.
- Radon is odorless, tasteless, and colorless. We cannot detect radon with our senses, but we can use simple tests to see if buildings are contaminated.
- The U.S. Environmental Protection Agency recommends that schools work to eliminate radon if it exceeds 4 picocuries per liter, about 10 times the concentration in outdoor air.
- Buildings that sit on radon-releasing soil can be made safe by installing a sub-slab depressurization system, which can be done as easily as typical building maintenance. Simply putting a vent under the building’s slab will allow the radon to disperse to the outside air, rather than becoming concentrated in the building.
- Properly ventilating schools that sit on radon-releasing soil will protect the children and adults who spend large parts of their lives breathing the air inside them.
- Find out if your school has been tested for radon. If not, contact your county public health department, Cooperative Extension, or an environmental consultant.

References


For additional information on this and other topics in this series contact
Lorraine E. Maxwell, Ph.D. Associate Professor Cornell University Department of Design and Environmental Analysis
Martha Van Rensselaer Hall
Ithaca, New York 14853-4401
E-mail: len3@cornell.edu

Joseph Laquatra and Lorraine Maxwell are associate professors in the Department of Design and Environmental Analysis at Cornell University. They acknowledge the assistance of Daniel Cullen in the preparation of this fact sheet.

Cornell Cooperative Extension
Helping You Put Knowledge to Work

This publication is issued in further Cooperative Extension work mandated by acts of Congress of May 8 and June 30, 1914. It was produced with cooperation of the U.S. Department of Agriculture; Cornell Cooperative Extension; and College of Agriculture and Life Sciences, College of Human Ecology, and College of Veterinary Medicine at Cornell University. Cornell Cooperative Extension provides equal program and employment opportunities. D. Merrill Ewert, Director.

Alternative formats of this publication are available on request to persons with disabilities who cannot use the printed format. For information, call or write the Office of the Director, Cornell Cooperative Extension, 306 Roberts Hall, Ithaca, NY 14850 (607-255-2295).

Produced by Media and Technology Services at Cornell University
www.mediasrv.cornell.edu
Copyright Cornell University
Printed on recycled paper:
211FPMN102001144200SCNTSMIT93084

Additional copies of this publication can be purchased from Cornell University, Media and Technology Services Resource Center, 7 Cornell Business & Technology Park, Ithaca, NY 14850. Phone: 607-255-2080. Fax: 607-255-9946. E-mail: restroom@cornell.edu

A free catalog of Cornell Cooperative Extension publications and audiovisuals is available from the same address, or from any Cornell Cooperative Extension office. The catalog also can be accessed at the following Web site:
www.cce.cornell.edu/publications/catalog.html