



# EPA tests classroom radon levels

Fifty-four percent of schools tested show at least one classroom above EPA recommended levels

By J.E. Cox, P.E., Ph.D. and Charles R. Miró

ASHRAE Director of Government Affairs

ASHRAE Issues Manager

The Environmental Protection Agency (EPA) recommended that the nation's schools be tested for the presence of radon gas. The decision, announced by the agency's administrator, William K. Reilly, was based on a testing program of 130 schools in 16 states. Fifty-four percent of the schools tested had at least one room above the recommended EPA action level.

### Understanding radon gas

Radon is an invisible, odorless radioactive gas that if inhaled can cause lung tissue damage and increased risk of lung cancer. As uranium decays, radium is produced that, in turn, releases radon gas. Once released, radon gas migrates through rock and soil—eventually escaping into the atmosphere or into buildings.

The health risk is not with the radon gas itself, but rather with the short-lived radon decay products that can be inhaled and trapped in the lungs. As the decay products break down, small bursts of energy are released that can damage lung tissue. The risk of lung cancer depends on the concentration of radon gas and the duration of exposure.

### Health risk

A safe level of radon gas exposure has not been established. The EPA specifies an "action" level of four picocuries per liter (pCi/l) of air. The agency has indicated that the risk of developing lung cancer from an extended exposure of 4pCi/l is equivalent to smoking eight to 10 cigarettes per day. The EPA cites studies that indicate indoor exposure to radon gas may account for 20,000 lung cancer deaths per year in the United States. The American Cancer Society predicts that 155,000 people will die of lung cancer from all causes in 1989. The U.S. Surgeon General attributes approximately 85 percent of lung cancer deaths to smoking. The National Academy of Sciences estimates that the exposure to radon and tobacco smoke in combination may be as much as 10 times as ser-

ious as exposure to either pollutant alone.

In the Indoor Radon Abatement Act of 1988 (PL 100-551), Congress expressed its concern for the health risks associated with the EPA action level of 4pCi/l by directing the agency to de-emphasize its action level and to explain the health risks. The Act also establishes a Federal goal of indoor radon exposure levels not exceeding the outdoor levels, which are estimated to average 0.2 pCi/l. Unacceptable concentration levels generally can be reduced by ventilation. Radon concentrations greater than the recommended action level have been found in every state surveyed. Available data indicate that perhaps 10 percent (or up to 8 million) of U.S. homes have annual average radon levels reaching or exceeding 4 pCi/l.

### School radon-testing survey

The purpose of the nationwide school survey was to gather data for developing procedures specifically for measuring radon in school buildings. This initial survey involved short-term (2-day) testing of school facilities. The EPA studied approximately 3,000 class-

rooms; 19 percent of the rooms had radon levels above the action level. Three percent of the classrooms had radon levels of 20 pCi/l. One school had levels of 136 pCi/l. The highest (not an average) schoolroom radon screening measurement in each of the 16 states surveyed are shown in Table 1.

Elevated levels of radon also have been reported in schools in Virginia, Maryland, Pennsylvania, Florida, New York, Ohio and Iowa.

Working with the nearby Fairfax County, Virginia, school system, the EPA studied five schools in the winter and spring of 1988. The following findings were reported:

- (1) Radon concentrations in schools typically vary from room to room.
- (2) Schools in the same general area can have significantly different radon concentrations.
- (3) Radon concentrations vary significantly over time.
- (4) Radon concentrations are considerably higher in basement and first-floor rooms than on upper-level floors.

### EPA school recommendations

The EPA believes that elevated radon levels may be as prevalent in schools as in private residences. Therefore, the agency recommends that schools test 100 percent of frequently-used rooms on basement- and ground-level floors. This includes classrooms, offices, libraries, gymnasiums and cafeterias. Testing should be conducted in the cooler months of the year when windows and doors are more likely to be closed. In its interim report "Radon Measurements in Schools" (EPA 520/1-89-010, available through state government radiation and control offices or regional EPA radiation offices) the EPA provides guidance to school systems on different screening measurement options, interpreting results and recommended time frames for remedial action.

State	Max pCi/l
Colorado	16
Georgia	12
Illinois	19
Indiana	6
Kansas	6
Maine	25
Minnesota	11
Missouri	13
Montana	51
Nevada	6
New Jersey	15
New Mexico	41
North Dakota	7
Tennessee	136
Washington	98
Wyoming	13

Table 1.