The University of North Dakota (UND) is committed to providing work, study, and research environments that are free from recognized hazards. As part of this commitment, the UND Office of Safety routinely monitors campus buildings for radon, and has developed guidelines for mitigation.

Radon is a naturally occurring radioactive gas without color, odor, or taste that comes from the natural breakdown of uranium in soil, rocks, and water. The U.S. Environmental Protection Agency (EPA) has designated Grand Forks County, North Dakota, as a Zone 1 county with the highest potential for indoor radon (greater than 4 pCi/L, picoCuries per liter).

Although there is no legal requirement to control exposure to radon or any legal standard for radon exposure, to promote healthy working and living conditions for its employees and students, UND has developed the following campus-wide radon measurement and mitigation protocols.

**Radon Measurement at UND**

Testing of UND buildings for radon began in 2010. Over 100 buildings have been or are in the process of being tested. Locations with elevated radon concentrations are prioritized for further testing or mitigation.

Typical follow-up actions have been additional testing (to confirm annual average radon concentrations and evaluate seasonal fluctuations), installation of small ventilation fans, evaluation of building HVAC systems, and installation of radon mitigation systems. To this date, mitigation has been conducted in several campus apartments. Subsequent testing indicates that mitigation systems and ventilation fans have been effective in reducing radon concentrations.

Radon monitoring activities are ongoing, since exposures can change over time due to factors such as climate, and building/foundation age. If you see a gray radon test box in your building, do not be surprised and do not disturb these boxes.

**Radon Testing Protocol**

The UND radon testing protocol follows the U.S. Environmental Protection Agency (EPA) publication, *Radon Measurement in Schools*. Specifically, areas to be considered for testing are identified as spaces located below grade, spaces located over a crawl space, spaces that come into direct contact with the ground, and the first and second floors of multi-story buildings. In this instance, such areas might include, but not be limited to: offices, classrooms, laboratories, residence halls, campus apartments, social spaces, and study areas that are occupied for more than 2 hours per week (per person). Areas for testing would not typically include...
stairways, hallways, storage rooms, closets, equipment rooms, kitchens, bathrooms, or buildings undergoing renovations.

The University of North Dakota’s strategy for radon testing is scheduled to begin during the 2013-2014 Winter Break using the short-term 2-4 days testing protocol. The results will determine if further testing or mitigation is indicated. This testing is currently scheduled to be performed in on-campus buildings that are residences for UND students and their families.

Building occupants will be provided guidelines for testing including requests that charcoal canisters that measure the radon not be disturbed. Implemented mitigation will be communicated to building occupants. Where mitigation systems are installed, radon testing will be repeated after the first 6 months with the operating system, and then again after one year. If the levels remain at or below the EPA accepted level, the building will be checked every 3 years as a periodic check of the mitigation systems.

- If testing confirms the presence of radon levels greater than 4 pCi/L, plans will be made to mitigate radon levels in the building, with a general target goal being 4 pCi/L or less.
- Whenever mitigation is performed, follow-up testing with charcoal canisters will be performed to determine whether the mitigation achieved the general target goal, in the range of 4 pCi/L or less.

**Radon Mitigation Protocol**

Environmental Protection Agency (EPA) guidelines recommend considering mitigation when indoor radon levels are greater than 4 pCi/L.

If mitigation is implemented, the University’s Office of Safety will use a Certified Radon Mitigator to design and oversee the work. Mitigation techniques may include sealing cracks in building foundations or installing sub-slab ventilation systems to vent the radon gas.
Frequently Asked Questions (FAQs)

What is radon?
Radon is a naturally occurring radioactive gas that comes from the natural breakdown of uranium in soil, rocks, and water. Levels of radon are common in the air we breathe every day.

Why is the University testing for radon?
Though radon is common in the everyday living environment, the US Environmental Protection Agency (EPA) has set guidelines that recommend limiting long term residential exposure levels to 4 picoCuries/liter (pCi/L) of air because of health risks associated with long-term exposure to high radon levels. Grand Forks County, North Dakota, is designated a Zone 1 county by the EPA with the highest potential for indoor radon.

What factors influence radon levels in a building?
A large number of factors influence radon concentrations:
- the amount of uranium in the geological structures underlying the soil and how close the underlying structures are to the soil surface;
- the concentration of radon in the soil and the permeability of the soil;
- time of day (radon concentrations often reach a peak in the middle of the night because of temperature differences between inside and outside) and the season;
- weather conditions, such as temperature, wind speed and direction, and humidity;
- building structure (slab construction, presence of crawl spaces)
- ventilation conditions (areas where doors and windows may not be opened regularly)
- type, operation, and maintenance of the heating, ventilation, and air conditioning (HVAC) system

How does the University test for radon?
The EPA guidelines for Radon Measurement in Schools provide a general basis for testing at UND. There are a variety of tests available to measure the level of radon present, and there are advantages and disadvantages to each type of test. One of the most widely available is a short-term test that utilizes charcoal canisters. Charcoal canisters are typically placed for 2-4 days and then collected and analyzed. Charcoal testing is good for quick assessments of the radon present during the time the canisters were present, but it only presents a "snapshot" of the conditions during those 2-4 days.

What does the sampling canister look like?
The sampling containers are small, plastic containers with a paper-like material covering activated charcoal. The container is approximately 3” x 4” in size and about ½” deep.

Do the air sampling canisters pose any health risk?
No. The charcoal which the containers hold is not hazardous, and the charcoal does not re-emit the radon after the radon is adsorbed.

Where can I expect to see the sampling canisters?
A sampling container will generally be placed in rooms that are regularly occupied for more than 2 hours per week that are in contact with the ground or are above closed crawl spaces. They are
placed 2 to 7 feet above the floor level, 3 feet from door and window openings, and 6” away from walls or large objects.

**Why is testing only being performed at the lower levels of a building?**
EPA studies indicate that radon levels on upper floors (3rd floor and above) are not likely to exceed the levels found in ground contact rooms. Testing rooms in contact with the ground is generally regarded as sufficient to determine if radon is a problem in a building.

**Why isn't the University testing every space that could potentially be occupied?**
The potential health risk from exposure is proportional to both the radon concentration and the amount of time spent in an area. This means that, if only a short time is spent in an area which has significantly elevated radon levels, the total exposure is not likely to exceed the risk of spending a long time in an area with an only slightly elevated level. In designing its protocol for sampling in schools, the EPA recognized that measurement and mitigation resources should be concentrated on areas in which occupancy is at least 2 hours per week or more (per person).

**If there are elevated radon levels in the room next to mine, does that mean there will be elevated levels in my room?**
Not necessarily. Indoor radon levels may vary from room to room, depending on various factors that might include: the pattern of airflow in the building; the location of features such as crawlspaces and foundation cracks; and the depth of soil and rock under different parts of the building. It is not possible to make a reliable prediction from one room to the next. The way to determine radon levels throughout a building is to test the protocol identified areas.

**If there are elevated radon levels in the building next to mine, does that mean there will be elevated levels in my building?**
Not necessarily. Indoor radon levels may vary from building to building, so it is not possible to make a reliable prediction from one building to the next. Guidance and experience suggests you should not rely on radon test results taken in other buildings nearby to estimate the radon level in your building. The way to determine radon levels in a given building is to test.

**What is a picoCurie?**
The quantity of radioactivity present is expressed in a unit called the Curie. One Curie is equivalent to 37 billion radioactive atoms disintegrating per second. However, the amount of radioactive atoms disintegrating per second as a result of the presence of radon in air is only a very small fraction of a Curie. In fact, the most convenient unit to express the amount of radioactivity present in air is the picoCurie, which is 1 trillionth of a Curie. For example, if an area has a radon level of 1 pCi/L of air this is equivalent to 0.037 radioactive atoms disintegrating per second in that liter of air.

**Does radon cause headaches, eye irritation, or sick-building syndrome?** No

**Is radon in water a problem?**
The primary entry route of radon in buildings is through the soil. However, radon can also enter through the water supply. It can then be released into the air while using water. Radon in water is not generally considered to be a problem for buildings serviced by a public water supply, as
public water supplies must be tested per EPA requirements. UND water comes from a public water supply.

**Are building materials likely to contain or emit radon?**
Radon emission from soil gas and its subsequent entry through the building foundation has been identified as the major source of radon in schools. Some building products may emit radon, but EPA studies indicate these concentrations are likely to be insignificant.

**What resources are available for additional information?**
http://www.epa.gov/radon/pubs/citguide.html
http://www.epa.gov/radon/rrnc/index.html

**If my question is not answered here, who can I contact at the University?**
Questions should be directed to Terry Wynne, Associate Director for Safety at 701.777.3491.