Radon Testing in Minnesota Schools

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1.Radon Testing Plan

Content of the testing plan was updated previously, effective 9/1/2021. In 2024, the name of the current radon standards was updated.

- Radon testing and mitigation must be conducted by licensed individuals (according to MN Statute 144.4961 Minnesota Radon Licensing Act)
- Testing and mitigation must comply with the Minnesota Radon Licensing Act (MN Statute 144.4961) and the MN Administrative Rules (4620.7000 – 4620.7950), which include the ANSI/AARST standards 'Protocol for Conducting Measurements of Radon and Radon Decay Products in Multifamily, School, Commercial and Mixed-Use Buildings' and 'Soil Gas Mitigation Standards for Existing Multifamily, School. Commercial, and Mixed-Use Buildings' or the successor ANSI/AARST standards
- Testing is conducted between November 1 and March 31
- Conduct tests with short-term tests
- Conduct testing on school days or with HVAC operating under occupied conditions
- Test all occupied and intended to be occupied rooms in contact with the ground, 10% of upper floor rooms, and other rooms specified in the ANSI/AARST standard
- Conduct follow-up testing in rooms that have radon ≥ 4 pCi/L and other rooms specified in the ANSI/AARST standard
- Mitigate occupied and intended to be occupied rooms that have radon ≥ 4 pCi/L
- Re-test the building after mitigation to verify radon reduction
- Report all radon test results to MDH on the 'School Radon Testing Form' at the conclusion of the testing project (after follow-up testing, mitigation, and post-mitigation testing have been completed)
- Report radon test results at a school board meeting

2. Laws & Standards

Testing in schools is not required in Minnesota, but it is highly encouraged. If schools choose to test, there are requirements they must follow.

A school radon testing law (MN Statute 123B.571) was codified during the 2012 legislature. Under this law, school districts may include radon testing as a part of its ten-year facility plan. School districts that receive authority to use long-term facilities maintenance revenue to conduct radon testing must follow the state's 'Radon Testing Plan'. The 'Radon Testing Plan' can be found in section 1 this guidance document. In addition, school districts must report test results to MDH and at a school board meeting. MDH updated the reporting form in 2021 and again in 2024, which is available at the MDH school radon website[1]. This reporting is done by school districts, to provide a project summary and determine consistency with the state's 'Radon Testing Plan'. It is separate and different from the quarterly reporting completed by licensed radon measurement professionals.

[1] MDH Radon in Schools: www.health.state.mn.us/communities/environment/air/radon/radonschool.html

The Minnesota Radon Licensing Act (Minnesota Statutes 144.4961) was enacted by the 2015 legislature. This law gives the Minnesota Department of Health (MDH) authority to write rules and enforce requirements for the radon industry in the state. Radon measurement and mitigation professionals who conduct testing are required to be licensed by MDH. Licensed individuals can be found on the MDH website. School staff are typically required to be licensed. Only individuals that are uncompensated and own or lease a building are exempt from licensure. To become licensed, an individual must complete 1 or 2 initial training(s), pass 1 or 2 exam(s), submit a quality assurance plan, and apply for licensure through MDH. Radon professionals must follow work practices, including the standards published by the American Association of Radon Scientists and Technologists (ANSI/AARST). They must also follow standards of conduct, report their work to MDH, and complete continuing education. Mitigation professionals must affix MDH radon system tags on to radon mitigation systems.

The EPA and MDH do not maintain prescriptive testing guidance for schools. The ANSI/AARST standards have detailed protocols and additional informative advisories and recommendations concerning radon testing and mitigation. The standards can be viewed online for free[2]. There is a fee to purchase or download the standards. Individuals required to be licensed, including school staff, must follow the requirements of the ANSI/AARST standards when testing or mitigating radon in schools. The testing standards include requirements concerning preparations, test locations, test conditions, procedures for conducting the test (including quality control), actions based on results, and test reports. The mitigation standards include general practices, system design, building investigations, active soil depressurization (ASD) installations, sealing, requirements, non-ASD systems, post-mitigation, documentation, and health and safety.

3. School Testing Overview

Testing must be conducted during the colder months when the building is heated (November through March), because radon levels may be higher during this timeframe. The heating season is considered representative of normal occupied building operating conditions in Minnesota.

Testing is conducted in all ground contact locations that are occupied or intended to be occupied. This includes rooms, offices, classrooms, and other general use areas. Ground contact means rooms that have floors or walls in contact with the ground. It also includes rooms that are closest to the ground over untested ground-contact locations, such as a crawl space, utility tunnel, parking garage and other non-habitable space that is in contact with ground. Intended to be occupied rooms are locations where there are plans to occupy rooms even though they are unoccupied at the time of the testing. In addition, if the building has upper floors, at least 10% of these rooms must be tested. Testing all these rooms is necessary because radon levels may vary significantly from room to room, and, where there is a problem, it is usually found in a few rooms.

[2] AARST Standards: standards.aarst.org

Conduct testing under closed building conditions, which include heating and cooling set to normal occupied operating conditions, windows closed, and doors closed (except momentary entry and exit). Testing must be conducted on school days, meaning when school is in session, or, if this is not possible, with HVAC operating under occupied conditions. Testing from Monday to Thursday is recommended, with over-night shipping so the devices are received on Friday and analyzed immediately

A second round of testing is required if the radon results are at or above 4 pCi/L. In addition, follow-up testing may be needed if there are invalid tests.

A continuous radon monitor (CRM) is recommended for follow-up testing in elevated rooms because it can determine if elevated levels are present during occupied times (radon levels can fluctuate with the operation of ventilation). Many licensed radon professionals own CRMs and they can also be rented through radon vendors.

Rooms with elevated radon during occupied times must be mitigated. Radon can be reduced (mitigated) by installing an active soil depressurization (ASD) system or by installing a system to dilute or pressurize the soil or indoor air (non-ASD methods). The building must be re-tested, to verify reduction and ensure mitigation has not increased radon in rooms that used to be low. An operations, maintenance and monitoring plan is implemented to ensure the system continues to function in the future.

Test results must be reported to the Minnesota Department of Health and at a school board meeting. Results should also be made available to other interested parties.

Building and occupancy changes may affect exposure to radon. Schools should be tested every five years (if prior results were below the action level), and sooner if any of the following apply:

- significant openings to the soil occur
- the HVAC or radon mitigation system is significantly altered
- a new addition is constructed
- a ground contact area not previously tested is occupied
- a building is newly occupied
- every 2 years, if the building has a mitigation system (to verify mitigation system effectiveness)

More information about radon, schools, and licensure is available on the MDH website: www.mn.gov/radon.

4. Preparing for the Test

The radon measurement professional must provide certain information to the school administration prior to testing and request information from the school to aid in proper testing.

MDH has created template forms to help with this process, which can be viewed at our website[3]. The professional will request the following:

- Who is authorized to receive test data and any limits on disclosing test data or results
- A commitment to aid quality control by ensuring required closed-building conditions
- A commitment from the on-site supervisor to distribute notifications to occupants and provide access to all test locations
- A commitment from the HVAC or building operations supervisor to provide information on the HVAC system and adjust dampers if needed

Prior to testing for radon, check the HVAC systems for proper maintenance and operation, as these systems can affect radon levels.

If the school has a HVAC system that temporarily varies outdoor air ventilation for seasonal comfort or energy savings (includes energy economizer systems and energy recovery ventilators), then set the outside air inlet dampers to provide the minimum volume of outdoor that is needed. This adjustment needs to be in place 12-hour prior to and during the test period.

Notifications of required closed-building test conditions should be distributed to occupants of the building(s) being tested and to staff who are responsible for maintaining closed-building conditions. Proper notifications helps to ensure closed-building conditions are maintained (e.g., don't open windows or leave exterior doors open).

5. Testing process

On the day of the test, the licensed measurement professional will conduct a visual inspection of the building to document test conditions and place test devices. The school should have someone available to ensure they can access all locations that need to be tested or inspected. They will place test devices in all occupied spaces and intended to be occupied spaces.

If the school staff has not done so, the professional will place 'radon test in progress' notices. It is important that occupants know testing is happening and to maintain closed-building conditions during the test.

The test devices cannot be disturbed during testing. If test kits are moved or missing, it may result in additional testing. If a test device does get moved (e.g., device is knocked down and teacher puts it back), that should be reported to the licensed professional.

6. Resources

MDH is available to provide technical assistance at no cost to schools. This includes presentations, providing radon testing data for your local community, reviewing your testing plans and reports, and advising on mitigation. Short term test devices are available for about

[3] MDH radon forms: https://www.health.state.mn.us/communities/environment/air/radon/radonforms.html

$10 each, including lab analysis, through radon labs and vendors. Public schools may qualify to purchase short-term test devices at about $6 through the state's master contract vendor.[4]

7. Radon Background

Radon is a naturally occurring radioactive gas. Radon is colorless, odorless, and tasteless. It comes from the natural breakdown (decay) of uranium, which is found in soil and rock across the United States. Radon travels through soil and enters buildings through cracks and other openings the foundation. It decays into particles (decay products) that can become trapped in your lungs when you breathe. As these particles in turn decay, they release small bursts of radiation. This radiation can damage lung tissue.

EPA studies have found that radon concentrations in outdoor air average about 0.4 pCi/L. Radon and its decay products can accumulate to much higher concentrations inside buildings. Testing the building is the only way to know whether an elevated level of radon is present. Testing a sample of rooms is not acceptable because problems can be missed (adjacent rooms can have different levels of radon).

Radon is a known human carcinogen. Prolonged exposure to elevated radon concentrations causes an increased risk of lung cancer. The EPA estimates that each year 21,000 people die of lung cancer due to radon exposure. The U. S. Surgeon General has warned that radon is the second leading cause of lung cancer deaths. Only smoking causes more lung cancer deaths. Not everyone that breathes radon decay products will develop lung cancer. An individual's risk of lung cancer from radon depends on the level of radon, the duration of exposure, and other cancer risk factors. The risk increases as an individual is exposed to higher levels of radon over a long period of time. Smoking combined with radon is an especially serious health risk. A child's different lung shape, size, and breathing rates as compared with adults means higher estimated radiation doses when exposed to radon.

The home is likely to be the most significant source of radon exposure because people typically spend most of their time at home and radon concentrations are usually higher in homes. In Minnesota, about 2 in 5 homes have radon levels at or above 4 pCi/L. MDH's radon data portal has maps, charts, and other data about radon in Minnesota.[5] MDH can provide more specific radon test data (by zip code), which may help provide context and encourage people to also test their homes.

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[4] The State Master Contract can be found on the Minnesota Department of Administration site. Public schools can see if they are on the current CPV Member List (mn.gov/admin/osp/other-purchasers/cpv/cpv-list.jsp). If they are not CPV members, they can apply. The state contracts are listed on the site, including radon kit (K-39(5)). Further questions can be directed to the MDA State Procurement or the MDH Indoor Air Unit (health.indoorair@state.mn.us).

[5] MDH Radon Data Portal: data.web.health.state.mn.us/web/mndata/radon

RADON TESTING SCHOOLS

Parents and staff are encouraged to test their homes for radon and to take action to reduce elevated radon concentrations. Inexpensive radon test devices are available from many local health departments or online. Licensed radon professionals can also conduct radon testing.

For most school children and staff, their school is the second largest contributor to their radon exposure. MDH analyzed school and professional reported data during the timeframe of 2018-2022. We found that 39% of public schools (25% of districts) tested during the 5-year timeframe. We also found that 16% of the public schools that tested had at least one room at or above 4.0 pCi/L.

MDH and EPA recommend reducing the concentration of radon in the air of a building to below the action level of 4.0 pCi/L, to reduce the risk of lung cancer.. In some buildings, other mitigation approaches may be needed, such as active soil depressurization (ASD), to vent radon from under the building to the outdoor air. In some school buildings, radon can be reduced by HVAC pressurization or dilution (non-ASD methods).

Many factors contribute to the entry of radon gas. Buildings in proximity can have significantly different radon levels. Testing is only way to know the levels of radon. The following factors determine why some buildings have elevated radon levels:

- the concentration of radon in the soil gas (source strength);
- permeability of the soil under the building (gas mobility);
- pathways for soil gas entry in the foundation;
- the type, operation, and maintenance of the HVAC system; and
- the structure and construction characteristics of the building.

Many schools and commercial buildings are constructed on concrete slabs that permit radon gas to enter through cracks, openings, penetrations (e.g., around pipes), and expansion joints between the slab and the ground soil. Other features, such as basement areas, crawl spaces, utility tunnels, and sub-slab HVAC ducts, may affect radon entry to occupied spaces.

Depending on their design and operation, HVAC systems can influence radon levels in a building by:

- increasing ventilation (diluting indoor radon concentrations with outdoor air)
- decreasing ventilation (allowing radon gas to build up)
- pressurizing a building (keeping radon out)
- depressurizing a building (drawing radon in)

The frequency and thoroughness of HVAC maintenance can also play an important role. For example, if air intake filters are not periodically cleaned or changed, or outdoor intake dampers are closed, the amount of outdoor air ventilating the indoor environment can be significantly less than design specifications. Less ventilation allows for radon to accumulate indoors. In addition, if ventilation systems are imbalanced and certain rooms are provided less air, then these rooms may have higher radon concentrations.

8. Summary

The EPA, MDH and other national and international scientific organizations have concluded that radon is a human carcinogen and a significant environmental health hazard. Early concern about indoor radon focused primarily on the hazard posed in the home. The EPA, MDH and other researchers have found that radon can be present at elevated levels in other buildings, including schools. Elevated levels of radon may be found throughout the state of Minnesota. Testing is the only way to determine whether the radon concentration in a building is elevated.

The EPA and MDH recommend all schools test for radon. Minnesota schools are not required to test for radon. Public schools that choose to test must conduct the testing according to the state's 'Radon Testing Plan' and report the results to MDH and at a board meeting. Testing and mitigation in schools must be conducted by licensed individuals, whether they are contracted professionals or school staff (licensing exemptions would not typically apply). Detailed testing procedures are described in the ANSI/AARST standards for radon measurement and mitigation in schools.

School officials can contact MDH Indoor Air Unit for further information.