



Radon Safety Management Plan

**Minneapolis Public Schools
Environmental Health and Safety
1225 N. 7th Street
Minneapolis, MN 55411**

Designated Person:

Lee Setter

Lee.setter@mpls.k12.mn.us

Telephone:

(612) 668-0308

Regulatory Coordinator:

Andrew Tinklenberg, NRPP ID 111389 RT

Andrew.tinklenberg@mpls.k12.mn.us

Telephone:

(612) 668-0306

Minneapolis Public Schools
Radon Safety Management Plan

TABLE OF CONTENTS

	Page
Purpose of this Plan	1
Introduction/Background	1
Regulatory Requirements/Action Guidelines	1-2
Sampling Protocol	2-3
Radon Reduction Strategies	3-4
Records	4
Resources	4

APPENDICES

- Appendix A: MPS Radon Testing Schedule
- Appendix B: MPS Annual Radon Testing Notice
- Appendix C: MDH Guidance for Radon Testing in Minnesota Schools

PURPOSE OF THIS PLAN

Minneapolis Public Schools (MPS) is committed to providing a safe and healthy learning and work environment for all of our students and staff. We recognize the importance of protecting our students and staff from potential radon exposure and are confident the procedures established in this Plan will accomplish that goal. This Plan is designed to minimize the exposure of students and staff to radon gas throughout the MPS district and is a continuation of the efforts that MPS has made since the mid-1990s. MPS Environmental Health & Safety (EH&S) manages the implementation of this Plan and it is reviewed annually by EH&S and updated as required.

INTRODUCTION/BACKGROUND

Radon is produced from the natural decay of uranium that is found in nearly all soils. Uranium breaks down to radium. As radium disintegrates it turns into a radioactive gas, radon, which moves up through the soil. It is colorless, odorless, tasteless and invisible. When radon is diluted into the outdoor atmosphere, it poses little threat because of the high ratio of air to radon. However, when the gas is able to get into indoor building spaces through cracks, holes and gaps in the foundation, it poses a health risk to the building occupants. According to the United States Environmental Protection Agency (EPA) and other scientific organizations, naturally occurring radon gas has been associated with an increased risk of developing lung cancer. Radon in schools can then be an important issue since children, as well as staff and administrators, spend a substantial amount of time inside school buildings.

All school buildings in the district were tested for radon in 1996. Eight schools were found to have rooms with radon levels above the action level. Mitigation methods were implemented, and the areas were re-tested to confirm that the levels were below the action level. In 2017, MPS re-initiated a radon testing program. Radon testing was completed in all district buildings by the end of school year 2020-2021, and will be performed continuously on a 5-year rotation. Radon levels throughout the district buildings have been found to be very low with follow-up testing and/or mitigation methods implemented in any space found to be elevated to ensure that radon levels are below the action level.

REGULATORY REQUIREMENTS/ACTION GUIDELINES

The EPA and the Minnesota Department of Health (MDH) have published extensive and specific guidelines for schools which outline testing and remediation strategies. While radon testing is not required in Minnesota schools, it is highly recommended. According to Minnesota Statute 123B.571, school districts that receive health and safety revenue to conduct radon testing must conduct the testing according to the state's 'Radon Testing Plan,' which consists of the following:

- 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 Schools and Large Buildings' and 'Radon Mitigation Standards for Schools and Large 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 ≥ 4.0 picocuries/liter of air (pCi/L) and other rooms specified in the ANSI/AARST standard
- Mitigate occupied and intended to be occupied rooms that have radon ≥ 4.0 pCi/L
- Re-test the building after mitigation to verify radon reduction
- Report all radon test results to MDH using the 'School Radon Testing Form' as well as submitting online quarterly reports 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.

Test kits should be shipped to the laboratory on the same day as they are retrieved to ensure they are analyzed within the time frame required by the laboratory. Quality assurance and quality control (QA/QC) devices such as blanks, duplicates and spikes should accompany all testing to provide assurance of the quality of the test kits and measurements.

Building-wide retests of all ground-contact rooms should be conducted after major renovations to the building or changes to the HVAC system as these building changes can affect the entry of radon. In addition, re-testing should be done periodically, at least every 5 years. Retesting should also be done in all buildings and in all ground contact rooms, regardless of prior results.

The amount of radon gas in the air is generally measured in picocuries per liter of air or pCi/L. However, sometimes test results are expressed in Working Levels (WL), representing radon decay products. EPA and MDH recommend that schools take action to reduce the level of radon when levels are 4.0 pCi/L (or 0.02 WL) or higher. Testing is the only way to determine whether or not the radon concentration in a school room is below the action level.

SAMPLING PROTOCOL

Minneapolis Public Schools uses AirChek ProChek short-term devices for radon testing. These are single-use devices which are set out for a period of 2-4 days and then sent to an analytical laboratory for analysis. The general sampling protocol is as follows:

- ◆ Because radon levels in schools have been found to vary significantly from room to room, comprehensive testing is performed of all frequently occupied, ground contact rooms as well as a percentage of rooms in the upper floors of each building.
- ◆ In conjunction with EH&S' Right to Know (RTK) program, radon testing notices are sent out annually to each school at the beginning of the school year to be distributed to parents of students. Then, a week prior to the testing, notification emails are sent to the necessary school personnel informing them of the radon testing, including pertinent information concerning the testing.
- ◆ To ensure the accuracy and integrity of the test kits and results, blank samples are submitted at a rate of 5% of the total samples collected, duplicate samples at a rate of 10% of the total samples collected, and spike samples at a rate of 3% with a minimum of 3 samples/year.

- ◆ For testing, the device is placed in a discreet area of the room where it is least likely to be disturbed or accidentally removed by the occupants. The device is generally placed in the breathing zone at least 20" above the floor, at least 3' from windows or exterior doors, at least 4" from objects or outside walls, and away from HVAC systems.
- ◆ The devices are left in place for a measurement period of at least 2 days, but not exceeding 4 days. Devices are placed and testing is performed in the months of November – March when the heating system is in operation and windows and doors are typically closed.
- ◆ The location for the test kits is then recorded on a building floor plan and the information (building, start time, stop time, location, test kit serial number, etc.) is entered into the Air Chek, Inc. mobile application and then sent to the laboratory following the sampling period.
- ◆ The devices are then collected, packaged up, and shipped off for analysis to Air Chek, Inc., 1936 Butler Bridge Rd., Mills River, NC 28759.
- ◆ If radon gas levels in a room/space are detected at or above the action level of 4.0 pCi/L, follow-up testing is performed using a Sun Nuclear Model 1030 continuous radon monitor (CRM). CRMs are recommended for follow-up testing because they give hour by hour results instead of just an overall average of the radon concentration during the test period. This can be helpful in assuring that radon gas concentrations in an area are below 4.0 pCi/L during occupied times. If CRM testing shows radon gas levels at or above the action level during occupied times, MPS utilizes two types of strategies to reduce the presence of radon in the space; remediation and prevention. (Refer to the Radon Reduction Strategies section following this section for further information.)
- ◆ Once all results are available, the information is reported and submitted to the necessary school personnel and regulatory agencies, along with being made available to all staff and parents on the [EH&S webpage](#) through the main MPS website.
- ◆ Because radon gas levels can increase due to cracks in the foundation or other structural changes as a building ages and settles, testing is performed in every District building at least once every 5 years. In order to accomplish this goal, MPS plans to test approximately 13 schools per year. (Refer to Appendix A for the testing schedule.)

RADON REDUCTION STRATEGIES

If radon gas levels are detected at or above the action level of 4.0 pCi/L after follow-up testing, MPS utilizes one or both of the following strategies to reduce the presence of radon in its buildings:

- **Remediation Strategies**

These methods usually involve verifying and possibly modifying the ventilation to areas where elevated radon levels were detected. This includes increasing the natural ventilation, using forced (fan powered) open ventilation or installing ducted ventilation in the affected area. In an effort to control radon by ventilation, it is very important to avoid creating a lower pressure inside the building than that of the ground that surrounds it. Otherwise, this negative pressure effect will draw radon gas into the building from the underlying soil.

Re-testing is then performed to determine the effectiveness of the remediation method and whether or not the radon levels are below the action level. If not, radon prevention methods are researched, discussed and then implemented to resolve the issue.

- **Prevention Strategies**

One of the easiest methods for eliminating radon infiltration is to seal the ground level and the ground structure of the building. It may be very simple when constructing a new building to include a vapor and/or air-proof barrier around the foundation. Existing buildings may need to be sealed by use of effective coatings. Another technique involves drawing the radon containing air away from the building by providing an alternative route. Three arrangements of this type are drain tile suction, block wall ventilation, and sub-slab suction. Just as drain tile can prevent a basement from flooding by diverting water, so too can radon gas be diverted from the surrounding soil if an appropriate stack is added to vent potential radon gas to the outside air. Block wall ventilation involves installing ducts with powerful fans to draw radon outside and away from the building. Sub-slab suction works the same way, with ducts going to the ground underneath the floor of the lowest level.

Following the implementation of a prevention method, re-testing is then performed to ensure that the radon levels are now below the action level.

RECORDS

This plan is available at the following locations:

- MPS website: [EH&S Webpage](#)
- Locally in the Trades/EHS department shared drive (S:Drive) under Regulatory Compliance Areas/Radon Safety Program.
- By request to EH&S at 612-668-0310.

RESOURCES:

EPA – Radon in Schools

<https://www.epa.gov/radon/radon-schools>

MDH – Radon in Schools

<https://www.health.state.mn.us/communities/environment/air/radon/radonschool.html>

MDH – Guidance for Radon Testing in Minnesota Schools

<https://www.health.state.mn.us/communities/environment/air/docs/radon/radontestguide.pdf>

Minnesota Statutes – Radon Testing in Schools

<https://www.revisor.mn.gov/statutes/cite/123B.571>

<https://www.revisor.mn.gov/statutes/cite/144.4961>

Center for Disease Control (CDC) – Radon

<https://www.cdc.gov/radon/index.html>

APPENDIX A
MPS RADON TESTING SCHEDULE

Minneapolis Public Schools - Radon Testing Schedule

Name of School	FY2022	FY2023	FY2024	FY2025	FY2026	Mitigation/ Adjustments required? (Y/N)	Comments
ABE / T-Plus					x	N	
Anderson				x		N	
Anthony				x		N	
Anwatin				x		N	
Armatage	11/12/2021					N	
Bancroft				x		N	
Barton	11/4/2021					N	
Bethune				x		N	
Bryn Mawr	1/6/2022					Y	FY22 - 2 rooms which did not have ventilation had elevated radon levels. Ventilation was added to the rooms.
Burroughs			1/5/2024			N	
Cityview		11/3/2022				N	
Davis Center					x	N	
Dowling			1/5/2024			N	
Edison					x	N	
Emerson		11/4/2022				N	
Ella Baker (Jefferson)			11/22/2023			N	
FAIR			12/14/2023			N	
Field			1/19/2024			N	
Folwell	11/18/2021					N	
Franklin			11/30/2023			N	
Green Central Park			12/14/2023			N	
Hale				x		N	
Hall			11/30/2023			N	
Harrison					x	N	
Henry					x	N	
Hiawatha Community (Hiawatha Campus)	11/12/2021					N	
Hiawatha Community (Howe Campus)	12/1/2021					N	
Hmong Academy		11/17/2022				N	
Jenny Lind Elementary		11/17/2022				N	
Justice Page (previously Ramsey)			1/11/2024			N	
Kenny			1/11/2024			N	
Kenwood	12/9/2021					N	
Lake Harriet Community (Lower)			1/19/2024			N	
Lake Harriet Community (Upper)	12/16/2021					N	
Lake Nokomis Community (Keewaydin)	12/2/2021					N	
Lake Nokomis Community (Wenonah)				x		N	
Las Estrellas (Sheridan)	12/16/2021					N	

Name of School	FY2022	FY2023	FY2024	FY2025	FY2026	Mitigation/ Adjustments required? (Y/N)	Comments
Longfellow Alternative / TAPP	11/24/2021					N	
Loring	12/2/2021					N	
Lucy Craft Laney		12/1/2022				N	
Lyndale		12/1/2022				N	
M&O Building					x	N	
Marcy				x		N	
Nellie Stone Johnson			12/7/2023			N	
North					x	N	
Northeast				x		N	
Northstar (Mona Moede ECFE)		11/23/2022				N	
Northrop (formerly Ericsson)				x		N	
Nutrition Center					x	N	
Olson			12/7/2023			N	
Pillsbury		12/8/2022				N	
Pratt		11/23/2022				Y	FY23 - Storage/Mechanical Room being used as an office did not have ventilation. Ventilation was added to the room.
River Bend		12/8/2022				N	
Roosevelt				x		N	
Sanford	12/9/2021					N	
Seward		12/15/2022				N	
South					x	N	
Southwest					x	N	
Sullivan/Anishinabe				x		N	
Transportation Center					x	N	
Waite Park				x		N	
Washburn					x	N	
Webster		12/15/2022				N	
Wilder Complex					x	N	
Whittier				x		N	
Windom		1/5/2023				N	
66 locations total	13	13	13	14	13		

APPENDIX B

MPS RADON TESTING NOTICE



Minneapolis Public Schools Radon Testing Notice

Minneapolis Public Schools (MPS) is committed to providing a safe and healthy learning and work environment for all of our students and staff. In accordance with Minnesota Statute 123B.571, the Minnesota Department of Health and the Minnesota Department of Education, MPS has implemented its Radon Safety Management Plan. The Plan includes a program of radon testing, radon mitigation options and communications.

In accordance with the statute, MPS performs radon testing in school buildings every five years. The testing reports for individual schools are available on the MPS website/departments/environmental health & safety/radon. Reports are also available by contacting Lee Setter at 612-668-0308 or lee.setter@mpls.k12.mn.us

If you have any questions regarding this notice, please contact Environmental Health & Safety at 612-668-0308.

Minneapolis Public Schools
Environmental Health and Safety
1225 N. 7th Street
Minneapolis, Minnesota 55411



Minneapolis Public Schools Radon Testing Notice

Minneapolis Public Schools (MPS) is committed to providing a safe and healthy learning and work environment for all of our students and staff. In accordance with Minnesota Statute 123B.571, the Minnesota Department of Health and the Minnesota Department of Education, MPS has implemented its Radon Safety Management Plan. The Plan includes a program of radon testing, radon mitigation options and communications.

In accordance with the statute, MPS performs radon testing in school buildings every five years. The testing reports for individual schools are available on the MPS website/departments/environmental health & safety/radon. Reports are also available by contacting Lee Setter at 612-668-0308 or lee.setter@mpls.k12.mn.us

If you have any questions regarding this notice, please contact Environmental Health & Safety at 612-668-0308.

Minneapolis Public Schools
Environmental Health and Safety
1225 N. 7th Street
Minneapolis, Minnesota 55411

APPENDIX C

MDH GUIDANCE FOR RADON TESTING IN MINNESOTA SCHOOLS

Radon Testing in Minnesota Schools

7/15/2024

Minnesota Department of Health
Indoor Air Unit
PO Box 64975
St. Paul, MN 55164-0975
651-201-4601
health.indoorair@state.mn.us
www.health.state.mn.us

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 website¹. 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 free². 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

RADON TESTING SCHOOLS

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 website³. 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 in 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.

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.