

**Midwest
Environmental
Consulting Services, Inc.**

*Providing Quality Service
Since 1994*

Consultants ◀ Engineers ◀ Scientists

RADON TESTING REPORT

Performed for:

**WAUKEGAN COMMUNITY UNIT
SCHOOL DISTRICT #60**

215 Edison Court
Waukegan, IL 60085

Project Location:

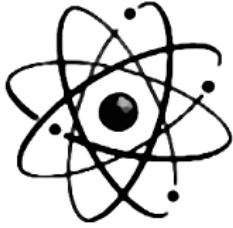


LYON MAGNET ELEMENTARY SCHOOL

*800 S. Elmwood Avenue
Waukegan, IL 60085*

June 7 – June 14, 2017

MEC Project #: 17-07-492-RADON



Radon Detection Specialists, Inc.

Love the Lungs You're With®

825 N Cass Avenue, Suite 310, Westmont, Illinois 60559

630-325-4443 800-244-4242

www.radondetection.net kirstens@radondetection.net

Certificate of Completion

Every parent or guardian is notified that this facility has performed radon measurements to ensure the health and safety of the occupants. The Illinois Emergency Management Agency (IEMA) recommends that all residential homes be tested and that corrective actions be taken at levels equal to or greater than 4.0 pCi/L.

Radon is a Class A human carcinogen, the leading cause of lung cancer in non-smokers, and the second leading cause of lung cancer overall. For additional information about this facility, contact the licensee, and for additional information regarding radon contact the IEMA Radon Program at 800-325-1245 or on the Internet at www.radon.illinois.gov.

Commercial Radon Survey Report

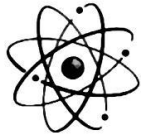
Client: Lyon Magnet School
Site Address: 800 S Elmwood Avenue
Waukegan, Illinois 60085

Survey Date: June 7, 2017 to June 14, 2017

**Initial Measurement
Certificate of Completion**

Expiration Date: June 13, 2020

Kirsten Schmidt
Measurement Professional
IL License RNI2006204




Contents

- 1.0 Basics of Radon and Radon Health Impacts
- 2.0 Scope of Work
- 3.0 Explanation of Quality Assurance Plan for this Site
- 4.0 Explanation of Device Results and Site Notes
- 5.0 Survey Summary and Recommendations

Appendices

- 1.0 Appendix A: Site Plan Showing Device Locations
- 2.0 Appendix B: Individual Device Results Table
- 3.0 Appendix C: License and Credential Documentation

 **Radon Detection Specialists** is licensed for both residential and commercial radon testing in Illinois. For more information regarding radon testing and mitigation practices in the state of Illinois, please visit the Illinois Emergency Management Agency Department of Nuclear Safety's website, www.radon.illinois.gov, or call the state of Illinois Radon Program at 217-782-1325.



Section 1.0 Basics of Radon and Radon Health Impacts

Radon is recognized by the Environmental Protection Agency as well as the scientific and medical communities as a Class A carcinogen, accounting for 15,000 – 22,000 lung cancer deaths annually. Exposure to radon gas is the leading cause of lung cancer among non-smokers.

Radon is a naturally occurring, radioactive gas which comes from the soil. It can't be seen, smelled or tasted. The only way to know if the level of radon gas in your building exceeds the recommended Action Level of 4.0 pCi/L is to test. The Department of Nuclear Safety in Illinois requires those testing for radon in commercial buildings, schools and multi-family housing communities, as well as individual residences, to be properly licensed.

The amount of radon in the soil depends on soil chemistry, which naturally varies. Radon levels in the soil can range from a few hundred to several thousands of pCi/L (pico Curies per liter of air). The amount of radon that escapes from the soil and enters the building depends on the weather, soil porosity, soil moisture, and the suction within the building.

Radon is the leading cause of lung cancer among non-smokers.

- There is no safe level of radon exposure. Any exposure causes some risk of developing cancer. The National Academy of Sciences (NAS) concluded that only cigarette smoking poses a greater risk. Exposure to radon accounts for 10% of all lung cancer deaths annually.
- As we breathe, the alpha radiation from radon and its decay products cause damage to the sensitive lung tissue. Most of the radiation dose is not actually from radon itself, but rather from radon's chain of short-lived decay products that are inhaled and lodge in the airways of the lungs. These radionuclides decay quickly, producing other radionuclides that continue damaging the lung tissue. Those particles that are retained long enough release radiation and damage the surrounding lung tissue. It is this damage that can lead to lung cancer.

What other health risks are related to radon exposure?

- No other respiratory ailments are linked to radon exposure.
- There are preliminary studies that are looking at the link between radon exposure and the development of Parkinson's and Alzheimer's disease. These are early studies, and research is on-going.





Client: Lyon Magnet School
Site Address: 800 S Elmwood Ave, Waukegan, Illinois 60085
Survey Date: 6/7/17 to 6/14/17

page 4 of 14

Section 2.0 Scope of Work Performed:

At the request of Midwest Environmental Consulting, Radon Detection Specialists performed an initial short-term radon measurement at the Lyon Magnet School, located at 800 S Elmwood Ave, Waukegan, Illinois. This scope of work included a 7-day (short-term) radon test in all classrooms, offices and common use spaces of the subject building.

A total of 41 passive devices were deployed. Of the 41 passive devices deployed, 35 were single measurements, 4 were duplicates and 2 were blanks.

This measurement was conducted from Wednesday, June 7, 2017 to Wednesday, June 14, 2017. The devices used were electret ionization chambers (Eperms™) manufactured by Rad Elec, Inc. The report includes a table that details all device measurement results. Because radon levels fluctuate hourly, daily, weekly, seasonally and yearly, these results should not be used to estimate radon levels of rooms that were not measured, or to estimate future radon levels of rooms that were measured. Changes to the building components (both structural and mechanical) can affect radon concentrations. Duplicate devices have been averaged together and demonstrate the precision of the measurements.

The testing was conducted in accordance with the Illinois Emergency Management Agency Division of Nuclear Safety (IEMA) and the United States Environmental Protection Agency (USEPA) testing protocols for commercial radon measurements, the device manufacturer's recommendations, and the RDS Quality Assurance Plan.



Radon Detection Specialists, Inc.
825 N Cass Avenue, Suite 310, Westmont, Illinois 60559
Phone: 630-325-4443
kirstens@radondetection.net
www.radondetection.net



Section 3.0 Quality Assurance Plan for this Site

Pre-Deployment Testing Strategy

Measurements will be conducted in all classrooms, offices and common use spaces of the subject property. A minimum of 1 detector will be placed every 2000 square feet in open areas. Measurements will not be conducted in rooms that are not frequently occupied such as closets, storage rooms, restrooms, hallways, and stairwells unless the space is considered alterable for future regular use, or the measurement is taken for diagnostic purposes.

Materials and Methods

RDS will use electret ionization chambers to measure radon levels in the air in the above referenced property. The test will comply with all protocols set forth by IEMA, as well as the RDS Quality Assurance Plan.

Duplicate measurements will be conducted for not less than 10% of the total single devices placed to measure precision. Field blanks will be deployed for not less than 5% of the total number of single measurements deployed to measure background gamma radiation. Spike tests are conducted monthly by an independent lab, at a minimum of 3% for the total number of devices deployed (annually) or at a rate of 6 spikes per calendar month, to measure accuracy. The initial voltage reading will take place not more than 24 hours prior to deployment and the final voltage of the devices will be determined within 24 hours of retrieval.

RDS will locate devices in such a way to limit unintentional interference from building occupants. A walk-through inspection of the building will allow RDS to document observations regarding radon entry mechanisms and general building pressure gradients. Measurement results will be reported in picoCuries per liter (pCi/L) of air.





Section 4.0 Explanation of Device Results and Site Notes

Appendix A provides a detailed drawing showing device locations, if an appropriate and accurate drawing is provided by the client and dimensional device plotting is possible. If Appendix A is blank, please refer to the Device Placement columns provided in Appendix B (Room Use and Room Number) as an explanation of device locations.

Appendix B identifies all the devices deployed and their reported radon levels. The results were determined using calculations supplied by the device manufacturer.

The radon levels were BELOW the recommended Action Level of 4.0 pCi/L in 35 of the 35 single locations measured.

Notes Regarding Appendix B:

- All radon levels are expressed in picoCuries per liter (pCi/L) of air.
- The building was tested in accordance with IEMA, and EPA protocols in regard to device placement and analytical methods of calculating results.
- Tampering was not detected at the time the devices were retrieved, unless noted in the Comment Column.
- Devices were placed strategically to reduce accidental interference by building occupants.
- Duplicates are averaged together. It is the average of the two devices upon which mitigation decisions should be based.

Site Notes:

1. The subject building was occupied and fully-functional during this radon measurement.
2. The testing period was noted to have been unremarkable in terms of changes/repairs to the building functionality and the weather.
3. The subject building is a single-story structure with a partial basement. Only Classrooms 4,5,6 and 7 sit above the basement. The rest of the building is slab-on-grade.





Section 5.0 Survey Summary

The radon levels found during this short-term survey were BELOW the US EPA and IEMA Action Level of 4.0 pCi/L in 35 of the 35 single locations measured.

Recommendations

For locations with invalid measurements or no measurements:

There are no locations with invalid measurements or no measurements.

When a Testing Period has been extended to 7 days and Closed Building Conditions are only maintained as much as possible:

When the subject building(s) either lacks the ability to maintain a livable temperature (defined as 67 to 77 degrees Fahrenheit) or it appears unlikely that occupants will be able to maintain strict Closed Building Conditions during the measurement, the testing period will be extended to seven days and occupants will be asked to maintain Closed Building Conditions as much as possible while the measurement is in progress. (32 IL Admin Code 422.130 (b)(1)(A)).

Please be advised the results of any radon test where Closed Building Conditions are not strictly maintained in no way reflects potential radon concentrations when Closed Building Conditions are able to be properly maintained for the 12 hours prior to, and during, the measurement period.

A Note About Long-Term Testing

The EPA and IEMA Action Level of 4.0 pCi/L is based upon an annual average exposure. As a matter of best practice in radon measurement, a long-term measurement is the best way to determine occupants' annual exposure, because radon levels vary hourly, daily, weekly, seasonally and over the years. Long-term testing (lasting 90 days to one year) provides a better understanding of building radon concentrations and the risks of exposure to radon.

Although the results of this short-term measurement performed by an Illinois licensed testing professional were below the EPA and IEMA Action Level of 4.0pCi/L, to have a thorough understanding of the occupants' risks of exposure, a long-term measurement is always recommended. This type of measurement will provide the best indication of radon concentrations and are the basis upon which mitigation decisions should be made.

Should you choose to engage in a long-term measurement as recommended, please contact us for further details.

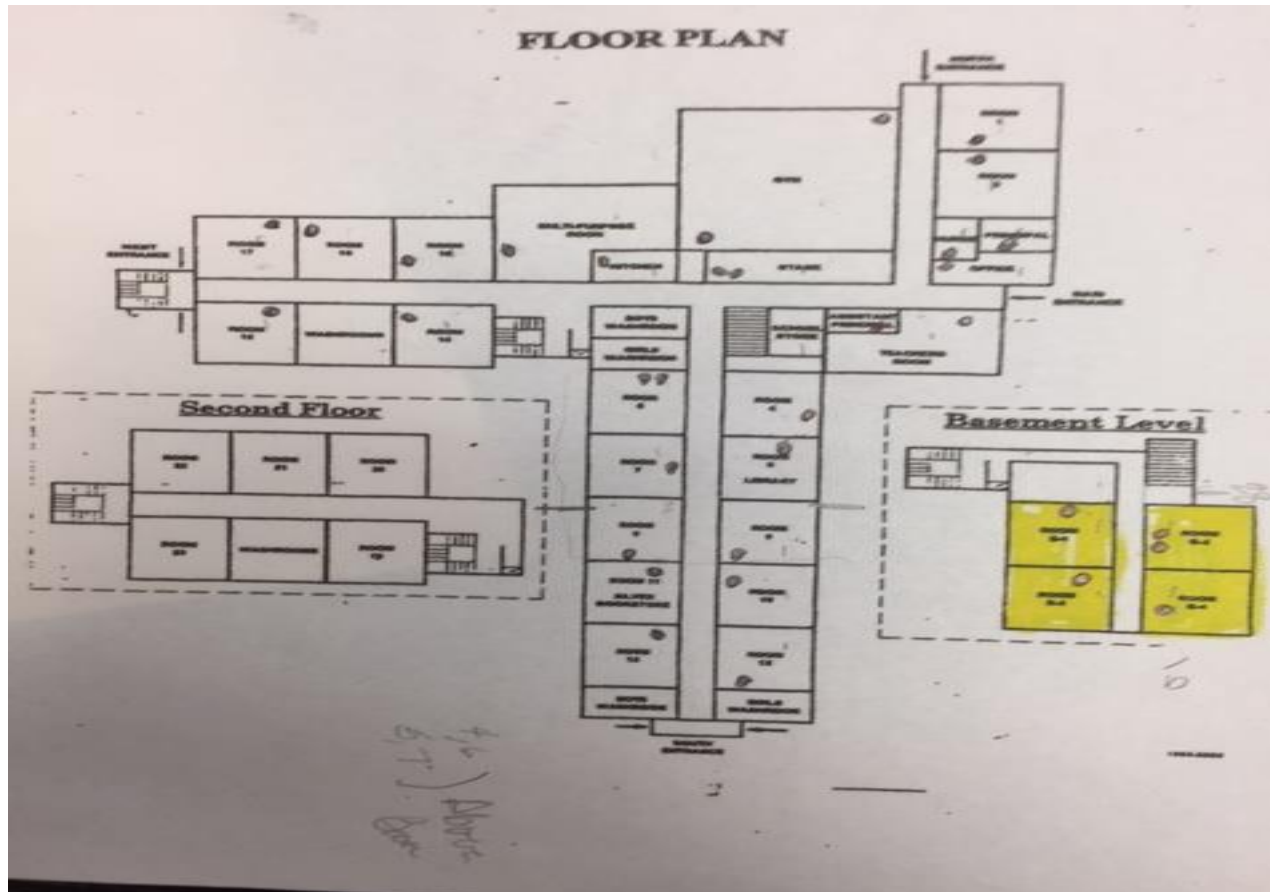




Client: Lyon Magnet School
Site Address: 800 S Elmwood Ave, Waukegan, Illinois 60085
Survey Date: 6/7/17 to 6/14/17

page 8 of 14

Appendix A: Site Plan Showing Device Locations



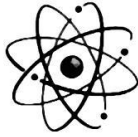
Radon Detection Specialists, Inc.

825 N Cass Avenue, Suite 310, Westmont, Illinois 60559

Phone: 630-325-4443

kirstens@radondetection.net

www.radondetection.net



Appendix B: Individual Device Results Table

Electret	Device Placement			Start			Stop			Exposure Period	Radon Level	Control Measurement	Duplicate Device Avg. Radon Level	Comments
	Foundation	Room Use	Room No.	Date	Time	Volts	Date	Time	Volts	Days	(pCi/L)	Duplicate/Blank	(pCi/L)	
SIK970	Slab-on-grade	Main Office		6/7/2017	10:45 AM	358	6/14/2017	10:44 AM	340	7.00	0.7			
SII706	Slab-on-grade	Principal		6/7/2017	10:45 AM	545	6/14/2017	11:20 AM	530	7.02	0.4			
SIK983	Slab-on-grade	Assistant Principal		6/7/2017	10:45 AM	345	6/14/2017	10:44 AM	330	7.00	0.5			
SJR446	Slab-on-grade	Nurse		6/7/2017	10:45 AM	764	6/14/2017	10:44 AM	745	7.00	0.6			
SJR482	Slab-on-grade	Classroom	2	6/7/2017	10:45 AM	744	6/14/2017	10:44 AM	719	7.00	1.0			
SJR488	Slab-on-grade	Gym-NE		6/7/2017	10:45 AM	752	6/14/2017	10:44 AM	730	7.00	0.8			
SIL351	Slab-on-grade	Gym-SW		6/7/2017	10:45 AM	409	6/14/2017	10:44 AM	389	7.00	0.8			
SJR574	Slab-on-grade	Classroom	1	6/7/2017	10:45 AM	756	6/14/2017	10:44 AM	734	7.00	0.8			
SJR489	Slab-on-grade	Storage		6/7/2017	10:45 AM	761	6/14/2017	10:50 AM	742	7.00	0.6			
SJR180	Slab-on-grade	Storage		6/7/2017	10:45 AM	749	6/14/2017	10:50 AM	728	7.00	0.8	Duplicate	0.7	

All radon levels are expressed in picoCuries per liter (pCi/L).
 Results of duplicate devices are averaged to determine the radon level in that location.

Radon Detection Specialists, Inc.
 825 N Cass Avenue, Suite 310, Westmont, Illinois 60559
 Phone: 630-325-4443
kirstens@radondetection.net
www.radondetection.net



Appendix B: Individual Device Results Table

Electret	Device Placement			Start			Stop			Exposure Period	Radon Level	Control Measurement	Duplicate Device Avg. Radon Level	Comments
	Foundation	Room Use	Room No.	Date	Time	Volts	Date	Time	Volts	Days	(pCi/L)	Duplicate/Blank	(pCi/L)	
SJR419	Slab-on-grade	Kitchen		6/7/2017	10:45 AM	742	6/14/2017	10:50 AM	725	7.00	0.5			
SJR364	Slab-on-grade	Cafeteria		6/7/2017	11:10 AM	736	6/14/2017	10:50 AM	720	6.99	0.4			
SJR661	Slab-on-grade	Classroom	15	6/7/2017	11:10 AM	749	6/14/2017	10:50 AM	716	6.99	1.6			
SJR620	Slab-on-grade	Classroom	16	6/7/2017	11:10 AM	762	6/14/2017	10:50 AM	727	6.99	1.7			
SII842	Slab-on-grade	Classroom	17	6/7/2017	11:10 AM	433	6/14/2017	10:50 AM	388	6.99	2.7			
SJR554	Slab-on-grade	Classroom	18	6/7/2017	11:10 AM	647	6/14/2017	10:50 AM	640	6.99	2.8			
SJR279	Slab-on-grade	Classroom	14	6/7/2017	11:10 AM	749	6/14/2017	10:50 AM	711	6.99	1.9			
SHX377	Above Basement	Classroom	7	6/7/2017	11:10 AM	287	6/14/2017	10:55 AM	273	6.99	0.4			
SJR230	Slab-on-grade	Classroom	9	6/7/2017	11:10 AM	740	6/14/2017	10:55 AM	720	6.99	0.7			
SHZ499	Slab-on-grade	Classroom	9	6/7/2017	11:10 AM	240	6/14/2017	10:55 AM	222	6.99	0.8	Duplicate	0.8	

All radon levels are expressed in picoCuries per liter (pCi/L).

Results of duplicate devices are averaged to determine the radon level in that location.



Radon Detection Specialists, Inc.
 825 N Cass Avenue, Suite 310, Westmont, Illinois 60559
 Phone: 630-325-4443
kirstens@radondetection.net
www.radondetection.net



Appendix B: Individual Device Results Table

Electret	Device Placement			Start			Stop			Exposure Period	Radon Level	Control Measurement	Duplicate Device Avg. Radon Level	Comments
	Foundation	Room Use	Room No.	Date	Time	Volts	Date	Time	Volts	Days	(pCi/L)	Duplicate/Blank	(pCi/L)	
SJC822	Slab-on-grade	Classroom	11	6/7/2017	11:10 AM	264	6/14/2017	10:55 AM	246	6.99	0.7			
SJD130	Slab-on-grade	Classroom	13	6/7/2017	11:10 AM	324	6/14/2017	10:55 AM	306	6.99	0.7			
SHZ482	Slab-on-grade	Classroom	12	6/7/2017	11:10 AM	346	6/14/2017	11:00 AM	328	6.99	0.7			
SJC989	Slab-on-grade	Classroom	10	6/7/2017	11:10 AM	517	6/14/2017	11:00 AM	495	6.99	0.9			
SJC863	Slab-on-grade	Classroom	8	6/7/2017	11:10 AM	549	6/14/2017	11:00 AM	526	6.99	1.0			
SII985	Above Basement	Classroom	6	6/7/2017	11:25 AM	584	6/14/2017	11:00 AM	571	6.98	0.3			
SIA377	Above Basement	Classroom	4	6/7/2017	11:25 AM	193	6/14/2017	10:55 AM	193	6.98	-0.7	Blank		
SIF048	Above Basement	Classroom	4	6/7/2017	11:25 AM	280	6/14/2017	10:55 AM	265	6.98	0.5			
SIF211	Above Basement	Classroom	5	6/7/2017	11:25 AM	388	6/14/2017	10:55 AM	373	6.98	0.5			
SIL228	Above Basement	Classroom	5	6/7/2017	11:25 AM	348	6/14/2017	10:55 AM	344	6.98	0.4	Duplicate	0.5	

All radon levels are expressed in picoCuries per liter (pCi/L).
 Results of duplicate devices are averaged to determine the radon level in that location.



Appendix B: Individual Device Results Table

Electret	Device Placement			Start			Stop			Exposure Period	Radon Level	Control Measurement	Duplicate Device Avg. Radon Level	Comments
	Foundation	Room Use	Room No.	Date	Time	Volts	Date	Time	Volts	Days	(pCi/L)	Duplicate/Blank	(pCi/L)	
SJD110	Slab-on-grade	Social Worker		6/7/2017	11:30 AM	439	6/14/2017	11:15 AM	417	6.99	1.0			
SJR437	Slab-on-grade	Lounge		6/7/2017	11:30 AM	758	6/14/2017	11:15 AM	740	6.99	0.6			
SHZ477	Basement	Classroom	25	6/7/2017	11:45 AM	249	6/14/2017	11:10 AM	230	6.98	0.8			
SIF122	Basement	Classroom	26	6/7/2017	11:45 AM	250	6/14/2017	11:10 AM	229	6.98	1.0			
SIL431	Basement	Classroom	24	6/7/2017	11:45 AM	681	6/14/2017	11:10 AM	660	6.98	0.8			
SIL071	Basement	Classroom	27	6/7/2017	11:45 AM	272	6/14/2017	11:10 AM	259	6.98	0.4			
SHZ639	Basement	Classroom	27	6/7/2017	11:45 AM	169	6/14/2017	11:10 AM	168	6.98	-0.6	Blank		
SII974	Basement	Office	28	6/7/2017	11:45 AM	296	6/14/2017	11:10 AM	284	6.98	0.3			
SJD018	Basement	Mechanical		6/7/2017	11:50 AM	517	6/14/2017	11:15 AM	497	6.98	0.8			
SIL349	Basement	Mechanical		6/7/2017	11:50 AM	430	6/14/2017	11:15 AM	402	6.98	1.4	Duplicate	1.1	

All radon levels are expressed in picoCuries per liter (pCi/L).
 Results of duplicate devices are averaged to determine the radon level in that location.




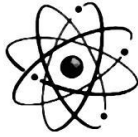
Client: Lyon Magnet School
 Site Address: 800 S Elmwood Ave, Waukegan, Illinois 60085
 Survey Date: 6/7/17 to 6/14/17 page 13 of 14

Appendix B: Individual Device Results Table

Electret	Device Placement			Start			Stop			Exposure Period	Radon Level	Control Measurement	Duplicate Device Avg. Radon Level	Comments
	Foundation	Room Use	Room No.	Date	Time	Volts	Date	Time	Volts	Days	(pCi/L)	Duplicate/Blank	(pCi/L)	
SJD093	Basement	Storage		6/7/2017	11:50 AM	556	6/14/2017	11:15 AM	536	6.98	0.8			

All radon levels are expressed in picoCuries per liter (pCi/L).
 Results of duplicate devices are averaged to determine the radon level in that location.


Radon Detection Specialists, Inc.
 825 N Cass Avenue, Suite 310, Westmont, Illinois 60559
 Phone: 630-325-4443
kirstens@radondetection.net
www.radondetection.net



Client: Lyon Magnet School
Site Address: 800 S Elmwood Ave, Waukegan, Illinois 60085
Survey Date: 6/7/17 to 6/14/17

page 14 of 14



Radon Detection Specialists, Inc.
825 N Cass Avenue, Suite 310, Westmont, Illinois 60559
Phone: 630-325-4443
kirstens@radondetection.net
www.radondetection.net