

Radon Detection Specialists, Inc.

# **Commercial Radon Survey Report**

Client:

Site Address: Clarendon Hills Middle School 301 Chicago Avenue Clarendon Hills, IL 60514 Survey Date: April 30, 2012 to May 2, 2012

Community Consolidated School District 181

# Initial Test

RDS-R-002 Prepared by: Kirsten Schmidt IL Professional Radon License RNI2006204 Licensed for Residential and Commercial Radon Testing

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# **Basics of Radon and Radon Health Impacts**

Radon is recognized by the United States Environmental Protection Agency (USEPA) 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 cancer-causing, naturally occurring, radioactive gas which comes from our 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 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. In two 1999 reports, the National Academy of Sciences (NAS) concluded after an exhaustive review that radon is the second leading cause of lung cancer. Only cigarette smoking poses a greater risk. The NAS estimates that 15,000 to 22,000 Americans die every year from radon-related lung cancer. That's 10% of all lung cancer deaths annually.
- 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. For more information on this issue, please visit our website and read the press release.



# **Scope of Work Performed:**

At the request of Jim Prusa, Facilities Coordinator for District 181, RDS performed radon testing at Clarendon Hills Middle School, located at 301 Chicago Avenue, Clarendon Hills, Illinois. This scope of work included a 2 day (short-term) radon test in all classrooms, offices, and common use spaces of the subject building.

A total of 66 devices were deployed, including one continuous radon monitor. Of the 65 passive devices deployed, 55 were single measurements, 7 were duplicates and 3 were blanks.

Testing was conducted from Monday, April 30, 2012 to Wednesday, May 2, 2012. The devices used were electret ionization chambers (Eperms<sup>TM</sup>) manufactured by RAD ELEC, Inc. and a continuous radon monitors manufactured by Sun Nuclear, model 1027. 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 tested, or to estimate future radon levels of rooms that were tested. Changes to the building components (both structural and mechanical) can effect 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.



# **Quality Assurance Plan for this Site**

### **Pre-Deployment Testing Strategy**

Tests will be conducted in all classrooms, portable classrooms, offices and common use spaces in the subject building. A minimum of 1 detector will be placed every 2000 square feet in open areas. Tests 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 and a continuous radon monitor 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 tests 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 tests deployed to measure background gamma radiation. Spike tests will be conducted at a minimum of 3% for the total amount of devices deployed (annually) 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 prior to device deployment will allow RDS to document observations regarding radon entry mechanisms and general building pressure gradients. Test results will be reported in picoCuries per liter (pCi/L) of air. The effects of the HVAC system on radon progeny will not be evaluated and working level exposure (WL) will not be calculated during this test.



# **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 of 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 in all locations tested, with the exception of Music Practice Room 129. Air exchange rates for the facility were not available at the time of testing. Air exchange rates can affect the radon concentration based on dilution of radon gas.

Notes Regarding Appendix B:

- All radon levels are expressed in picoCuries per liter (pCi/L) of air.
- The building was tested according to IEMA, and USEPA protocol 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 decisions with regard to mitigation should be based.

### Site Notes:

- 1. The subject building was occupied and fully-functional during this initial short-term survey.
- 2. The subject building is a three-story, brick structure, built slab-on-grade.
- 3. The subject building was built in 2000.
- 4. Upon device retrieval, the testing device in Room 133 (Stage) was noted to have been moved. Upon analysis, all the voltage from the device had been discharged. The results for this testing device are invalid.
- 5. The west end of the subject building is used by the Clarendon Hills Park District. This portion of the building used by the Park District was not included in this initial building survey.



# **Survey Summary**

The radon levels found during this short-term survey were BELOW the USEPA and IEMA Action Level of 4.0 pCi/L, with the exception of Music Practice Room 129.

# Recommendations

It is the recommendation of this testing professional to perform another short-term test in Room 129 (Music Practice Room). If the results of the second short-term test confirm elevated readings, consultation with an Illinois licensed commercial mitigation firm will be recommended.

If the results of the second short-term test do not confirm elevated readings, long-term testing will be recommended in the areas where elevated levels were previously found. Long-term testing (testing lasting 90 days or more) provides a better understanding of building radon concentrations and the risks of exposure to radon on an annual basis.

**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, <u>www.radon.illinois.gov</u>, or call the state of Illinois Radon Program at 217-782-1325.

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**Appendix A: Site Plan Showing Device Locations** 



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Client:C.C.S.D. 181Site Address:CHMS, 301 Chicago AvenueCity, State, ZIPClarendon Hills, IL 60514Survey Date:4/30/12 to 5/2/12

Electret	Device Placement				Start			Stop			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)	
SFS446	Slab	Mechanical	140	4/30/12	10:25 AM	340	5/2/12	11:10 AM	332	2.03	1.5			
SFS663	Slab	Electrical	139	4/30/12	10:25 AM	230	5/2/12	11:10 AM	225	2.03	0.7			
SGH728	Slab	Kitchen Storage	137	4/30/12	10:25 AM	728	5/2/12	11:10 AM	720	2.03	1.2			
SGC592	Slab	Kitchen Office	135	4/30/12	10:25 AM	586	5/2/12	11:10 AM	581	2.03	0.6			
SGI104	Slab	Kitchen	134	4/30/12	10:25 AM	754	5/2/12	11:10 AM	751	2.03	0.1			
SFS596	Slab	Mechanical - South	140	4/30/12	10:30 AM	424	5/2/12	11:10 AM	417	2.03	1.2			
SFS709	Slab	Custodial Office	141	4/30/12	10:30 AM	354	5/2/12	11:15 AM	345	2.03	1.7			
SGH732	Slab	Kitchen - Serving	134	4/30/12	10:30 AM	723	5/2/12	11:15 AM	721	2.03	-0.2			Below the lower limits of detection
SGC502	Slab	Cafetorium		4/30/12	10:30 AM	654	5/2/12	11:15 AM	645	2.03	1.5			
SGC425	Slab	Cafetorium		4/30/12	10:30 AM	575	5/2/12	11:15 AM	568	2.03	1.1	Duplicate	1.3	

# **Appendix B: Individual Device Results Table**

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

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Electret	Dev	vice 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)	
SGI113	Slab	Cafetorium		4/30/12	10:30 AM	727	5/2/12	11:15 AM	718	2.03	1.5			
SEY494	Slab	Stage	133	4/30/12	10:35 AM	170	5/2/12	11:15 AM		2.03				Invalid test – Please see Site Notes
SGC359	Slab	Gym - Storage	142A	4/30/12	10:35 AM	485	5/2/12	11:20 AM	476	2.03	1.6			
SFS698	Slab	Gym - W		4/30/12	10:35 AM	409	5/2/12	11:15 AM	403	2.03	0.9			
SFS585	Slab	Gym Office - Girls		4/30/12	10:40 AM	362	5/2/12	11:20 AM	356	2.03	0.9			
SGH817	Slab	Gym Office - Girls		4/30/12	10:40 AM	724	5/2/12	11:20 AM	723	2.03	-0.4	Blank		
SGC439	Slab	Gym Office - Boys	147	4/30/12	10:40 AM	478	5/2/12	11:20 AM	473	2.03	0.6			
SGC334	Slab	Gym - North		4/30/12	10:40 AM	540	5/2/12	11:20 AM	532	2.03	1.3			
SFS555	Slab	Gym Storage - E		4/30/12	10:45 AM	512	5/2/12	11:20 AM	505	2.02	1.1			
SGC537	Slab	Gym Storage - E		4/30/12	10:45 AM	546	5/2/12	11:20 AM	540	2.02	0.9	Duplicate	1.0	

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Device Placement Electret					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)	
SFS668	Slab	Music Practice	127	4/30/12	10:45 AM	482	5/2/12	11:20 AM	477	2.02	0.6			
SFS488	Slab	Music Practice	128	4/30/12	10:45 AM	325	5/2/12	11:20 AM	320	2.02	0.7			
SGC512	Slab	Music Practice	129	4/30/12	10:50 AM	558	5/2/12	11:20 AM	532	2.02	5.8			
SFS721	Slab	Music - Office	130	4/30/12	10:50 AM	407	5/2/12	11:20 AM	403	2.02	0.4			
SDF066	Slab	Music Room - W	125	4/30/12	10:50 AM	343	5/2/12	11:20 AM	337	2.02	1.0			
SGC452	Slab	Main Office	101A	4/30/12	10:55 AM	626	5/2/12	11:25 AM	621	2.02	0.6			
SFS463	Slab	Principal	101D	4/30/12	10:55 AM	493	5/2/12	11:25 AM	485	2.02	1.4			
SDF079	Slab	Asst. Principal	101B	4/30/12	11:00 AM	199	5/2/12	11:25 AM	195	2.02	0.5			
SGH853	Slab	Asst. Principal	101B	4/30/12	11:00 AM	735	5/2/12	11:25 AM	725	2.02	1.7	Duplicate	1.1	
SFS484	Slab	Conference Room	101E	4/30/12	11:00 AM	442	5/2/12	11:25 AM	434	2.02	1.4			

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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)	
SGH834	Slab	Work Room	101N	4/30/12	11:00 AM	722	5/2/12	11:30 AM	715	2.02	1.0			
SGC563	Slab	Guidance	101F	4/30/12	11:00 AM	530	5/2/12	11:50 AM	523	2.03	1.1			
SFS556	Slab	Guidance	101G	4/30/12	11:00 AM	343	5/2/12	11:50 AM	336	2.03	1.2			
SGH789	Slab	Resource	101K	4/30/12	11:00 AM	731	5/2/12	11:25 AM	725	2.02	0.8			
SGC589	Slab	Nurse	1011	4/30/12	11:00 AM	469	5/2/12	11:25 AM	465	2.02	0.4			
SGH710	Slab	Office	101H	4/30/12	11:00 AM	680	5/2/12	11:25 AM	676	2.02	0.3			
SGC390	Slab	Custodial	123	4/30/12	11:05 AM	588	5/2/12	11:30 AM	580	2.02	1.3			
SGH734	Slab	Office	122	4/30/12	11:05 AM	701	5/2/12	11:30 AM	698	2.02	0.1			
SFS662	Slab	Office	122	4/30/12	11:05 AM	444	5/2/12	11:30 AM	440	2.02	0.4	Duplicate	0.3	
SGC467	Slab	Classroom	121	4/30/12	11:05 AM	598	5/2/12	11:30 AM	590	2.02	1.3			

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Electret	Electret				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)	
SFS511	Slab	Classroom	120	4/30/12	11:15 AM	230	5/2/12	11:30 AM	226	2.01	0.5			
SFS664	Slab	Custodial	117	4/30/12	11:15 AM	323	5/2/12	11:30 AM	319	2.01	0.4			
SFS496	Slab	Tech	114	4/30/12	11:15 AM	315	5/2/12	11:35 AM	310	2.01	0.7			
SGH651	Slab	Video Production	114A	4/30/12	11:15 AM	735	5/2/12	11:35 AM	725	2.01	1.7			
SFS474	Slab	Video Production	114A	4/30/12	11:15 AM	422	5/2/12	11:35 AM	422	2.01	-0.6	Blank		
SGH792	Slab	Work Room	115	4/30/12	11:15 AM	761	5/2/12	11:35 AM	755	2.01	0.8			
SGI085	Slab	Tech Asst. Office	115A	4/30/12	11:15 AM	740	5/2/12	11:35 AM	727	2.01	2.4			
SFS519	Slab	Classroom	113	4/30/12	11:15 AM	222	5/2/12	11:35 AM	218	2.01	0.5			
SGC548	Slab	Classroom	113	4/30/12	11:15 AM	587	5/2/12	11:35 AM	580	2.01	1.1	Duplicate	0.8	
SFS535	Slab	AV Room	112	4/30/12	11:15 AM	471	5/2/12	11:40 AM	468	2.02	0.1			

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Electret	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)	
SFS560	Slab	Classroom	111A	4/30/12	11:15 AM	397	5/2/12	11:40 AM	390	2.02	1.2			
SGC461	Slab	MRC - South	MRC	4/30/12	11:20 AM	567	5/2/12	11:40 AM	558	2.01	1.6			
SDF231	Slab	MRC - North	MRC	4/30/12	11:20 AM	197	5/2/12	11:40 AM	197	2.01	-0.6	Blank		
SGC556	Slab	MRC - North	MRC	4/30/12	11:20 AM	629	5/2/12	11:40 AM	624	2.01	0.6			
SFS458	Slab	Classroom	110A	4/30/12	11:25 AM	259	5/2/12	11:40 AM	252	2.01	1.3			
SFS501	Slab	Classroom	110B	4/30/12	11:25 AM	201	5/2/12	11:40 AM	197	2.01	0.5			
SFS692	Slab	Classroom	109	4/30/12	11:25 AM	379	5/2/12	11:40 AM	374	2.01	0.7			
SG1085	Slab	Classroom	108	4/30/12	11:25 AM	712	5/2/12	11:40 AM	708	2.01	0.3			
SGH872	Slab	Classroom	108	4/30/12	11:25 AM	744	5/2/12	11:40 AM	740	2.01	0.3	Duplicate	0.3	
SGI123	Slab	Lab Prep	107	4/30/12	11:30 AM	730	5/2/12	11:40 AM	725	2.01	0.6			

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Electret	Dev	vice 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)	
SFS682	Slab	Classroom	106	4/30/12	11:30 AM	325	5/2/12	11:45 AM	321	2.01	0.4			
SFS710	Slab	Classroom	104	4/30/12	11:30 AM	499	5/2/12	11:45 AM	495	2.01	0.4			
SFS509	Slab	Machine Room	105	4/30/12	11:35 AM	286	5/2/12	11:45 AM	281	2.01	0.7			
SGC453	Slab	Machine Room	105	4/30/12	11:35 AM	592	5/2/12	11:45 AM	587	2.01	0.6	Duplicate	0.7	
SGC460	Slab	Music Room	125	4/30/12	11:45 AM	566	5/2/12	11:50 AM	561	2.00	0.6			
CRM 11360	Slab	Main Office	101N	4/30/12	11:50 AM		5/2/12	11:50 AM			0.8			

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