

---

## Radon Measurement Survey Report

Site:

**Administrative Service Center  
231 East Indian Trail  
Aurora, Illinois 60505**

Survey Dates: May 2, 2018 thru May 4, 2018

---



Prepared For:

**East Aurora School District 131  
417 Fifth Street  
Aurora, Illinois 60505**

Carnow Conibear Project No. A146000137



## Radon Measurement Survey Report

Site:

**Administrative Service Center  
231 East Indian Trail  
Aurora, Illinois 60505**

Surveyed by:

A handwritten signature in black ink that reads "Nicole Bennett".

---

Nicole Bennett  
Radon Measurement Professional

Report by:

A handwritten signature in black ink that reads "Nicole Bennett".

---

Nicole Bennett  
Radon Measurement Professional

Reviewed by:

A handwritten signature in blue ink that reads "Derek Lantry".

---

Derek Lantry  
Director, Technical Services

Report Issued:

# TABLE OF CONTENTS

---

1.0	EXECUTIVE SUMMARY .....	1
2.0	BACKGROUND.....	2
3.0	SCOPE OF WORK.....	3
4.0	METHODOLOGY .....	4
5.0	SUMMARY OF RESULTS.....	5
	TABLE 1.0 – Radon Measurement Device Results	
6.0	CONCLUSIONS.....	8
7.0	LIMITATIONS AND CONDITIONS .....	9

## APPENDICES

- Appendix A Floor Plans – Radon Sampling Locations
- Appendix B Laboratory Analysis Report
- Appendix C Radon Measurement Professional License

## **1.0 EXECUTIVE SUMMARY**

---

Carnow, Conibear, & Assoc., Ltd. (Carnow Conibear) was contracted by East Aurora School District 131 to perform a radon measurement survey at the Administrative Service Center located at 231 East Indian Trail in Aurora, Illinois. The survey was initiated on May 2, 2018 and completed on May 4, 2018 by Nicole Bennett, an Illinois Emergency Management Agency (IEMA) licensed Radon Measurement Professional (License No. RNI2016213). The scope of work included short-term (two to four day) radon measurements in frequently occupied rooms with substantial ground contact. The radon sampling was performed following IEMA and the United States Environmental Protection Agency (USEPA) testing protocols for commercial and school radon measurements, the radon device manufacturer's recommendations, and Carnow Conibear's Quality Assurance Plan.

A total of thirty-three (33) radon test devices were deployed including twenty-eight (28) single devices, three (3) duplicates, and two (2) blanks. Activated radon charcoal devices manufactured by Air Chek Inc. were utilized during the radon survey. The activated charcoal devices are passive devices containing activated carbon to measure radon. Testing was initiated on May 2, 2018 and completed on May 4, 2018.

Radon measurement results ranged from less than (<) 0.3 to 0.6 PicoCuries per liter (pCi/L). The radon measurement results indicate areas tested were below the EPA and IEMA recommended action level of 4.0 pCi/L during the time of the test. The average indoor radon concentrations are 1.3 pCi/L nationwide. The average outdoor radon concentration is 0.4 pCi/L.

Based on the radon measurement results Carnow Conibear recommends routine follow-up radon measurement survey every three (3) years, preferably at different seasonal times of the year. Additional radon testing is recommended if significant changes are made to the building's structural or mechanical components.

## **2.0 BACKGROUND**

---

Radon is a naturally occurring, radioactive, colorless, odorless, tasteless gas produced from the decay of uranium and radium found in most soil and rock. Natural soils and rock such as granites, shales, and corals, contaminated soils from uranium processing mills, contaminated building materials, and groundwater water supplies directly from wells are a few common sources of radon. Radon can be found at some level in all indoor and outdoor air. Unlike most airborne contaminants radon is chemically inert, or chemically inactive. As a result, it is not chemically bound or attached to other materials and can move easily through porous materials or void space.

Typically, most radon gas is generated from the surrounding soil or bedrock, pulled through the soil or rock by air pressure differentials and enters the structure. However, radon gas can come from water, outside air, or contaminated building materials. The strength of the radon source has the biggest impact on indoor radon concentrations. The route of entry (i.e. through holes in the foundation), the building's ventilation rate, foundation type and differences in soils beneath the building can affect the indoor radon concentrations.

The primary health effect attributed to radon exposure is lung cancer. The World Health Organization (WHO), the National Academy of Sciences, the US Department of Health and Human Services, and the EPA classify radon as known human carcinogen. The EPA states radon is the largest source of radiation exposure and risk to the general public. When radon and products of radon decay are inhaled, decay can occur while in contact with the lung prior to being expelled. Because radon is chemically inert, most inhaled radon is rapidly exhaled. However, the inhaled decay products are readily deposited in the lungs, release energy in the form of radiation causing lung tissue damage and consequently increase the risk of lung cancer.

Radon concentrations in air are commonly expressed in picoCuries per liter (pCi/L) in the United States. An EPA national residential radon survey completed in 1991, determined the average indoor radon level is 1.3 pCi/L and the average outdoor level is about 0.4 pCi/L. The National Academy of Sciences' (NAS) latest report on radon, the Biological Effects of Ionizing Radiation (BEIR) VI Report (1999) estimates radon in indoor air causes about 21,000 lung cancer deaths each year in the United States. The EPA states that any level of radon carries some risk and there are no safe levels, and has established an action level of 4.0 pCi/L.

## **3.0 SCOPE OF WORK**

---

Carnow, Conibear was contracted by East Aurora School District 131 to perform a radon survey at the Administrative Service Center located at 231 East Indian Trail in Aurora, Illinois.

The scope of work included short-term radon measurements in frequently occupied rooms with substantial ground contact. The duration of short-term measurements can range from two (2) to four (4) days. Prior to placement of the radon measurement devices a Quality Assurance Project Plan (QAPP) was developed, a non-interference agreement document was signed, and general observations were performed to verify test conditions, identify device placement locations, and determine structural and mechanical building components. The QAPP was created to document and describe the necessary quality assurance procedures, quality control activities, and provide a clear, concise, and complete plan for the radon measurement operations. The non-interference agreement is required by the IEMA to document an understanding of the required closed building testing conditions. Observations of test conditions verified closed building conditions were maintained at a minimum of twelve (12) hours prior to testing and throughout the measurement period. Closed building conditions are necessary for short-term radon measurements in order to stabilize the radon and radon decay product concentrations and increase the reproducibility of the measurement. Closed building conditions require windows and exterior doors on all levels be kept closed (except for normal entry and exit) during the measurement period. Closed building conditions also require the normal operation of heating, ventilating, and air condition systems.

Radon test devices were deployed in twenty-eight (28) locations. In addition, three (3) duplicates, and two (2) blanks, were utilized to measure precision and bias, and ensure quality data. Radon test devices were documented in a permanent log noting the address of the building measured, a diagram of the test area noting the exact locations of all measurement devices deployed, exact start and stop times of the measurement period, a description of the device used and serial number, and the name and IEMA license number of the Radon Measurement Professional. At the end of the measurement period the radon test devices were retrieved, resealed, and mailed to the laboratory for analysis.

The radon measurement results are reported in picoCurie per liter. A picoCurie per liter is 2.22 atomic radon disintegrations per minute for each liter of air. The results of the radon measurements are interpreted to determine the need for additional testing and assess the quality and confidence of the measurement data. Typically, follow-up measurements will be recommended in every room with results greater than 4.0 pCi/L. The recommendation to mitigate elevated levels of radon shall not be based on the initial measurement results.

## 4.0 METHODOLOGY

---

The radon testing was performed following requirements set forth by the IEMA, USEPA, and Carnow Conibear's Quality Assurance Plan. The radon measurement survey consisted of several phases. The initial phase consisted of preliminary testing protocol, including an explanation of services, instructions to comply with closed building conditions, the development of the Quality Assurance Project Plan, and determination of the testing period. Next, general observations of the building were performed to verify test conditions, identify device placement locations, and determine structural and mechanical building components.

The measurement phase included the radon testing device placement and retrieval. Activated radon charcoal devices manufactured by Air Chek Inc. were utilized during this radon survey. The activated charcoal devices are passive devices containing activated carbon to measure radon. Radon test devices were placed in such a way to limit unintentional interference from building occupants. The measurement devices were placed at least three feet from doors, windows to the outside, at least one foot from exterior walls, at least four feet from heat sources, out of the direct flow of ventilation ducts and sunlight, and suspended in the general breathing zone. Duplicate tests were conducted for a minimum of 10% of the total radon test devices deployed to measure precision. Field blanks were submitted for a minimum of 5% of the total number of radon test devices deployed to measure background gamma radiation. Spike tests were not submitted for this survey, but are submitted for a minimum of three per 100 radon test devices or a minimum of three per year to measure laboratory accuracy. A total of thirty-three (33) radon test devices were deployed including twenty-eight (28) single devices, three (3) duplicates, and two (2) blanks. At the end of the measurement period the radon measurement devices were retrieved, resealed, and shipped overnight to Air Chek Inc. for analysis. Air Chek Inc. calculates the radon concentration after measuring the gamma activity by the radon decay products produced from the random decay of the collected radon. The final phase consisted of interpreting the results and an assessment of the quality and confidence of the measurement data.

## **5.0 SUMMARY OF RESULTS**

---

Table 1.0 Radon Measurement Device Results identify all the radon measurement devices deployed and the reported radon results. The radon measurement results are reported in picoCurie per liter (pCi/L).

Radon measurement results were below 4.0pCi/L. The radon measurement results indicate areas tested were below the EPA and IEMA recommended action level of 4.0 pCi/L during the time of the test. No testing abnormalities were noted during the radon measurement interval. Additionally, no radon mitigation systems were observed in the building.



**Table 1.0 Radon Measurement Device Results**

**Administrative Service Center -  
231 East Indian Trail  
Aurora, Illinois 60505**

Device Location	Device Serial #	Start Date	Start Time	Stop Date	Stop Time	Result (pCi/L)	Comments
Room 040	9043300	5/2/2018	3:09 PM	5/4/2018	3:25 PM	0.5	
Room 042	9043001	5/2/2018	3:12 PM	5/4/2018	3:21 PM	0.5	
Room 039	9043002	5/2/2018	3:13 PM	5/4/2018	3:25 PM	< 0.3	
Room 038	9043003	5/2/2018	3:14 PM	5/4/2018	3:26 PM	0.6	
Room 036	9043004	5/2/2018	3:16 PM	5/4/2018	3:26 PM	< 0.3	
Room 037	9043005	5/2/2018	3:17 PM	5/4/2018	3:26 PM	< 0.3	
Room 035	9043006	5/2/2018	3:18 PM	5/4/2018	3:27 PM	< 0.3	
Room 030	9043007	5/2/2018	3:20 PM	5/4/2018	3:30 PM	< 0.3	
Room 030	9043008	5/2/2018	3:20 PM	5/4/2018	3:30 PM	< 0.3	Duplicate RPD = 0.0%
Room 026	9043009	5/2/2018	3:20 PM	5/4/2018	3:31 PM	< 0.3	
Room 028	9043010	5/2/2018	3:22 PM	5/4/2018	3:32 PM	< 0.3	
Room 023	9043011	5/2/2018	3:22 PM	5/4/2018	3:32 PM	< 0.3	
Room 027	9043012	5/2/2018	3:23 PM	5/4/2018	3:33 PM	< 0.3	
Room 022	9043013	5/2/2018	3:24 PM	5/4/2018	3:33 PM	< 0.3	
Room 024	9043014	5/2/2018	3:25 PM	5/4/2018	3:33 PM	< 0.3	
Room 021	9043015	5/2/2018	3:25 PM	5/4/2018	3:34 PM	< 0.3	
Room 020	9043016	5/2/2018	3:26 PM	5/4/2018	3:38 PM	< 0.3	
Room 025	9043017	5/2/2018	3:27 PM	5/4/2018	3:39 PM	0.5	
Room 018	9043018	5/2/2018	3:30 PM	5/4/2018	3:39 PM	< 0.3	
Room 018	9043019	5/2/2018	3:30 PM	5/4/2018	3:39 PM	< 0.3	Duplicate RPD = 0.0%

**Table 1.0 Radon Measurement Device Results**

**Administrative Service Center -  
231 East Indian Trail  
Aurora, Illinois 60505**

Device Location	Device Serial #	Start Date	Start Time	Stop Date	Stop Time	Result (pCi/L)	Comments
Room 019	9043020	5/2/2018	3:31 PM	5/4/2018	3:40 PM	< 0.3	
Room 017	9043021	5/2/2018	3:32 PM	5/4/2018	3:40 PM	< 0.3	
Room 015	9043022	5/2/2018	3:34 PM	5/4/2018	3:41 PM	< 0.3	
Room 014	9043023	5/2/2018	3:35 PM	5/4/2018	3:41 PM	< 0.3	
Room 013	9043024	5/2/2018	3:39 PM	5/4/2018	3:42 PM	< 0.3	
Room 012	9043025	5/2/2018	3:40 PM	5/4/2018	3:42 PM	< 0.3	
Room 010	9043026	5/2/2018	3:40 PM	5/4/2018	3:42 PM	< 0.3	
Room 006	9043027	5/2/2018	3:41 PM	5/4/2018	3:43 PM	0.6	
Room 007	9043028	5/2/2018	3:42 PM	5/4/2018	3:43 PM	< 0.3	
Room 008	9043029	5/2/2018	3:44 PM	5/4/2018	3:44 PM	< 0.3	
Room 008	9043030	5/2/2018	3:44 PM	5/4/2018	3:44 PM	< 0.3	Duplicate RPD = 0.0%
Hallway	9043031	5/2/2018	3:45 PM	5/4/2018	3:45 PM	< 0.3	Blank
Hallway	9043032	5/2/2018	3:45 PM	5/4/2018	3:45 PM	< 0.3	Blank

RPD - Relative Percent Difference = difference divided by the average of simultaneous results times 100. Results less than 4.0 pCi/L shall agree with a RPD of less than 67 percent. Results greater than 4.0 pCi/l shall agree with a RDP of less than 36 percent.  
The EPA and IEMA recommended radon action level is 4.0 pCi/L.

## 6.0 CONCLUSIONS

---

Carnow, Conibear, & Assoc., Ltd. (Carnow Conibear) was contracted by East Aurora School District 131 to perform a radon survey at the Administrative Service Center located at 231 East Indian Trail in Aurora, Illinois. The survey was initiated on May 2, 2018 and completed on May 4, 2018 by Nicole Bennett, an Illinois Emergency Management Agency (IEMA) licensed Radon Measurement Professional (License No. RNI2016213). The scope of work included short-term (two to four day) radon measurements in frequently occupied rooms with substantial ground contact. The radon survey was performed in following the IEMA and the USEPA testing protocols for commercial and school radon measurements, the radon device manufacturer's recommendations, and the Carnow Conibear Quality Assurance Plan.

Radon measurement results ranged from less than (<) 0.3 to 0.6 pCi/L. The radon measurement results indicate radon concentrations for areas tested were below the EPA and IEMA recommended action level of 4.0 pCi/L during the time of the test. The average indoor radon concentrations are 1.3 pCi/L nationwide. The average outdoor radon concentration is 0.4 pCi/L.

Based on the radon measurement results Carnow Conibear recommends the following:

- A routine follow-up radon measurement survey every three (3) years, preferably at different seasonal times of the year. Follow-up radon testing is also recommended in locations with invalid test results.
- Additional radon testing if significant changes are made to the building's structural or mechanical components.

## **7.0 LIMITATIONS AND CONDITIONS**

---

The information contained in this report was prepared for the exclusive use and reliance of East Aurora School District 131 and Carnow Conibear. This information is based on the specific parameters of the scope of work for this project and the regulations in force at the time of the report.

Carnow Conibear has applied prevailing industry standards and reasonable judgment and effort within the scope of work, while conducting the radon measurement survey. The standards, judgment, and effort used by Carnow Conibear personnel to investigate, assess, and determine the presence of potential environmental hazards and liabilities associated with the radon survey at the Administrative Service Center, Aurora, Illinois are consistent with requirements outlined in federal and state guidelines. Carnow Conibear makes no warranty, express or implied, that the findings and interpretations in this report are a complete representation of the environmental hazards and liabilities, associated with the Administrative Service Center, Aurora, Illinois.

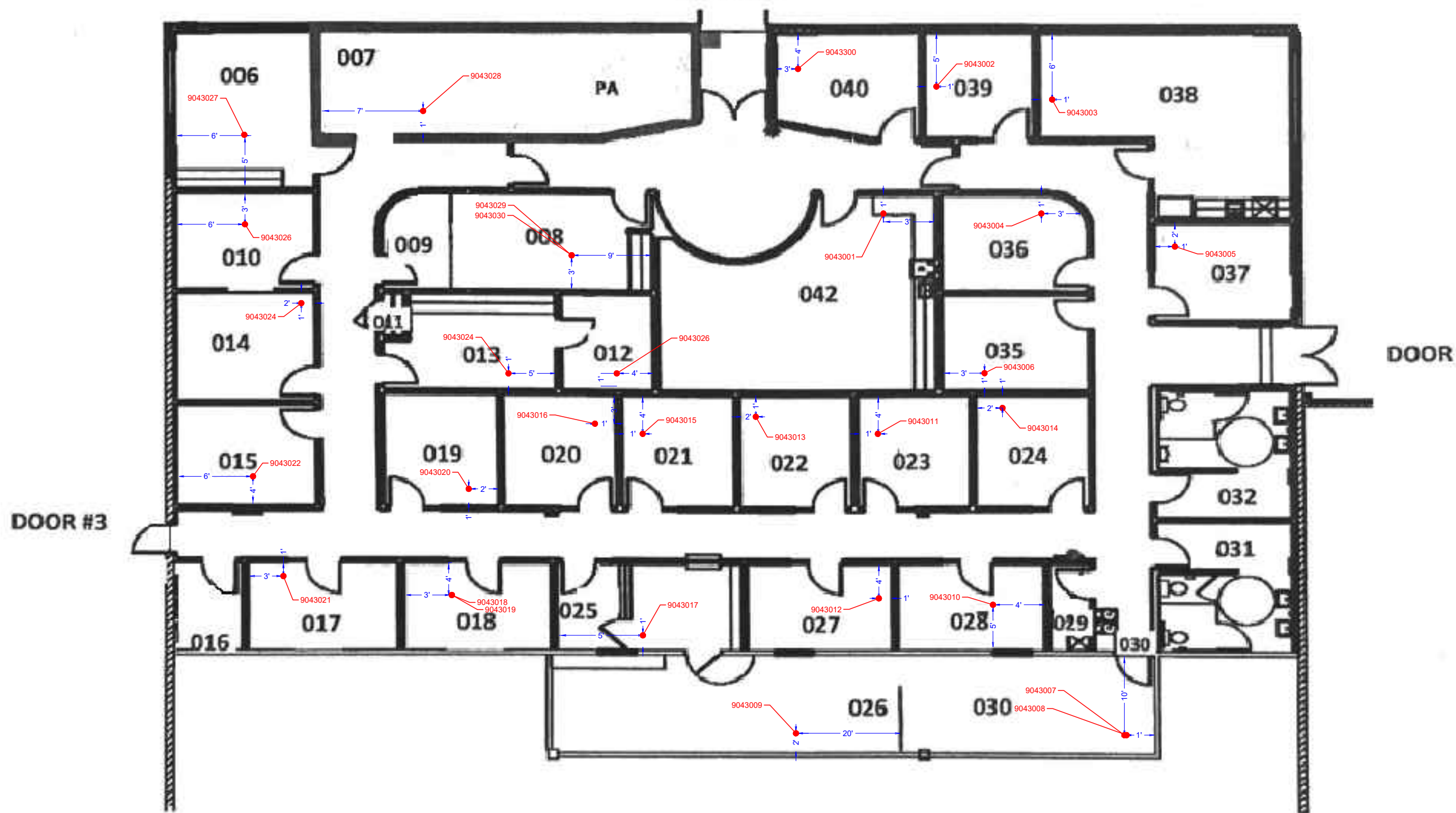
# APPENDIX A

---

## Floor Plans – Radon Sampling Locations

MAIN ENTRY

DOOR # 1

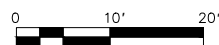


1 RADON SAMPLE LOCATIONS  
GROUND FLOOR PLAN

NOT TO SCALE



- LEGEND:
- Approximate location of activated charcoal radon measurement device
  - 4482418 Radon measurement device serial number



SHEET TITLE:  
Radon Testing Locations at  
Mabel O'Donnell Elementary School  
1640 Reckinger Road  
Aurora, Illinois 60505

Carnow, Conibeat & Assoc., Ltd.  
Environmental Consulting Services  
600 W. Van Buren St., Suite 500, Chicago, IL 60607  
t: 312.782.4486 f: 312.782.5145  
www.ccaltd.com

CCA PROJECT NO.  
A146000137  
SURVEY DATE:  
4/30/2018 to 5/3/2018  
SHEET NO.



Rn-1

TESTED BY:  
Derek Lantry  
IEMA License #: RNI2004213

DRAWN BY:  
J. Kalingsan

CHECKED BY:  
D. Lantry

CLIENT:  
East Aurora Public School District 131  
417 Fifth Street  
Aurora, Illinois, 60505

## APPENDIX B

Laboratory Analysis Report

---

Radon test result report for:

**ADMINISTRATIVE SERVICE CENTER  
231 EAST INDIAN TRAIL, AURORA, IL**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9043031	HALLWAY	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043032	HALLWAY	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043027	ROOM 006	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	0.6 ± 0.3	2018-05-08
9043028	ROOM 007	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043029	ROOM 008	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043030	ROOM 008	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043026	ROOM 010	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043025	ROOM 012	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043024	ROOM 013	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043023	ROOM 014	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043022	ROOM 015	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043021	ROOM 017	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043018	ROOM 018	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043019	ROOM 018	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043020	ROOM 019	2018-05-02 @ 4:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043016	ROOM 020	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043015	ROOM 021	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043013	ROOM 022	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043011	ROOM 023	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043014	ROOM 024	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043017	ROOM 025	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	0.5 ± 0.3	2018-05-08
9043009	ROOM 026	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043012	ROOM 027	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043010	ROOM 028	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043008	ROOM 030	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043007	ROOM 030	2018-05-02 @ 3:00 pm	2018-05-04 @ 4:00 pm	< 0.3	2018-05-08
9043006	ROOM 035	2018-05-02 @ 3:00 pm	2018-05-04 @ 3:00 pm	< 0.3	2018-05-08
9043004	ROOM 036	2018-05-02 @ 3:00 pm	2018-05-04 @ 3:00 pm	< 0.3	2018-05-08
9043005	ROOM 037	2018-05-02 @ 3:00 pm	2018-05-04 @ 3:00 pm	< 0.3	2018-05-08
9043003	ROOM 038	2018-05-02 @ 3:00 pm	2018-05-04 @ 3:00 pm	0.6 ± 0.3	2018-05-08
9043002	ROOM 039	2018-05-02 @ 3:00 pm	2018-05-04 @ 3:00 pm	< 0.3	2018-05-08
9043300	ROOM 040	2018-05-02 @ 3:00 pm	2018-05-04 @ 3:00 pm	0.5 ± 0.3	2018-05-08
9043001	ROOM 042	2018-05-02 @ 3:00 pm	2018-05-04 @ 3:00 pm	0.5 ± 0.3	2018-05-08



## APPENDIX C

Radon Measurement Professional License

---

*Bruce Rauner*  
Governor

State of Illinois  
IEMA Division of Nuclear Safety

*James K. Joseph*  
Director

Pursuant to the Radon Industry Licensing Act, 420 ILCS 44 et seq. and 32 Illinois Administrative Code 422, Licensing of Radon Detection and Mitigation Services, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued.

This is to certify that **Nicole Bennett**

License Number **RNI2016213**

has met the requirements for **Radon Measurement Professional**

Issued - Expires **05/18/2016 - 05/31/2021**

Limited to **Radon measurements of residential real estate, home environment, school and commercial buildings only.**



161391001

*Patrick I. Daniels*

Patrick I. Daniels, Radon Program