**Carnow, Conibear & 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

CARNOW CONIBEAR

# Follow-up Radon Measurement Survey Summary Report

Site:

## Johnson Elementary School
## 1934 Liberty Street
## Aurora, Illinois 60505

Initial Survey Dates: May 7, 2018 thru May 10, 2018
Follow-Up Survey Dates: November 7, 2018 thru November 9, 2018


Prepared For:

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

Carnow Conibear Project No. A146000151

**Carnow, Conibear & Assoc., Ltd.**
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# Follow-up Radon Measurement Survey Summary Report

Site:

**Johnson Elementary School**
**1934 Liberty Street**
**Aurora, Illinois 60505**

*Surveyed by:* Nicole Bennett
Nicole Bennett
Radon Measurement Professional

*Report by:* Daniel Lyons
Daniel Lyons
Industrial Hygiene Technician

*Reviewed by:*
Derek Lantry
Director, Technical Operations

Carnow Conibear Project No. A146000151

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**APPENDICES**

# 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 Johnson Elementary School located at 1934 Liberty Street in Aurora, Illinois. An initial survey was conducted on May 7, 2018 and completed on May 10, 2018 by Nicole Bennett, an Illinois Emergency Management Agency (IEMA) licensed Radon Measurement Professional (License No. RNI2016213). Following the initial survey, Carnow Conibear conducted follow-up radon measurement surveys in locations exceeding the EPA recommended radon action level of 4.0 PicoCuries per liter (pCi/L). Subsequently, the follow-up sampling was initiated on November 7, 2018 and completed on November 9, 2018 by Nicole Bennett. 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.

*May 7, 2018 thru May 10, 2018 (Initial Survey)*
A total of sixty-four (64) radon test devices were deployed during the initial survey including fifty-six (56) single devices, five (5) duplicates, and three (3) blanks.

*November 7, 2018 thru November 9, 2018 (Follow-up Survey*)
A total of four (4) radon test devices were deployed during the follow-up survey including one (1) single device, one (1) duplicate, and two (2) blanks.

Activated radon charcoal devices manufactured by Air Chek Inc. were utilized during the initial and follow-up radon surveys. The activated charcoal devices are passive devices containing activated carbon to measure radon. Testing was initiated on May 7, 2018 and completed on May 10, 2018. Follow-up testing was initiated on November 7, 2018 and completed on November 9, 2018.

Radon measurement results for initial testing ranged from less than (<) 0.3 to 6.9 pCi/L. Results for follow-up testing averaged 1.1 pCi/L. The radon measurement results identified the Boiler Room exceeding the EPA recommended radon action level of 4.0 pCi/L. 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 offers the following:

- Initial testing results within the Boiler Room (6.9 pCi/L) confirmed concentrations exceeded the EPA recommended radon action level of 4.0 pCi/L. The follow-up radon testing results from the Boiler Room were 1.1 pCi/L, resulting in an average radon level of 4.0 pCi/L.

- Develop a mitigation strategy to reduce radon concentrations starting with the simplest approach, re-evaluate thru additional radon testing to determine effectiveness, and utilize information to proceed with subsequent phases, as necessary.

- Routine follow-up radon measurement surveys are recommended every two (2) years at different seasonal times following IEMA and the USEPA testing protocols and the radon device manufacturer's recommendations.

- Additional testing is also 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, there are no safe levels, and has established an action level of 4.0 pCi/L.

# 3.0 SCOPE OF WORK

Carnow, Conibear, & Assoc., Ltd. (Carnow Conibear) was contracted by East Aurora School District 131 to perform a radon measurement survey at the Johnson Elementary School located at 1934 Liberty Street 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 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 conditions systems.

Initial radon test devices were deployed in sixty-four (64) locations. In addition, five (5) duplicates and three (3) blanks were utilized to measure precision and bias, and ensure quality data. Follow-up radon test devices were deployed in one (1) location. In addition, one (1) duplicate 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 (pCi/L). 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 one sixty-four (64) initial radon test devices were deployed including fifty-six (56) single devices, five (5) duplicates, and three (3) blanks. Additionally, a total of four (4) follow-up radon test devices were deployed including one (1) single device, one (1) duplicate, and two (2) blanks. At the end of the measurement periods 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).

The radon measurement results indicate areas tested exceeded the EPA and IEMA recommended radon 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

### Johnson Elementary School
### 1934 Liberty Street
### Aurora, Illinois 60505

| Device Location | Device Serial # | Start Date | Start Time | Stop Date | Stop Time | Result (pCi/L) | Average Result (pCi/L) | Comments |
|---|---|---|---|---|---|---|---|---|
| Social Worker Room 100 | 9044519 | 5/7/2018 | 5:28 PM | 5/10/2018 | 4:09 PM | < 0.3 | - | |
| Café Johnson 114 | 9044520 | 5/7/2018 | 5:29 PM | 5/10/2018 | 4:10 PM | < 0.3 | - | |
| Custodian Office 113 | 9044521 | 5/7/2018 | 5:31 PM | 5/10/2018 | 3:37 PM | < 0.3 | - | |
| Stage 111 | 9044522 | 5/7/2018 | 5:33 PM | 5/10/2018 | 3:43 PM | < 0.3 | - | |
| Stage Closet 111A | 9044523 | 5/7/2018 | 5:34 PM | 5/10/2018 | 3:43 PM | < 0.3 | - | |
| Stage Closet 111B | 9044524 | 5/7/2018 | 5:36 PM | 5/10/2018 | 3:44 PM | < 0.3 | - | |
| Gymnasium 109 | 9044525 | 5/7/2018 | 5:38 PM | 5/10/2018 | 3:45 PM | < 0.3 | - | |
| Gymnasium 109 | 9044526 | 5/7/2018 | 5:39 PM | 5/10/2018 | 3:45 PM | < 0.3 | - | |
| Equipment Storage 108 | 9044527 | 5/7/2018 | 5:39 PM | 5/10/2018 | 3:46 PM | < 0.3 | - | |
| Room 107 | 9044528 | 5/7/2018 | 5:41 PM | 5/10/2018 | 3:06 PM | 0.8 | - | |
| Café 114A | 9044529 | 5/7/2018 | 5:44 PM | 5/10/2018 | 3:36 PM | 0.5 | - | |
| Storage 107B | 9044530 | 5/7/2018 | 5:50 PM | 5/10/2018 | 4:12 PM | 0.8 | - | |
| Storage 107B | 9044531 | 5/7/2018 | 5:50 PM | 5/10/2018 | 4:12 PM | 0.9 | - | Duplicate<br>RPD = 11.7% |
| Main Office Area 102 | 9044532 | 5/7/2018 | 5:52 PM | 5/10/2018 | 3:02 PM | < 0.3 | - | |
| Data Room 102A | 9044533 | 5/7/2018 | 5:54 PM | 5/10/2018 | 3:04 PM | < 0.3 | - | |
| Nurse's Office 103 | 9044534 | 5/7/2018 | 5:54 PM | 5/10/2018 | 3:05 PM | < 0.3 | - | |
| Office 105 | 9044535 | 5/7/2018 | 5:55 PM | 5/10/2018 | 4:30 PM | < 0.3 | - | |

## Table 1.0 Radon Measurement Device Results

### Johnson Elementary School
### 1934 Liberty Street
### Aurora, Illinois 60505

| Device Location | Device Serial # | Start Date | Start Time | Stop Date | Stop Time | Result (pCi/L) | Average Result (pCi/L) | Comments |
|---|---|---|---|---|---|---|---|---|
| Boiler Room 106 | 9044536 | 5/7/2018 | 5:59 PM | 5/10/2018 | 4:31 PM | **6.9** | **4.0** | |
| Boiler Room 106 | 9106297 | 11/7/2018 | 6:18 PM | 11/9/2018 | 6:51 PM | 1.0 | | Follow-Up Measurement |
| Boiler Room 106 | 9106298 | 11/7/2018 | 6:18 PM | 11/9/2018 | 6:51 PM | 1.1 | | Follow-Up Measurement Duplicate RPD = 9.5% |
| Office 101 | 9044537 | 5/7/2018 | 6:00 PM | 5/10/2018 | 3:03 PM | < 0.3 | - | |
| Office 104 | 9044538 | 5/7/2018 | 6:00 PM | 5/10/2018 | 3:05 PM | < 0.3 | - | |
| Classroom 208 | 9044539 | 5/7/2018 | 6:03 PM | 5/10/2018 | 3:47 PM | < 0.3 | - | |
| Classroom 208 | 9044540 | 5/7/2018 | 6:03 PM | 5/10/2018 | 3:47 PM | < 0.3 | - | Duplicate RPD = 0% |
| Classroom 200 | 9044541 | 5/7/2018 | 6:04 PM | 5/10/2018 | 3:49 PM | < 0.3 | - | |
| Classroom 207 | 9044542 | 5/7/2018 | 6:05 PM | 5/10/2018 | 3:50 PM | < 0.3 | - | |
| Classroom 206 | 9044543 | 5/7/2018 | 6:07 PM | 5/10/2018 | 3:53 PM | < 0.3 | - | |
| Classroom 206 Storage | 9044544 | 5/7/2018 | 6:08 PM | 5/10/2018 | - | - | - | Unable to Retrieve Device |
| Classroom 201 | 9044545 | 5/7/2018 | 6:09 PM | 5/10/2018 | 3:55 PM | < 0.3 | - | |
| Classroom 202 | 9044546 | 5/7/2018 | 6:10 PM | 5/10/2018 | 3:56 PM | < 0.3 | - | |
| Classroom 205 | 9044547 | 5/7/2018 | 6:11 PM | 5/10/2018 | 3:59 PM | < 0.3 | - | |
| Classroom 205 Storage | 9044548 | 5/7/2018 | 6:12 PM | 5/10/2018 | 3:59 PM | < 0.3 | - | |
| Custodial Closet 202A | 9044549 | 5/7/2018 | 6:14 PM | 5/10/2018 | 4:00 PM | < 0.3 | - | |
| Classroom 203 | 9044550 | 5/7/2018 | 6:15 PM | 5/10/2018 | 4:01 PM | < 0.3 | - | |
| Classroom 204 | 9044551 | 5/7/2018 | 6:15 PM | 5/10/2018 | 4:04 PM | 3.8 | - | |
| Classroom 311 | 9044552 | 5/7/2018 | 6:17 PM | 5/10/2018 | 3:10 PM | < 0.3 | - | |

## Table 1.0 Radon Measurement Device Results

### Johnson Elementary School
### 1934 Liberty Street
### Aurora, Illinois 60505

| Device Location | Device Serial # | Start Date | Start Time | Stop Date | Stop Time | Result (pCi/L) | Average Result (pCi/L) | Comments |
|---|---|---|---|---|---|---|---|---|
| Classroom 311 | 9044553 | 5/7/2018 | 6:17 PM | 5/10/2018 | 3:10 PM | < 0.3 | - | Duplicate RPD = 0% |
| Classroom 300 | 9044554 | 5/7/2018 | 6:19 PM | 5/10/2018 | 3:11 PM | < 0.3 | - | |
| Classroom 301 | 9044555 | 5/7/2018 | 6:21 PM | 5/10/2018 | 3:11 PM | < 0.3 | - | |
| Classroom 310 | 9044556 | 5/7/2018 | 6:22 PM | 5/10/2018 | 3:14 PM | 0.6 | - | |
| Classroom 309 | 9044557 | 5/7/2018 | 6:22 PM | 5/10/2018 | 3:15 PM | < 0.3 | - | |
| Classroom 302 | 9044558 | 5/7/2018 | 6:23 PM | 5/10/2018 | 3:17 PM | < 0.3 | - | |
| Classroom 308 | 9044559 | 5/7/2018 | 6:25 PM | 5/10/2018 | 3:18 PM | < 0.3 | - | |
| Office 307 | 9044560 | 5/7/2018 | 6:25 PM | 5/10/2018 | 4:16 PM | 0.5 | - | |
| Server Room 307A | 9044561 | 5/7/2018 | 6:26 PM | 5/10/2018 | 3:18 PM | < 0.3 | - | |
| Learning Resource Center 305 | 9044562 | 5/7/2018 | 6:28 PM | 5/10/2018 | 3:20 PM | < 0.3 | - | Device Collapsed and in Different Location |
| Learning Resource Center 305 | 9044563 | 5/7/2018 | 6:28 PM | 5/10/2018 | 3:20 PM | < 0.3 | - | |
| Computer Lab 306 | 9044564 | 5/7/2018 | 6:29 PM | 5/10/2018 | 3:22 PM | 1.0 | - | |
| Classroom 303 | 9044565 | 5/7/2018 | 6:30 PM | 5/10/2018 | 3:24 PM | < 0.3 | - | |
| Classroom 303 | 9044566 | 5/7/2018 | 6:30 PM | 5/10/2018 | 3:24 PM | < 0.3 | - | Duplicate RPD = 0% |
| Classroom 304 | 9044567 | 5/7/2018 | 6:31 PM | 5/10/2018 | 3:25 PM | < 0.3 | - | |
| Classroom 400 | 9044568 | 5/7/2018 | 6:33 PM | 5/10/2018 | 4:19 PM | < 0.3 | - | |
| Electrical Room 400B | 9044569 | 5/7/2018 | 6:33 PM | 5/10/2018 | 4:20 PM | < 0.3 | - | |
| Custodial/Mechanical Room 400C | 9044570 | 5/7/2018 | 6:34 PM | 5/10/2018 | 4:21 PM | 0.8 | - | |

## Table 1.0 Radon Measurement Device Results

### Johnson Elementary School
### 1934 Liberty Street
### Aurora, Illinois 60505

| Device Location | Device Serial # | Start Date | Start Time | Stop Date | Stop Time | Result (pCi/L) | Average Result (pCi/L) | Comments |
|---|---|---|---|---|---|---|---|---|
| Classroom 410 | 9044571 | 5/7/2018 | 6:35 PM | 5/10/2018 | 3:27 PM | < 0.3 | - | |
| Classroom 402 | 9044572 | 5/7/2018 | 6:36 PM | 5/10/2018 | 3:29 PM | < 0.3 | - | |
| Classroom 403 | 9044573 | 5/7/2018 | 6:37 PM | 5/10/2018 | 3:30 PM | 0.5 | - | |
| Classroom 408 | 9044574 | 5/7/2018 | 6:37 PM | 5/10/2018 | 3:30 PM | < 0.3 | - | |
| Classroom 409 | 9044575 | 5/7/2018 | 6:38 PM | 5/10/2018 | 3:28 PM | < 0.3 | - | |
| Classroom 404 | 9044576 | 5/7/2018 | 6:39 PM | 5/10/2018 | 4:24 PM | 0.8 | - | |
| Classroom 404 | 9044577 | 5/7/2018 | 6:39 PM | 5/10/2018 | 4:24 PM | 0.7 | - | Duplicate<br>RPD = 13.3% |
| Classroom 405 | 9044578 | 5/7/2018 | 6:41 PM | 5/10/2018 | 4:25 PM | < 0.3 | - | |
| Classroom 406 | 9044579 | 5/7/2018 | 6:42 PM | 5/10/2018 | 4:26 PM | < 0.3 | - | |
| Classroom 407 | 9044580 | 5/7/2018 | 6:43 PM | 5/10/2018 | 3:31 PM | < 0.3 | - | |
| Hallway | 9044581 | 5/7/2018 | 6:44 PM | 5/10/2018 | 4:35 PM | < 0.3 | - | Blank |
| Hallway | 9044582 | 5/7/2018 | 6:44 PM | 5/10/2018 | 4:35 PM | < 0.3 | - | Blank |
| Hallway | 9044583 | 5/7/2018 | 6:45 PM | 5/10/2018 | 4:35 PM | < 0.3 | - | Blank |
| Hallway | 9130380 | 11/7/2018 | 6:21 PM | 11/9/2018 | 6:52 PM | < 0.3 | - | Follow-Up Measurement Blank |
| Hallway | 9130381 | 11/7/2018 | 6:21 PM | 11/9/2018 | 6:52 PM | < 0.3 | - | Follow-Up Measurement Blank |

RPD - Relative Percent Difference = difference divided by the average of simultan-eous 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 measurement survey at the Johnson Elementary School located at 1934 Liberty Street in Aurora, Illinois. The initial survey was conducted on May 7, 2018 and completed on May 10, 2018 by Nicole Bennett, an Illinois Emergency Management Agency (IEMA) licensed Radon Measurement Professional (License No. RNI2016213). Following the initial survey, Carnow Conibear conducted follow-up radon measurement surveys in locations exceeding the EPA recommended radon action level of 4.0 PicoCuries per liter (pCi/L). Subsequently, the follow-up sampling was initiated on November 7, 2018 and completed on November 9, 2018 by Nicole Bennet. 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.

Radon measurement results for initial testing ranged from less than (<) 0.3 to 6.9 pCi/L. Additionally, radon measurement results for follow-up testing averaged 1.1 pCi/L. Radon measurement results indicate the Boiler Room exceeded the EPA recommended radon action level of 4.0 pCi/L. 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 offers the following:

- Initial testing results within the Boiler Room (6.9 pCi/L) confirmed concentrations exceeded the EPA recommended radon action level of 4.0 pCi/L. The follow-up radon testing results from the Boiler Room were 1.1 pCi/L, resulting in an average radon level of 4.0 pCi/L.

- Develop a mitigation strategy to reduce radon concentrations starting with the simplest approach, re-evaluate thru additional radon testing to determine effectiveness, and utilize information to proceed with subsequent phases, as necessary.

- Mechanical ventilation equipment is present in the Boiler Room to periodically suppling outdoor as needed to operate the boiler equipment. Consider modifying the mechanical ventilation equipment to increase the frequency of the supplied outdoor air to the Boiler Room. Additional outdoor air will not only help reduce radon levels but improve overall indoor air quality.

- Routine follow-up radon measurement surveys are recommended every two (2) years at different seasonal times following IEMA and the USEPA testing protocols and the radon device manufacturer's recommendations.

- Additional testing is also recommended 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 Johnson Elementary School, 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 Johnson Elementary School, Aurora, Illinois.

# APPENDIX A

Floor Plans – Radon Sampling Locations


1 RADON RESAMPLE LOCATIONS
GROUND FLOOR PLAN

NOT TO SCALE

N
TRUE NORTH

TESTED BY:
Derek Lantry
IEMA License #: RNI2004213

DRAWN BY:
J. Kalingasan

CHECKED BY:
D. Lantry

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

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

SHEET TITLE:
Radon Retesting Locations at
Clifford I Johnson Elementary School
1934 Liberty Street
Aurora IL, 60505

Carnow, Conibear & 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

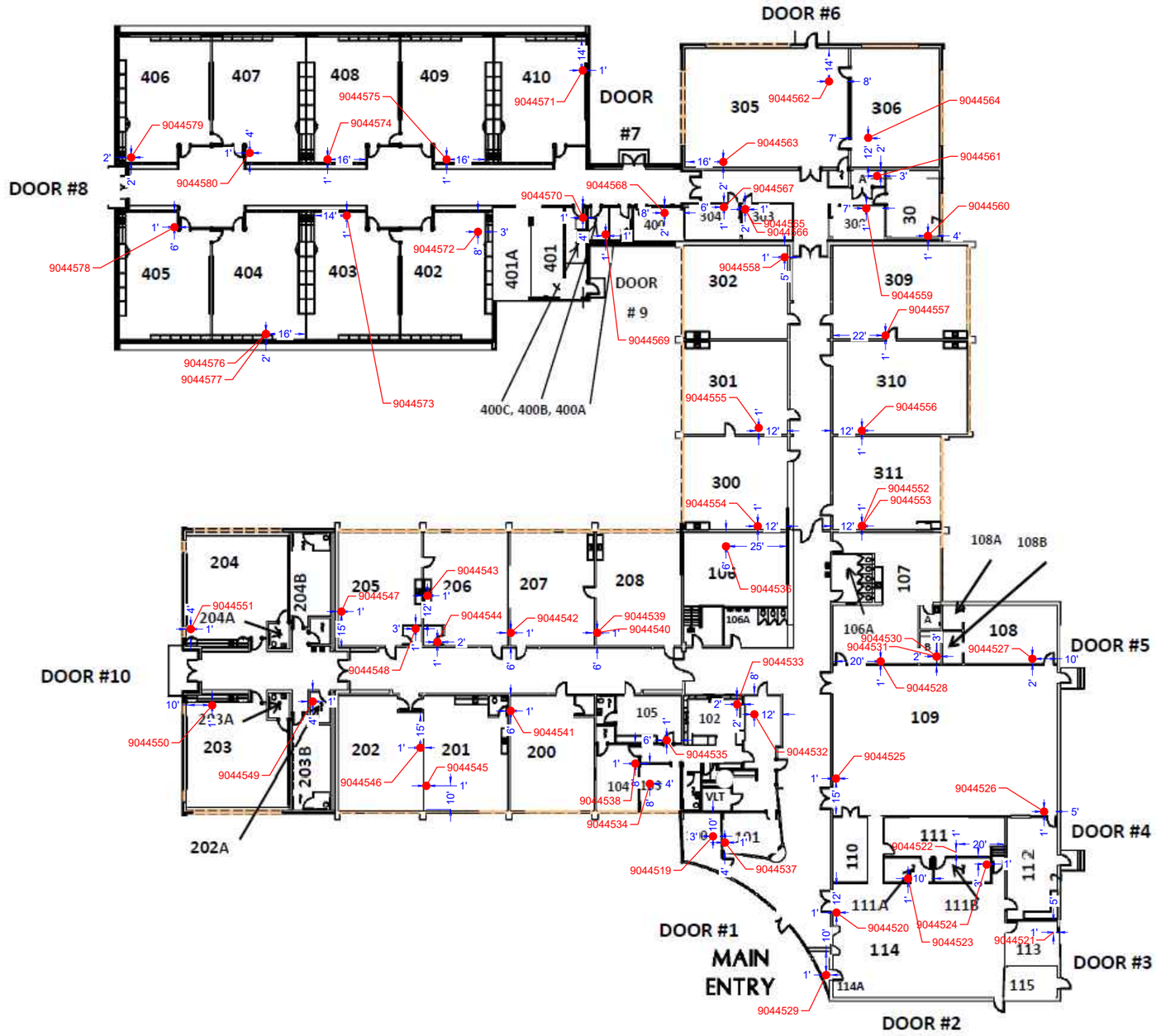
CARNOW CONIBEAR

CCA PROJECT NO.
A146000137

SURVEY DATE:
11/7/2018 to 11/9/2018

SHEET NO.
Rn-1

\\carnow-dc2ih_comwpd\Projects\Radon Program\2018 Projects\2018 East Aurora District Radon Testing\000 Retests (Long and Short-term)\Johnson\Johnson School Radon.dwg




1 RADON SAMPLE LOCATIONS
GROUND FLOOR PLAN

NOT TO SCALE

N TRUE NORTH

TESTED BY:
Derek Lantry
IEMA License #: RNI2004213

DRAWN BY:
J. Kalingasan

CHECKED BY:
D. Lantry

K:_comwpd\Projects\Radon Program\2018 Projects\2018 East Aurora District Radon Testing\Johnson\Johnson School Radon.dwg

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

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

SHEET TITLE:
Radon Testing Locations at
Clifford I Johnson Elementary School
1934 Liberty Street
Aurora IL, 60505


Carnow, Conibear & Assoc., Ltd.
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CARNOW CONIBEAR

CCA PROJECT NO.
A146000137

SURVEY DATE:
5/7/2018 to 5/10/2018

SHEET NO.
Rn-1

# APPENDIX B

Laboratory Analysis Report

November 13, 2018 **** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
**SCHOOL**
**JOHNSON**

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|---|---|---|---|---|---|
| 9106298 | BOILER ROOM 106 | 2018-11-07 @ 6:00 pm | 2018-11-09 @ 7:00 pm | 1.1 ± 0.3 | 2018-11-12 |
| 9106297 | BOILER ROOM 106 | 2018-11-07 @ 6:00 pm | 2018-11-09 @ 7:00 pm | 1.0 ± 0.3 | 2018-11-12 |
| 9130380 | HALLWAY | 2018-11-07 @ 6:00 pm | 2018-11-09 @ 7:00 pm | < 0.3 | 2018-11-12 |
| 9130381 | HALLWAY | 2018-11-07 @ 6:00 pm | 2018-11-09 @ 7:00 pm | < 0.3 | 2018-11-12 |

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May 16, 2018 **** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

**CLIFFORD I. JOHNSON ELEMENTARY SCHO**
**1934 LIBERTY STREET, AURORA, IL**

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|---|---|---|---|---|---|
| 9044536 | BOILER ROOM 106 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 5:00 pm | 6.9 ± 0.5 | 2018-05-14 |
| 9044529 | CAFÃ© 114A | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | 0.5 ± 0.3 | 2018-05-14 |
| 9044520 | CAFÃ© JOHNSON 114 | 2018-05-07 @ 5:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044541 | CLASSROOM 200 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044545 | CLASSROOM 201 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044546 | CLASSROOM 202 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044550 | CLASSROOM 203 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044551 | CLASSROOM 204 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | 3.8 ± 0.4 | 2018-05-14 |
| 9044547 | CLASSROOM 205 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044548 | CLASSROOM 205 STORAGE | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044543 | CLASSROOM 206 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044542 | CLASSROOM 207 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044540 | CLASSROOM 208 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044539 | CLASSROOM 208 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044554 | CLASSROOM 300 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044555 | CLASSROOM 301 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044558 | CLASSROOM 302 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044565 | CLASSROOM 303 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044566 | CLASSROOM 303 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044567 | CLASSROOM 304 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044559 | CLASSROOM 308 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044557 | CLASSROOM 309 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044556 | CLASSROOM 310 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | 0.6 ± 0.3 | 2018-05-14 |
| 9044552 | CLASSROOM 311 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044553 | CLASSROOM 311 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044568 | CLASSROOM 400 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044572 | CLASSROOM 402 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044573 | CLASSROOM 403 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | 0.5 ± 0.3 | 2018-05-14 |
| 9044577 | CLASSROOM 404 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | 0.7 ± 0.3 | 2018-05-14 |
| 9044576 | CLASSROOM 404 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | 0.8 ± 0.3 | 2018-05-14 |
| 9044578 | CLASSROOM 405 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044579 | CLASSROOM 406 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044580 | CLASSROOM 407 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044574 | CLASSROOM 408 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044575 | CLASSROOM 409 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044571 | CLASSROOM 410 | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044564 | COMPUTER LAB 306 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | 1.0 ± 0.3 | 2018-05-14 |

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May 16, 2018 **** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

**CLIFFORD I. JOHNSON ELEMENTARY SCHO**
**1934 LIBERTY STREET, AURORA, IL**

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|---|---|---|---|---|---|
| 9044549 | CUSTODIAL CLOSET 202A | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044570 | CUSTODIAL/MECHANICAL ROOM 400C | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | 0.8 ± 0.3 | 2018-05-14 |
| 9044521 | CUSTODIAN OFFICE 113 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044533 | DATA ROOM 102A | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044569 | ELECTRICAL ROOM 400B | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044527 | EQUIPMENT STORAGE 108 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044525 | GYMNASIUM 109 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044526 | GYMNASIUM 109 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044583 | HALLWAY | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 5:00 pm | < 0.3 | 2018-05-14 |
| 9044581 | HALLWAY | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 5:00 pm | < 0.3 | 2018-05-14 |
| 9044582 | HALLWAY | 2018-05-07 @ 7:00 pm | 2018-05-10 @ 5:00 pm | < 0.3 | 2018-05-14 |
| 9044562 | LEARNING RESOURCE CENTER 305 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044563 | LEARNING RESOURCE CENTER 305 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044532 | MAIN OFFICE AREA 102 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044534 | NURSE&APOS;S OFFICE 103 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044537 | OFFICE 101 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044538 | OFFICE 104 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044535 | OFFICE 105 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 5:00 pm | < 0.3 | 2018-05-14 |
| 9044560 | OFFICE 307 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | 0.5 ± 0.3 | 2018-05-14 |
| 9044528 | ROOM 107 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | 0.8 ± 0.3 | 2018-05-14 |
| 9044561 | SERVER ROOM 307A | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 3:00 pm | < 0.3 | 2018-05-14 |
| 9044519 | SOCIAL WORKER ROOM 100 | 2018-05-07 @ 5:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044522 | STAGE 111 | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044523 | STAGE CLOSET 111A | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044524 | STAGE CLOSET 111B | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | < 0.3 | 2018-05-14 |
| 9044531 | STORAGE 107B | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | 0.9 ± 0.3 | 2018-05-14 |
| 9044530 | STORAGE 107B | 2018-05-07 @ 6:00 pm | 2018-05-10 @ 4:00 pm | 0.8 ± 0.3 | 2018-05-14 |

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# APPENDIX C

Radon Measurement Professional License

*Bruce Rauner*
*Governor*

# State of Illinois

*James K. Joseph*
*Director*

## IEMA Division of Nuclear Safety

Pursuant to the Radon Industry Licensing Act, 420 ILCS 44 et seq. and 32 Illinois Adminstrative 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.

SEAL OF THE STATE OF ILLINOIS
AUG. 26TH 1818

161391001

Patrick I. Daniels, Radon Program