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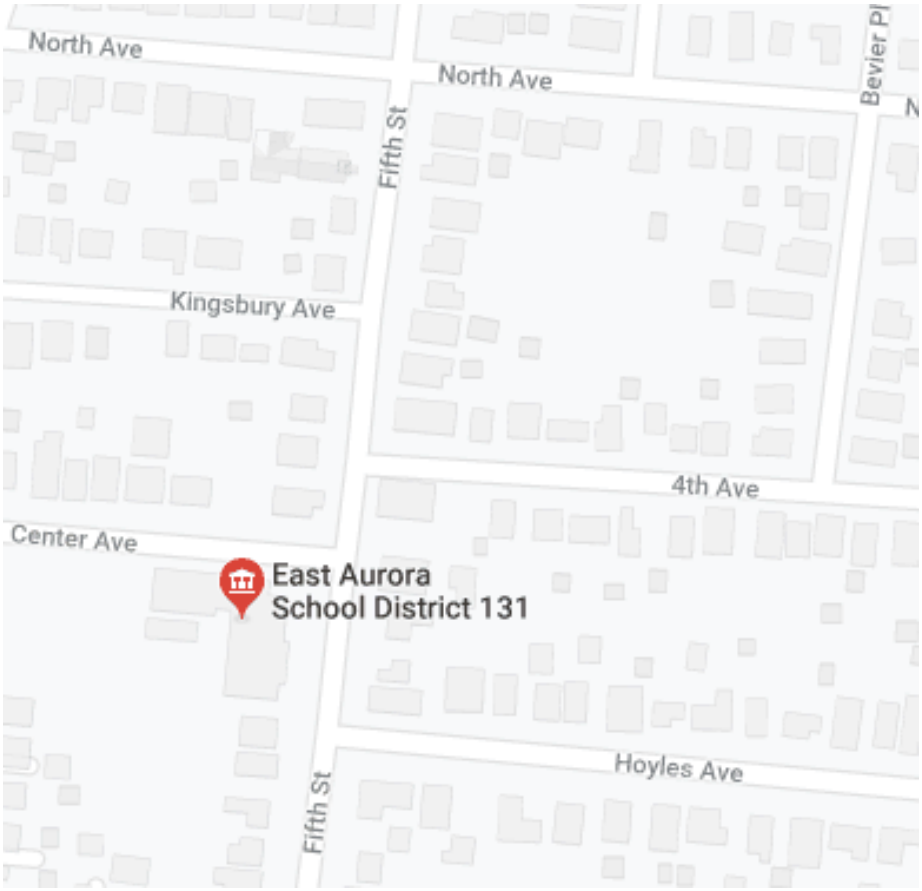
Follow-up Long-Term Radon Measurement Summary Report

Site: **McKnight School Service Center**
417 Fifth Street
Aurora, Illinois 60505

Survey Dates: October 29, 2018, November 9, 2018 thru June 6, 2019



Prepared By: **Carnow, Conibear & Assoc., Ltd.**
600 West Van Buren St., Suite 500
Chicago, Illinois 60607

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

Carnow Conibear Project No. A146000151

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CARNOW CONIBEAR

Follow-up Long-Term Radon Measurement Summary Report

Site: **McKnight School Service Center**
417 Fifth Street
Aurora, Illinois 60505

Surveyed by: Nicole Bennett

Nicole Bennett
Industrial Hygiene Specialist

Report by: Nicole Bennett

Nicole Bennett
Industrial Hygiene Specialist

Reviewed by:

Derek Lantry
Director, Technical Services

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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 follow-up long-term radon sampling at McKnight School Service Center located in Aurora, Illinois. Previous short-term radon testing identified areas within the school exceeding the EPA recommended action level of 4.0 PicoCuries per liter (pCi/L).

The follow-up survey was initiated on October 29, 2018 & November 9, 2018 and completed on June 6, 2019 by Nicole Bennett, an Illinois Emergency Management Agency (IEMA) licensed Radon Measurement Professional (License No. RNI2016213). The scope of work included long-term (90-360 days) radon measurements where previous short-term testing exceeded 4.0 pCi/L. 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 eighteen (18) radon test devices were deployed including fourteen (14) single devices, three (3) duplicates, and one (1) blank. Alpha-track radon devices manufactured by RSSI were utilized to conduct the radon survey. Radon measurement results ranged from 3.0 to 6.3 picocuries per liter (pCi/L). The radon measurement results indicate that seven (7) locations were above the EPA 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 and 2.6 pCi/L in Illinois. The average outdoor radon concentration is 0.4 pCi/L.

Based on the radon survey results, Carnow Conibear recommends the following:

- Reduce the radon levels in a phased approach utilizing a combination of mitigation techniques including sealing foundation penetrations and cracks, positive pressurization, and subslab depressurization. The phased approach should focus on installing the simplest, most cost-effective technique followed by re-testing to determine effectiveness.

- Contract a qualified mechanical engineer or firm to assess the existing HVAC system and for information on the minimum ventilation standards for indoor air quality. If necessary, determine applicability, feasibility, and cost of modifying and/or installing an HVAC system capable of meeting the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Standard 62-1981R "Ventilation for Acceptable Indoor Air Quality" in the dwelling units tested. The USEPA recommends achieving the recommended ventilation standards in conjunction with or in addition to installation of a system for radon reduction in schools and commercial buildings.

- Contract an IEMA licensed radon mitigation professional to design and install a remediation system to reduce radon levels. The radon mitigation professional shall be licensed by the IEMA to conduct radon mitigation in schools and commercial buildings. The radon contractor shall install the mitigation system in accordance with all requirements of 32 Illinois Administrative Code 422. The contractor shall conduct communication tests prior to completing the radon mitigation system to verify the location and quantity of suction points and fans installed is adequate to remove the radon gas. Additionally, the radon contractor shall include in the mitigation design, contingencies for managing any unidentified restricting subslab conditions, i.e. poor subslab permeability, the presence of subslab barriers, etc.

- Conduct post mitigation radon testing to evaluate the radon mitigation system function. The post mitigation testing shall be conducted no sooner than twenty-four (24) hours nor later than thirty (30) days following activation of the mitigation system. The post mitigation radon test shall be conducted by an IEMA licensed radon measurement professional. 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.

Because building designs, construction, and tenant and operational use patterns vary, it is not always possible to recommend standard mitigation actional that apply to all buildings. Costs for radon reduction are dependent on the extent and levels of radon, building design and construction, and the ability of maintenance personnel or building engineers to participate in the diagnosis and mitigation of the radon problem.

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 was contracted by contracted by East Aurora School District 131 to perform a long-term follow-up radon measurement survey at McKnight School Service Center, located in Aurora, Illinois.

The scope of work included long-term radon measurements in every room with a short-term, initial measurement of 4.0 PicoCuries per liter (pCi/L) or greater. The duration of the long-term measurements can range from 90 days to one year. 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.

Radon test devices were deployed in fourteen (14) locations. In addition, three (3) duplicates and one (1) blank 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 radon testing requirements, 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. Alpha-track radon devices manufactured by RSSI were utilized during this radon survey. The alpha-track radon devices are passive radon detection devices. 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 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 eighteen (18) radon test devices were deployed including fourteen (14) single devices, three (3) duplicates, and one (1) blank. At the end of the measurement period the radon measurement devices were retrieved, resealed, and delivered to RSSI for analysis. Each RSSI Alpha-track radon gas detector contains a detector element, called a foil. When radon atoms decay inside the detector, they release alpha particles. If the alpha particles strike the foil, they make microscopic tracks in the surface of the foil. When the detector is analyzed, the foil is chemically treated to enlarge the alpha tracks, which are counted on an automated system. The average radon level is calculated from the number of tracks and the number of days the detector was exposed. This level is reported in picocuries per liter (pCi/L). 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 ranged from 3.0 to 6.3 pCi/L. The radon measurement results indicate that seven (7) tested locations were above the EPA and IEMA recommended action level of 4.0 pCi/L during the time of the test. No testing abnormalities were noted at the time the devices were retrieved.

Table 1.0 Radon Measurement Device Results
McKnight School Service Center
417 Fifth Street
Aurora, Illinois 60505

Device Location	Device Serial #	Start Date	Start Time	Stop Date	Stop Time	Result (pCi/L)	Comments
Room 11	375616	10/29/2018	5:33 PM	6/6/2019	11:59 AM	3.2	Initial result = 4.8 pCi/L
Room 12	375617	10/29/2018	5:38 PM	6/6/2019	11:59 AM	3.0	Initial result = 4.0 pCi/L
Lower Level Storage	375618	10/29/2018	5:57 PM	6/6/2019	12:08 PM	4.8	Initial result = 7.3 pCi/L
Room 35B	375619	10/29/2018	6:00 PM	6/6/2019	12:05 PM	3.5	Initial result = 4.1 pCi/L
Room 35B	375620	10/29/2018	6:00 PM	6/6/2019	12:05 PM	3.4	Duplicate
Room 30	375621	10/29/2018	6:05 PM	6/6/2019	12:23 PM	4.9	Initial result = 4.2 pCi/L
Room 14	375622	10/29/2018	6:16 PM	6/6/2019	12:00 PM	3.5	Initial result = 5.4 pCi/L
Room 13	375623	10/29/2018	6:21 PM	6/6/2019	12:00 PM	3.9	Initial result = 6.1 pCi/L
Room 13	375624	10/29/2018	6:21 PM	6/6/2019	12:00 PM	3.9	Duplicate
Room 10	375625	10/29/2018	6:24 PM	6/6/2019	12:01 PM	5.9	Initial result = 5.8 pCi/L
Room 10A	375626	10/29/2018	6:30 PM	6/6/2019	12:01 PM	6.3	Initial result = 8.2 pCi/L
Room 10B	375627	10/29/2018	6:31 PM	6/6/2019	12:01 PM	6.2	Initial result = 5.5 pCi/L
Room 9	375628	10/29/2018	6:38 PM	6/6/2019	11:56 AM	5.7	Initial result = 6.3 pCi/L
Room 9	375629	10/29/2018	6:39 PM	6/6/2019	11:57 AM	5.2	Initial result = 6.2 pCi/L
Room 31	375635	11/9/2018	3:30 PM	6/6/2019	12:04 PM	3.9	Initial result = 4.4 pCi/L
Room 31	375633	11/9/2018	3:30 PM	6/6/2019	12:04 PM	3.8	Duplicate
Room 36	375634	11/9/2018	3:32 PM	6/6/2019	12:07 PM	5.7	Initial result = 6.9 pCi/L
Room 32	375650	11/9/2018	3:35 PM	6/6/2019	12:08 PM	0.2	Blank

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 follow-up long-term radon sampling at McKnight School Service Center, located in Aurora, Illinois. The survey was initiated on October 29, 2018 & November 9, 2018 and completed on June 6, 2019 by Nicole Bennett, an Illinois Emergency Management Agency (IEMA) licensed Radon Measurement Professional (License No. RNI2016213). The scope of work included long-term (>90 days) radon measurements performed in rooms with a short-term, initial measurement of 4.0 PicoCuries per liter (pCi/L) or greater. 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 eighteen (18) radon test devices were deployed including fourteen (14) single devices, three (3) duplicates, and one (1) blank. Alpha-track radon devices manufactured by RSSI were utilized to conduct the radon survey. Radon measurement results ranged from 3.0 to 6.3 picocuries per liter (pCi/L). The radon measurement results indicate that seven (7) locations were above the EPA 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 and 2.6 pCi/L in Illinois. The average outdoor radon concentration is 0.4 pCi/L.

Based on the radon survey results, Carnow Conibear recommends the following:

- Reduce the radon levels in a phased approach utilizing a combination of mitigation techniques including sealing foundation penetrations and cracks, positive pressurization, and subslab depressurization. The phased approach should focus on installing the simplest, most cost-effective technique followed by re-testing to determine effectiveness.

- Contract a qualified mechanical engineer or firm to assess the existing HVAC system and for information on the minimum ventilation standards for indoor air quality. If necessary, determine applicability, feasibility, and cost of modifying and/or installing an HVAC system capable of meeting the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Standard 62-1981R "Ventilation for Acceptable Indoor Air Quality" in the dwelling units tested. The USEPA recommends achieving the recommended ventilation standards in conjunction with or in addition to installation of a system for radon reduction in schools and commercial buildings.

- Contract an IEMA licensed radon mitigation professional to design and install a remediation system to reduce radon levels. The radon mitigation professional shall be licensed by the IEMA to conduct radon mitigation in schools and

commercial buildings. The radon contractor shall install the mitigation system in accordance with all requirements of 32 Illinois Administrative Code 422. The contractor shall conduct communication tests prior to completing the radon mitigation system to verify the location and quantity of suction points and fans installed is adequate to remove the radon gas. Additionally, the radon contractor shall include in the mitigation design, contingencies for managing any unidentified restricting subslab conditions, i.e. poor subslab permeability, the presence of subslab barriers, etc.

- Conduct post mitigation radon testing to evaluate the radon mitigation system function. The post mitigation testing shall be conducted no sooner than twenty-four (24) hours nor later than thirty (30) days following activation of the mitigation system. The post mitigation radon test shall be conducted by an IEMA licensed radon measurement professional. 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. 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 McKnight School 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 McKnight School Service Center, Aurora, Illinois.

Appendix A

Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

RADON MEASUREMENT
SURVEY

MCKNIGHT SCHOOL SERVICE CENTER
417 FIFTH STREET
AURORA, ILLINOIS 60505

PROJECT NUMBER: A146000151

CARNOW, CONIBEAR, & ASSOC., LTD.
600 WEST VAN BUREN STREET, SUITE 500
CHICAGO, IL 60607
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Derek Lantry
Carnow, Conibear, & Assoc., Ltd.
Radon Measurement Professional

T. Rodman Harvey, P.E., CIH, CSP, CHMM
Carnow, Conibear & Assoc., Ltd
QA/QC Officer

A1 Title Page

A2 Table of Contents

A3 Distribution List

Name	Organization	Title	Contact Information
T. Rodman Harvey	Carnow Conibear	QA/QC Officer	(312) 762-2904
Derek Lantry	Carnow Conibear	RMP	(312) 762-2956
Nicole Bennett	Carnow Conibear	Field Technician	(312) 762-2939

A4 Project Task List

Task/ Responsibility	Name	Title	Contact Information	Note
Team Manager	Derek Lantry	RPM	(312) 762-2956	Carnow Conibear
Project Manager	Derek Lantry	RPM	(312) 762-2956	Carnow Conibear
Field Technician	Nicole Bennett	RPM	(312) 762-2939	Carnow Conibear
Laboratory Analysis	RSSI	Radon Lab	(847) 965-1999	Vendor
QA/QC data review	T. Rodman Harvey	QA/QC	(312) 762-2904	Carnow Conibear
QA/QC Report Review	T. Rodman Harvey	QA/QC	(312) 762-2904	Carnow Conibear
Client Contact	Jesse Vargas	Buildings & Grounds Supervisor	(630) 779-8087	Client
Site Contact	Jesse Vargas	Buildings & Grounds Supervisor	(630) 779-8087	Client

A5 Background

East Aurora School District 131 has retained Carnow, Conibear & Assoc., Ltd. (Carnow Conibear) to conduct long-term radon testing at McKnight School Service Center in Aurora, Illinois

Project objective
The objective of this project is to conduct long-term radon measurements at the project location.

Reason for Project
The project is being conducted to verify radon levels in every room with a short-term, initial measurement of 4.0 PicoCuries per liter (pCi/L) or greater.

This radon measurement project is being conducted in accordance with the Illinois Emergency Management Agency regulations part 422.

A6 Project Description

Carnow, Conibear, & Assoc., Ltd. was contracted by East Aurora School District 131 to perform a long-term radon survey at McKnight School Service Center located in Aurora, Illinois. The scope of work includes longer (>90 days) radon measurements in every room with a short-term, initial measurement of 4.0 PicoCuries per liter (pCi/L) or greater. The radon survey shall be performed in accordance with the Illinois Emergency Management Agency (IEMA) and the United Sates Environmental Protection Agency (USEPA) testing protocols for commercial and school radon measurements, the radon device manufacturer's recommendations, and the Carnow Conibear Quality Assurance Plan.

Project Schedule

Task	Responsibility	Due Date
Site Assessment	RMP	May 1, 2018
AT Canister set out	RMP	October 29, 2018
AC Canister Collection	RMP	June 6, 2019
Sample Shipment	RMP	June 7, 2019
Laboratory Analysis	RMP	June 13, 2019
Laboratory data review	RMP, QA/QC Officer	June 14, 2019
Draft Report	RMP	June 18, 2019
Report QA/QC	QA/QC Officer	July 8, 2019
Final Report	RMP	July 12, 2019
Project Closeout	RMP, Administration	September 1, 2019

Project Location
McKnight School Service Center
417 Fifth Street
Aurora, Illinois 60505

A7 Quality Objectives and Criteria

The objective for the precision of the measurements of indoor ambient radon concentrations measured with RSSI Alpha-track samplers at or above 4 pCi/L is an average ten percent relative difference between duplicates. (This is the warning level, necessitating an investigation into the cause of the discrepancy between duplicates.)

The objective for accuracy of the measurements of indoor ambient radon concentrations measured with RSSI Alpha-track samplers is ten percent at concentrations of 4 pCi/L or

greater. This value is the average percent accuracy, or the ratio of the measured to the known (chamber) value.

All measurements of radon gas or shall report the value to no more than 1 decimal place, e.g., 4.3 pCi/L. Any measurements passed on radon progeny shall be reported to no more than three decimal places, e.g., 0.033 WL.

All measurement activities shall conform to CCA SOPs and QA/QC documents.

Sample devices shall be located in accordance with IEMA requirements and CCA's SOPs. Sample locations shall be indicated on a field sketch of the project site.

Duplicate and blank samples shall be collected in accordance with the requirements of this document and the results of those samples shall be included in the final report.

All field forms, chain of custody forms, etc., shall be filled out in their entirety.

All field sketches, drawings etc., shall be dated and labeled with the name of the person preparing the sketch, the project name and any other information required, e.g., sample locations, building foundations, floor drains, slabs, crawl spaces, major HVAC components.

A8 Special Training/Certifications

Name	License/ Certification	Number	Expiration Date
Nicole Bennett	Radon Measurement professional license	RNI2016213	05/31/2021

Copies of all licenses and certifications shall be kept in the project file.

A9 Documentation and Records

The RPM or the QA/QC Officer will create a new QA project Plan for each new radon measurement project. It will be the RPM's responsibility to make sure that the latest versions of the appropriate documents are used. In the event that the QA project Plan, Standard Operating Procedures or other documents are updated during the course of an active radon measurement project, the new version of the affected document will be distributed to the appropriate project personnel along with a sign off sheet stating that the new document was received. The old versions of the affected documents shall be collected at this time, and any extra (non-file) copies will be destroyed.

The project data package shall include, but not be limited to the following information:

The project proposal;

A copy of the QA Project Plan;
Field Logs and data sheets;
Copies of training certificates and or licenses;
Field sketches, drawings or other graphical data;
Chain of Custody Forms;
Laboratory Reports;
Sample shipment logs or receipts
Correspondence
Local weather data
Final Reports

Documents and records shall be filed and retained in accordance with SOP #2.

B1 Sampling Process Design (Experimental Design)

Sampling strategy shall be planned and executed in accordance with SOP #1.

B2 Sampling Methods

RSSI Alpha-track (AT) devices shall be used. Refer to SOP #1.

B3 Sample Handling and Custody

The samples shall be collected in accordance with to SOP #1.

The samples shall be labeled with a unique sample identifier.

The samples shall be shipped to the laboratory immediately after retrieval. Sample packaging and shipment shall conform to the laboratories requirements.

A complete chain of custody shall be maintained with the sample set and the sample set shall remain in the possession and control of the RPM until it is transferred to the laboratory or a delivery service. A copy of the chain of custody shall be retained whenever the samples are transferred to another individual or organization.

A copy of delivery service tickets shall be retained when samples are shipped via overnight service to a vendor laboratory.

B4 Analytical Methods

ASTM D6327-98, Standard Test Method for Determination of Radon Decay Product Concentration and Working Level in Indoor Atmospheres by Active Sampling on a Filter

EPA Indoor Radon and Radon Decay Product Measurement Protocols, EPA 520-1/89-009, issued by the Office of Radiation Programs

B5 Quality Control

In order to assure the quality of testing duplicate samples are taken. For school and commercial building testing duplicate samples shall represent 10 percent of all the detectors deployed, or a maximum of 50 detectors, whichever is less. Two (2) canisters are set side by side at the selected site.

Blank samples or unopened canisters (sample not taken) are submitted. For residential home testing, blank measurements shall be performed 1 for every 20 samples collected. For school and commercial building testing, blank measurements shall be performed and shall represent 5 percent of all the detectors deployed, or a maximum of 25 detectors, whichever is less, within the building.

Radon measuring devices are spiked 3 per 100 canisters or a minimum of 3 per year. Spiked Radon measuring devices are obtained from an approved laboratory supplier.

	NUMBER
Estimated total number of samples to be collected:	18
Estimated number of duplicates samples to be collected	3
Estimated number of blanks to be collected	1
Estimated number of spike samples to be submitted for this project	0

B6 Instrument/Equipment Testing, Inspection, and Maintenance

Carnow Conibear will use Alpha-track long-term radon testing devices. The devices will be inspected prior to deployment for physical damage. The devices come from the laboratory in sealed bags which must remain sealed until they are actually deployed.

B7 Instrument/Equipment Calibration and Frequency

Carnow Conibear controls the use of instruments and testing equipment. Documentation of calibration is maintained as a quality record. Calibration is performed in accordance with SOP #1 – Measurements, Section 4.00 - Calibration Requirements.

RSSI contracts with commercial radon chambers and maintains an in-house chamber to conduct batch calibrations. Each batch calibration includes at least 64 samplers. At least 8 of each are exposed for periods of two days through seven days at specified humidity and temperature. A minimum of three different (low, medium and high) humidity levels are specified for each production type. The results from these batch exposures are used to generate calibration tables for each batch of charcoal used in the samplers. These calibrations are performed whenever the activated charcoal type used in the samplers changes, and/or at least every twelve months.

B8 Inspection/Acceptance of Supplies and Consumables

Alpha-track (AT) devices will be inspected for physical damage prior to use on a project. The AT devices from RSSI come in a sealed foil package. The package shall be checked to be sure that it is still sealed. No other supplies or consumables have been deemed critical for a radon measurement project.

B9 Non-direct Measurements

Radon background information for the project location shall be obtained from either the USEPA, or the applicable local or state agencies. The final report shall include this data and its source. Since this information will be used as a general baseline or background, it will not be necessary to critically evaluate the quality of this data.

B10 Data Management

Data management shall be in accordance with SOP #1.

C1 Assessments and Response Actions

The designated QA/QC officer for the project shall review the project data, forms, logs, and documentation to ensure that the proper SOPs were followed in collecting, submitting, and analysis of the data.

Any deficiencies shall be reported to management in accordance with SOP #3.

C2 Reports to Management

Due to the short-term nature of the radon measurement projects, interim project status reports will not be required. Management will review the final project reports and any QA/QC deficiency reports upon completion of the project.

D1 Data Review, Verification, and Validation

Due to the straightforward nature of the data generated in a radon measurement project, the review, verification and validation of the data is also simple and straightforward.

The RPM, the designated QA/QC officer and any other individual involved in the review process for the project report shall endeavor to ensure that the report data meets all of the required quality criteria.

D2 Verification and Validation Methods

The QA/QC check of the draft report shall include a cross check of the final laboratory reports with any report summary tables to ensure that the tables are accurate.

The laboratory report shall be reviewed to ensure that the data meets the required precision as listed in section A7 Quality Objectives and Criteria.

The duplicate samples shall be compared as follows:

The Relative Percent Difference of the two sample results is calculated as the difference between the two results divided by the average of the two results.

If both of the test results are less than 4.0 pCi/L, they must agree with a Relative Percent Difference (RPD) of less than 67 percent.

If both of the test results are either equal to or greater than 4.0 pCi/L, they must agree with a RPD of less than 36 percent.

If the RPD is greater than the above values, the RMP investigates documents and corrects the source(s) of the error.

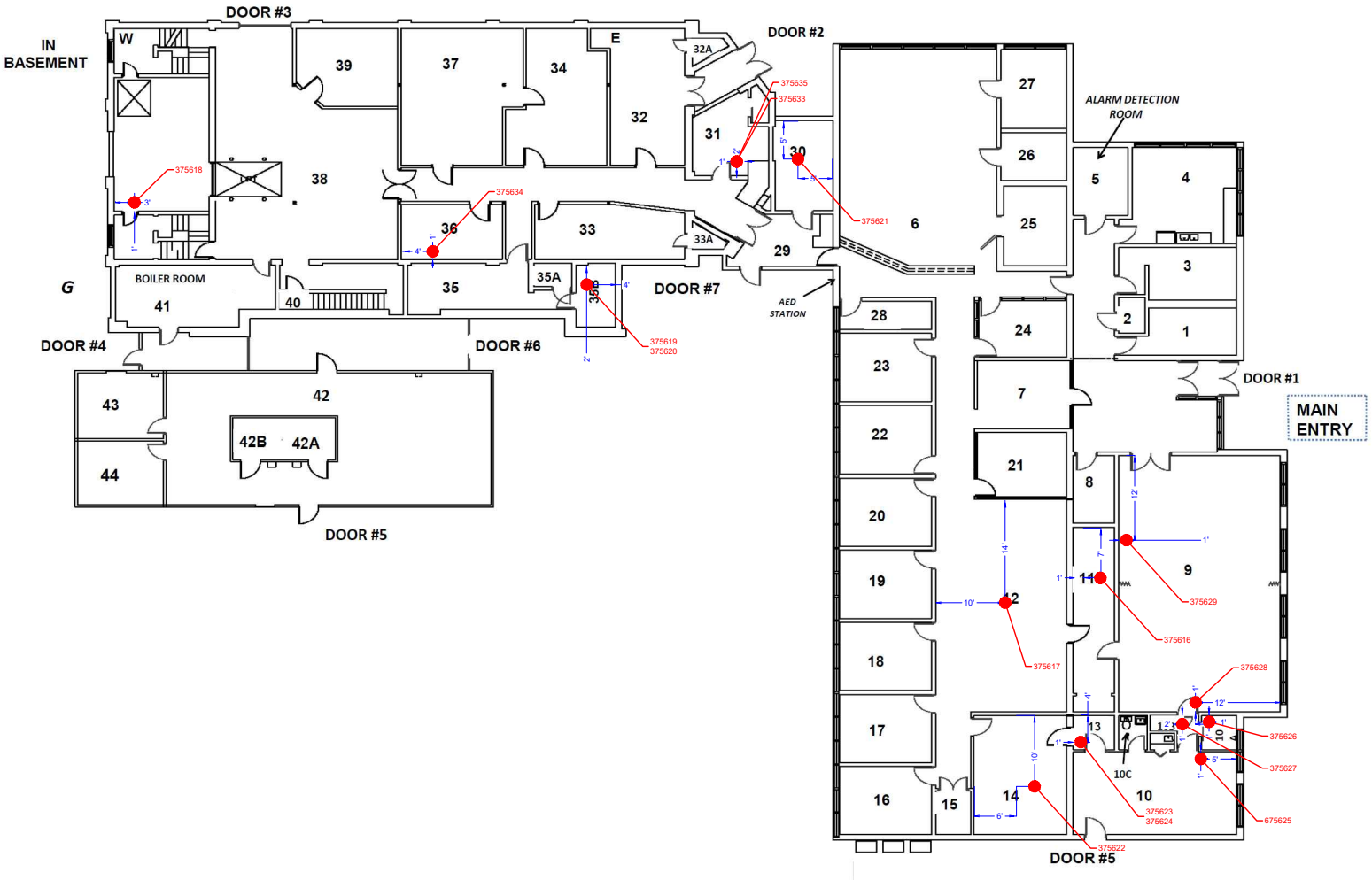
When one of the measurements is equal to or greater than 4.0 pCi/L and one is less than 4.0 pCi/L, and the higher result is greater than twice the lower result, the client is informed of the large discrepancy and the simultaneous tests repeated.

D3 Reconciliation with User Requirements

The final review of the project report shall include a determination of whether the information presented in the report meets the project scope of work and the client's needs.

Appendix B

Floor Plans – Radon Sampling Locations



1 RADON RESAMPLE LOCATIONS
GROUND LEVEL PLAN

NOT TO SCALE

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
School Service Center
417 Fifth 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

K:_comwpd\Projects\Radon Program\0000 ORGANIZATION FILES COMPLETED\East Aurora School District\School Service Center (McKnight)\2018\Long-Term Follow-Up Testing\12.11.2018 School Service Center Radon.dwg

Appendix C

Laboratory Analysis Report

RSSI

6312 West Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

June 14, 2019

Carnow, Conibear & Associates, Ltd.
Nicole Bennett
600 West Van Buren Street
Suite 500
Chicago, IL 60607
USA

Alpha Track Radon Test Results

Detector Number	pCi/L	Test Location	Test Address	Start Date	End Date	Note*
375601	1.6 ± 4%	Principal's Office 25A	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375602	1.7 ± 4%	Room 25	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375603	1.8 ± 4%	Nurse's Office 24	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375604	2.1 ± 4%	Conference Room 25B	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375605	2.2 ± 4%	Conference Room 25B	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375606	3.0 ± 3%	Room 25C	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375607	2.0 ± 4%	Room 25A	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375608	1.8 ± 4%	Room 15	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	1,

Analytical results showing the radon concentration relate only to the device(s) tested in the condition as received by RSSI. Results were calculated based on information provided by the client.

Detector Number	pCi/L	Test Location	Test Address	Start Date	End Date	Note*
375609	2.4 ± 4%	Classroom 16	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375610	3.3 ± 3%	Custodian Closet 3A	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375611	1.8 ± 4%	Classroom 17	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375612	3.3 ± 3%	Classroom 113	Waldo Middle School 56 Jackson Street Aurora, IL 60505	10/29/2018	6/6/2019	
375613	3.2 ± 3%	Classroom 113	Waldo Middle School 56 Jackson Street Aurora, IL 60505	10/29/2018	6/6/2019	
375614	1.8 ± 4%	Classroom 30	Rollins Elementary School 950 Kane Street Aurora, IL 60505	10/29/2018	6/6/2019	
375615	1.7 ± 4%	Classroom 30	Rollins Elementary School 950 Kane Street Aurora, IL 60505	10/29/2018	6/6/2019	
375616	3.2 ± 3%	Room 11	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375617	3.0 ± 3%	Room 12	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375618	4.8 ± 3%	Lower Level Storage	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375619	3.5 ± 3%	Room 35B	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	

Analytical results showing the radon concentration relate only to the device(s) tested in the condition as received by RSSI. Results were calculated based on information provided by the client.

Detector Number	pCi/L	Test Location	Test Address	Start Date	End Date	Note*
375620	3.4 ± 3%	Room 35B	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375621	4.9 ± 3%	Room 30	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375622	3.5 ± 3%	Room 14	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375623	3.9 ± 3%	Room 13	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375624	3.9 ± 3%	Room 13	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375625	5.9 ± 2%	Room 10	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375626	6.3 ± 2%	Room 10A	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375627	6.2 ± 2%	Room 10B	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375628	5.7 ± 3%	Room 9	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	
375629	5.2 ± 3%	Room 9	McKnight School Service Center 417 5th Street Aurora, IL 60505	10/29/2018	6/6/2019	

Analytical results showing the radon concentration relate only to the device(s) tested in the condition as received by RSSI. Results were calculated based on information provided by the client.

Detector Number	pCi/L	Test Location	Test Address	Start Date	End Date	Note*
375633	3.8 ± 3%	Room 31	McKnight School Service Center 417 5th Street Aurora, IL 60505	11/9/2018	6/6/2019	
375634	5.7 ± 3%	Room 36	McKnight School Service Center 417 5th Street Aurora, IL 60505	11/9/2018	6/6/2019	
375635	3.9 ± 3%	Room 31	McKnight School Service Center 417 5th Street Aurora, IL 60505	11/9/2018	6/6/2019	
375638	0.2 ± 12%	Classroom 112	Waldo Middle School 56 Jackson Street Aurora, IL 60505	10/29/2018	6/6/2019	
375639	0.1 ± 12%	Hallway	Krug Elementary School 240 Melrose Avenue Aurora, IL 60505	10/29/2018	6/6/2019	
375647	0.1 ± 13%	Classroom 31	Rollins Elementary School 950 Kane Street Aurora, IL 60505	10/29/2018	6/6/2019	
375650	0.2 ± 12%	Room 32	McKnight School Service Center 417 5th Street Aurora, IL 60505	11/9/2018	6/6/2019	

Analyzed By:  06/13/ 2019

Elektra Musich — Analysis Date

Radon Analyst

*****END REPORT*****

* 1-Broken Seal, 2-Damaged Filter, 3-Loose Test Material, 4-Missing Test Material, 5-Missing End Date, 6-Missing Start Date, 7-Less Than 8 Days, 8-Past Expiration Date, 9-Missing Both Dates, NA-No applicable notes

Analytical results showing the radon concentration relate only to the device(s) tested in the condition as received by RSSI. Results were calculated based on information provided by the client.

Appendix D

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