



MCPS RADON TESTING – EXECUTIVE SUMMARY

| | |
|--------------------------|--|
| Site Name | MacDonald Knolls Early Childhood Center |
| Date of Test Report | 2/16/2023 |
| Round of Testing | Initial Follow-up Post Remediation 2 Year Testing 5 Year Testing HVAC Upgrade Window Replacement New Addition New Facility |
| # Rooms Tested | 1 |
| # Rooms \geq 4.0 pCi/L | 0 |
| Lowest Value | <0.3 pCi/L |
| Highest Value | <0.3 pCi/L |

Project Status:

1. Post mitigation testing completed.



February 16, 2023

Mr. Brian Croyle
Environmental Specialist
Montgomery County Public Schools
Gaithersburg, MD 20879

Re: **Radon Testing Services**
KCI Job # 122210551

Location: MacDonald Knolls Early Childhood Center
10611 Tenbrook Drive
Silver Spring, MD 20901

Dear Mr. Croyle:

KCI Technologies, Inc. (KCI) is pleased to submit the following report to Montgomery County Public Schools (MCPS) pursuant to completing a “short-term” 3 day radon test for the MacDonald Knolls Early Childhood Center, located at 10611 Tenbrook Dr. Silver Spring, MD 20901 (subject site).

Scope of Services:

KCI conducted radon testing at the subject site to evaluate indoor radon levels relative to the USEPA's recommended action level of 4.0 picocuries per Liter (pCi/L) - the level at which EPA recommends that schools take action to reduce the level. KCI conducted the radon testing in accordance with American Association of Radon Scientists and Technologists (AARST) *Protocol for Conducting Measurements of Radon and Radon Decay Products in Schools and Large Buildings*. A National Radon Proficiency Program (NRPP) Radon Measurement Specialist (certification #111004 RT) supervised the testing. Additional information on radon management and the health effects of radon exposure is available from <https://www.montgomeryschoolsmd.org> or www.epa.gov/radon.

KCI visited the site on January 10, 2023 and deployed three (3) activated charcoal (AC) radon test kits. KCI deployed radon test kits in all frequently-occupied ground contact rooms, and other areas, (if applicable) in accordance with AARST guidance.

A floor plan map of the building with the test locations is included as Attachment A of this report.

As a quality control measure, KCI also included duplicate samples, field blanks, lab transit blanks, and office blanks in accordance with AARST recommendations. In addition, KCI submitted test kits to Bowser-Morner, Inc. as spike samples. The spiked tests were exposed to a known radon concentration by Bowser-Morner prior to being returned to the laboratory for analysis.

KCI returned to the site on January 13, 2023 to retrieve the radon sampling test kits. KCI shipped all radon tests via overnight delivery to Accustar Labs - MA for analysis by gamma-ray spectroscopy.

Accustar Labs - MA is a NRSB certified analytical laboratory for radon analysis (certification #ARL0017) located at 2 Saber Way, Ward Hill, MA 01835.

Evaluation of Testing Conditions:

These tests represent:

- Follow up to post mitigation biennial testing.

These tests were conducted to:

- Confirm the success of the mitigation system(s).

According to AARST, *Protocol for Conducting Measurements of Radon and Radon Decay Products in Schools and Large Buildings*, ideal testing conditions would be when the building is fully occupied and the heating system is active. For this test, the facility’s HVAC system was operating in heating mode; therefore, KCI concludes that this test was conducted during ideal testing conditions.

KCI recorded observations of the following conditions in each room during the time of deployment and collection of the radon test kits:

- Indoor temperature,
- HVAC Operation,
- Dehumidifier operation,
- Humidifier operation,
- Ceiling fan operation, and
- Open windows or doors.

KCI also compiled weather data for the testing period and conducted observations of relevant field conditions. During the test period, weather records indicate temperatures ranged from the 26°F to the mid 56°F. Maximum sustained winds ranged from 0-21 miles per hour. Average humidity was around 68% with .09 inches of precipitation (rain) was recorded during testing period.

Results:

The sampling locations and analytical results are listed on Table 1 (Attachment B). The quality control sample locations and analytical results are listed on Table 2 (Attachment B). Sampling locations and associated test kit identification numbers and relevant field observations are listed on Table 3 (Attachment B). The laboratory analytical results are included in Attachment C. Laboratory results and exposure data for the spike samples are also included in Attachment C.

The results of the radon test analysis indicated the following:

| Radon Concentration | Room | Result |
|----------------------------|------------------|---------------|
| ≥4.0 pCi/L | None | N/A |
| <4.0 pCi/L | See Attachment B | |

| Quality Control Samples | |
|--------------------------------|--|
| Results of Blank Canisters: | The office blanks, and lab transit blanks had test results of less than the laboratory detection limit of 0.3 pCi/L. |
| Adequate Laboratory Precision? | Review of the duplicate sample analysis indicates that adequate laboratory measurement precision was achieved. |
| Spike Sample Analysis: | The Spike Sample analysis results indicate the laboratory is operating within statistical control limits. |

Our professional services have been performed in accordance with customary principles and practices in the field of industrial hygiene and engineering. If you have any questions or comments regarding this report, please feel free to contact me at (410) 891-1769.

Sincerely,



Tyler P. McCleaf
Radon Measurement Provider
#111004 RT
KCI Technologies, Inc.

Attachments: A- Floor Plan with Test Locations
 B- Table 1-3, Radon Test Summary Spreadsheets
 C- Laboratory Analytical Results

ATTACHMENT A

Floor Plan With Test Locations

ATTACHMENT B

Radon Test Summary Spreadsheet

Table Notes:

AC- Activated Charcoal

ACI- Air Check, Inc.

D- Duplicate

FB- Field Blank

KCI- KCI Technologies, Inc.

OB- Office Blank

PM- Project Manager

OC- Quality Control

| Table 1- Radon Testing Results | | |
|--------------------------------------|-------------|--------|
| MacDonald Knolls ECC | | |
| Test Period: 01/10/2023 - 01/13/2023 | | |
| | | |
| Kit Number | Room / Area | Result |
| 11288402 | 10 | < 0.3 |
| 11288407 | 10 | < 0.3 |
| 11288600 | 10 | < 0.3 |

| Table 2- Radon Testing Results | | | |
|----------------------------------|---------|--------------|--------|
| MacDonald Knolls ECC | | | |
| Test Period: 01/10/23 - 01/13/23 | | | |
| | | | |
| Kit Number | QC Type | Room / Area | Result |
| 11288407 | D | 10 | < 0.3 |
| 11288402 | FB | 10 | < 0.3 |
| 11285162 | OB | OFFICE BLANK | < 0.3 |
| 11284899 | TB | TRAVEL BLANK | < 0.3 |

| Summary of Missed Locations | | |
|----------------------------------|-----------|--------|
| MacDonald Knolls ECC | | |
| Test Period: 01/10/23 - 01/13/23 | | |
| Kit Number | Room/Area | Result |
| | N/A | |
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| Summary of Missing, Compromised and >= 4 piC/L Tests | | |
|--|-----------|--------|
| MacDonald Knolls ECC | | |
| Test Period: 01/10/23 - 01/13/23 | | |
| Kit Number | Room/Area | Result |
| | N/A | |
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Table Note:
* Missing or Compromised Sample

ATTACHMENT C

Laboratory Analytical Results

January 16, 2023

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

**MACDONALD KNOLLS ECC
MAIN**

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|--------------|----------------|-----------------------|-----------------------|--------------|-----------------|
| 11288402 | 10 | 2023-01-10 @ 12:00 pm | 2023-01-13 @ 12:00 pm | < 0.3 | 2023-01-16 |
| 11288407 | 10 | 2023-01-10 @ 12:00 pm | 2023-01-13 @ 12:00 pm | < 0.3 | 2023-01-16 |
| 11288600 | 10 | 2023-01-10 @ 12:00 pm | 2023-01-13 @ 12:00 pm | < 0.3 | 2023-01-16 |

Air Chek 1936 Butler Bridge Rd, Mills River, NC 28759-3892 Phone: (828) 684-0893 Fax: (828) 684-8498

EXPOSURE IN BOWSER-MORNER RADON CHAMBER

CLIENT KC1 TECHNOLOGIES, INC Job Number 208343

NOMINAL Conditions: Radon Conc 34.7 pCi/L Rel. Hum 49.4 % Temp. 69.6 F

Date Start: 12/24/22 Date Stop: 12/27/22 Date Start: _____ Date Stop: _____

Time Start: 0810 Time Stop: 0810 Time Start: _____ Time Stop: _____

Device No.'s: (5) CHAR BAGS - Device No.'s: _____

11285109, 11285110, 11285101

THRU 11285103

BY LEFT

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

Device No.'s: _____ Device No.'s: _____

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

Device No.'s: _____ Device No.'s: _____

Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

December 29, 2022

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

OFFICE

MAIN

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|--------------|----------------|----------------------|----------------------|--------------|-----------------|
| 11285110 | SK1 | 2022-12-24 @ 8:00 am | 2022-12-27 @ 8:00 am | 31.7 ± 2.5 | 2022-12-29 |
| 11285101 | SK2 | 2022-12-24 @ 8:00 am | 2022-12-27 @ 8:00 am | 30.1 ± 2.4 | 2022-12-29 |
| 11285103 | SK3 | 2022-12-24 @ 8:00 am | 2022-12-27 @ 8:00 am | 34.0 ± 2.7 | 2022-12-29 |
| 11285102 | SK4 | 2022-12-24 @ 8:00 am | 2022-12-27 @ 8:00 am | 30.9 ± 2.5 | 2022-12-29 |
| 11285109 | SK5 | 2022-12-24 @ 8:00 am | 2022-12-27 @ 8:00 am | 32.0 ± 2.6 | 2022-12-29 |

Air Chek 1936 Butler Bridge Rd, Mills River, NC 28759-3892 Phone: (828) 684-0893 Fax: (828) 684-8498



Radon Test Kit Chain of Custody

Project Name: MCPS Radon – Week 1 January Schools

Name of Schools:

1. Woodfield ES
2. Montgomery Village MS
3. Albert Einstein HS
4. Garrett Park Annex
5. Garrett Park ES
6. Kensington-Parkwood ES
7. Silver Creek MS
8. Stephen Knolls School
9. Highland View ES
10. MacDonald Knolls ECC
11. Montgomery Knolls ES
12. Rock Terrace HS

| | Date | Initials |
|----------------------------------|------------|----------|
| Radon Test Kits Deployed | 01/10/2023 | BMM |
| Radon Test Kits Collected | 01/13/2023 | BMM |
| Radon Test Kits Shipped to Lab* | 01/13/2023 | BMM |
| Radon Test Kits Received by Lab* | 01/17/2023 | BMM |

*All samples sent to Air Check, Inc., 2 Saber Way, Ward Hill, MA 01835



MCPS RADON TESTING – EXECUTIVE SUMMARY

| | |
|--------------------------|---|
| Site Name | MacDonald Knolls ECC |
| Date of Test Report | 03/14/2022 |
| Round of Testing | Initial <u>Follow-up</u> Post Remediation 2 Year Testing 5 Year Testing HVAC Upgrade Window Replacement New Addition New Facility |
| # Rooms Tested | 3 |
| # Rooms \geq 4.0 pCi/L | 0 |
| Lowest Value | <0.3 pCi/L |
| Highest Value | 2.9 pCi/L |

Project Status

Current Project Status at this time: Testing Completed; Remediation Plan for Room 10.



March 14, 2022

Mr. Brian Croyle, PG, CHMM
Environmental Specialist
Montgomery County Public Schools
Gaithersburg, MD 20879

Re: **Radon Testing Services**
KCI Job # 122108316

Location: MacDonal Knolls ECC
10611 Tenbrook Dr.
Silver Spring, MD 20901

Dear Mr. Croyle:

KCI Technologies, Inc. (KCI) is pleased to submit the following report to Montgomery County Public Schools (MCPS) pursuant to completing a “short-term” 3 day radon test for MacDonal Knolls ECC, located at 10611 Tenbrook Dr. Silver Spring, MD 20901 (subject site).

Scope of Services:

KCI conducted radon testing at the subject site to evaluate indoor radon levels relative to the USEPA's recommended action level of 4.0 picocuries per Liter (pCi/L) - the level at which EPA recommends that schools take action to reduce the level. KCI conducted the radon testing in accordance with American Association of Radon Scientists and Technologists (AARST) *Protocol for Conducting Measurements of Radon and Radon Decay Products in Schools and Large Buildings*. A National Radon Proficiency Program (NRPP) Radon Measurement Specialist (certification #111004 RT) supervised the testing. Additional information on radon management and the health effects of radon exposure is available from <https://www.montgomeryschoolsmd.org> or www.epa.gov/radon.

KCI visited the site on January 18, 2022 and five (5) activated charcoal (AC) radon test kits. KCI deployed radon test kits in all frequently-occupied ground contact rooms, and other areas, (if applicable) in accordance with AARST guidance.

KCI sampled the following locations during this follow-up test:

1. Rooms with missing test kits from the December 2021 testing period (i.e. test kit was deployed but not recovered),
2. Rooms with invalidated test kits from the December 2021 testing period (e.g. an open window in the room or disturbed test kit),
3. Rooms which were locked/inaccessible during the December 2021 testing period,
4. Rooms with elevated December 2021 results (i.e. ≥ 3.5 pCi/L),
5. Rooms previously tested for radon but not tested in December 2021, and
6. Additional rooms that require testing (if applicable.)

A floor plan map of the building with the test locations is included as Attachment A of this report.

As a quality control measure, KCI also included duplicate samples, field blanks, lab transit blanks, and office blanks in accordance with AARST recommendations. In addition, KCI submitted test kits to Bowser-Morner, Inc. as spike samples. The spiked tests were exposed to a known radon concentration by Bowser-Morner prior to being returned to the laboratory for analysis.

KCI returned to the site on January 21, 2022 to retrieve the radon sampling test kits. KCI shipped all radon tests via overnight delivery to Airchek, Inc. for analysis by gamma-ray spectroscopy. Airchek, Inc. is a NRSB certified analytical laboratory for radon analysis (certification # ARL1402) located at 1936 Butler Bridge Road, Mills River, North Carolina.

Evaluation of Testing Conditions:

These tests represent:

- Follow-up to initial testing.

These tests were conducted to:

- Evaluate radon concentrations at the facility.

According to AARST, *Protocol for Conducting Measurements of Radon and Radon Decay Products in Schools and Large Buildings*, ideal testing conditions would be when the building is fully occupied and the heating system is active. For this test, the facility's HVAC system was operating in heating mode; therefore, KCI concludes that this test was conducted during ideal testing conditions.

KCI recorded observations of the following conditions in each room during the time of deployment and collection of the radon test kits:

- Indoor temperature,
- HVAC Operation,
- Dehumidifier operation,
- Humidifier operation,
- Ceiling fan operation, and
- Open windows or doors.

KCI also compiled weather data for the testing period and conducted observations of relevant field conditions. During the test period, weather records indicate low temperatures were in the low 20°Fs and high temperatures ranged from the mid 20°Fs to the high 50°Fs. Maximum sustained winds ranged from 9-11 miles per hour. Average humidity was around 61% with 0.0 inches of precipitation (rain) was recorded during testing period.

Results:

The sampling locations and analytical results are listed on Table 1 (Attachment B). The quality control sample locations and analytical results are listed on Table 2 (Attachment B). Sampling locations and associated test kit identification numbers and relevant field observations are listed on Table 3 (Attachment B). The laboratory analytical results are included in Attachment C. Laboratory results and exposure data for the spike samples are also included in Attachment C.

The results of the radon test analysis indicated the following:

| Radon Concentration | Room | Result |
|---------------------|------------------|--------|
| ≥4.0 pCi/L | None | NA |
| <4.0 pCi/L | See Attachment B | |

| Quality Control Samples | |
|--------------------------------|--|
| Results of Blank Canisters: | The office blanks, and lab transit blanks had test results of less than the laboratory detection limit of 0.3 pCi/L. |
| Adequate Laboratory Precision? | Review of the duplicate sample analysis indicates that adequate laboratory measurement precision was achieved. |
| Spike Sample Analysis: | The Spike Sample analysis results indicate the laboratory is operating within statistical control limits. |

Our professional services have been performed in accordance with customary principles and practices in the field of industrial hygiene and engineering. If you have any questions or comments regarding this report, please feel free to contact me at (410) 891-1769.

Sincerely,



Tyler P. McCleaf
Radon Measurement Provider
#111004 RT
KCI Technologies, Inc.

Attachments: A- Floor Plan with Test Locations
 B- Table 1-3, Radon Test Summary Spreadsheets
 C- Laboratory Analytical Results

ATTACHMENT A

Floor Plan With Test Locations

ATTACHMENT B

Radon Test Summary Spreadsheets

Table Notes:

AC- Activated Charcoal

ACI- Air Check, Inc.

D- Duplicate

FB- Field Blank

KCI- KCI Technologies, Inc.

OB- Office Blank

PM- Project Manager

OC- Quality Control

| Table 1- Radon Testing Results | | |
|------------------------------------|-------------------|--------|
| Macdonald Knolls ECC RT | | |
| Test Period: 01/18/2022-01/21/2022 | | |
| | | |
| Kit Number | Room / Area | Result |
| 11106903 | 10 | 2.9 |
| 11106906 | 10 | 2.8 |
| 11106902 | MPAC INNER OFFICE | 0.9 |
| 11106905 | MPAC INNER OFFICE | < 0.3 |
| 11106901 | MPAC OFFICE | 0.7 |

| Table 2- Radon Testing Results | | | |
|--------------------------------|---------|-------------------|--------|
| Macdonald Knolls ECC RT | | | |
| Test Period: 01/18/22-01/21/22 | | | |
| | | | |
| Kit Number | QC Type | Room / Area | Result |
| 11106903 | D | 10 | 2.9 |
| 11106905 | FB | Mpac inner office | < 0.3 |

| Summary of Missed Locations | | |
|----------------------------------|-----------|--------|
| Macdonald Knolls ECC RT | | |
| Test Period: 01/18/22 - 01/21/22 | | |
| Kit Number | Room/Area | Result |
| | NA | |
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| Summary of Missing, Compromised and ≥ 4 piC/L Tests | | |
|--|-----------|--------|
| Macdonald Knolls ECC RT | | |
| Test Period: 01/18/22 - 01/21/22 | | |
| Kit Number | Room/Area | Result |
| | NA | |
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Table Note:
 * Missing or Compromised Sample

ATTACHMENT C

Laboratory Analytical Results

P4792 / WILLIAM LYMAN

| Kit Number | Start Date | Start Time | End Date | End Time | Temp. | Facility | Building | Room | Project ID | Floor | Result |
|------------|------------|------------|------------|----------|-------|------------------------|----------|-------------------|------------|-------|--------|
| 11106901 | 2022-01-18 | 8:00 am | 2022-01-21 | 9:00 am | 72 | MACDONALD KNOLLS ES RT | MAIN | MPAC OFFICE | | 1 | 0.7 |
| 11106902 | 2022-01-18 | 8:00 am | 2022-01-21 | 9:00 am | 72 | MACDONALD KNOLLS ES RT | MAIN | MPAC INNER OFFICE | | 1 | 0.9 |
| 11106903 | 2022-01-18 | 8:00 am | 2022-01-21 | 9:00 am | 72 | MACDONALD KNOLLS ES RT | MAIN | 10 | | 1 | 2.9 |
| 11106905 | 2022-01-18 | 8:00 am | 2022-01-21 | 9:00 am | 72 | MACDONALD KNOLLS ES RT | MAIN | MPAC INNER OFFICE | | 1 | < 0.3 |
| 11106906 | 2022-01-18 | 8:00 am | 2022-01-21 | 9:00 am | 72 | MACDONALD KNOLLS ES RT | MAIN | 10 | | 1 | 2.8 |

EXPOSURE IN BOWSER-MORNER RADON CHAMBER

CLIENT KCI Technologies, Inc. Job Number 203404

NOMINAL Conditions: Radon Conc 16.2 pCi/L Rel. Hum 28.8 % Temp. 59.9 F

Date Start: 12/24/21 Date Stop: 12/27/21 Date Start: _____ Date Stop: _____

Time Start: 0809 Time Stop: 0809 Time Start: _____ Time Stop: _____

Device No.'s: (2) Char Bags- Device No.'s: _____

9341721, 9341722

64 left

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

Device No.'s: _____ Device No.'s: _____

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

Device No.'s: _____ Device No.'s: _____

Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

December 31, 2021

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

SK
MA MCPS - Spike Sample Lab Results. Measured values are satisfactory, i.e., within $\pm 25\%$ of the chamber's reference value (16.2 pCi/L).

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|--------------|----------------|----------------------|----------------------|----------------|-----------------|
| 9341721 | 1 | 2021-12-24 @ 8:00 am | 2021-12-27 @ 8:00 am | 11.6 \pm 0.9 | 2021-12-31 |
| 9341722 | 1 | 2021-12-24 @ 8:00 am | 2021-12-27 @ 8:00 am | 15.4 \pm 1.2 | 2021-12-31 |

Air Chek 1936 Butler Bridge Rd, Mills River, NC 28759-3892 Phone: (828) 684-0893 Fax: (828) 684-8498



Radon Test Kit Chain of Custody

Project Name: MCPS Radon – December 2021 Schools Retesting

Name of Schools:

1. 45 Gude
2. Bethesda M&T
3. Darnestown ES
4. McDonald Knolls ECC
5. Shady Grove M&T

| | Date | Initials |
|----------------------------------|------------|----------|
| Radon Test Kits Deployed | 01/18/2022 | DM |
| Radon Test Kits Collected | 01/21/2022 | DM |
| Radon Test Kits Shipped to Lab* | 01/21/2022 | DM |
| Radon Test Kits Received by Lab* | 01/23/2022 | DM |

*All samples sent to Air Check, Inc., 1936 Butler Bridge Rd, Mills River, NC 28759



MCPS RADON TESTING – EXECUTIVE SUMMARY

| | |
|--------------------------|---|
| Site Name | MacDonald Knolls ECC |
| Date of Test Report | 01/20/2022 |
| Round of Testing | <p>Initial</p> <p>Follow-up</p> <p>Post Remediation</p> <p>2 Year Testing</p> <p>5 Year Testing</p> <p>HVAC Upgrade</p> <p>Window Replacement</p> <p>New Addition</p> <p>New Facility</p> |
| # Rooms Tested | 28 |
| # Rooms \geq 4.0 pCi/L | 1 |
| Lowest Value | <0.3 pCi/L |
| Highest Value | 5.9 pCi/L |

Project Status

Current Project Status at this time: Testing Complete; missing locations to be sampled; elevated tests to be re-sampled.



January 20, 2022

Mr. Richard Cox
Indoor Air Quality Team Leader
Montgomery County Public Schools
Gaithersburg, MD 20879

Re: **Radon Testing Services**
KCI Job # 122108316

Location: MacDonal Knolls ECC
10611 Tenbrook Dr.
Silver Spring, MD 20901

Dear Mr. Cox:

KCI Technologies, Inc. (KCI) is pleased to submit the following report to Montgomery County Public Schools (MCPS) pursuant to completing a “short-term” 3 day radon test for MacDonal Knolls ECC, located at 10611 Tenbrook Dr. Silver Spring, MD 20901 (subject site).

Scope of Services:

KCI conducted radon testing at the subject site to evaluate indoor radon levels relative to the USEPA's recommended action level of 4.0 picocuries per Liter (pCi/L) - the level at which EPA recommends that schools take action to reduce the level. KCI conducted the radon testing in accordance with American Association of Radon Scientists and Technologists (AARST) *Protocol for Conducting Measurements of Radon and Radon Decay Products in Schools and Large Buildings*. A National Radon Proficiency Program (NRPP) Radon Measurement Specialist (certification #111004 RT) supervised the testing. Additional information on radon management and the health effects of radon exposure is available from <https://www.montgomeryschoolsmd.org> or www.epa.gov/radon.

KCI visited the site on December 13, 2021 and deployed thirty-two (32) activated charcoal (AC) radon test kits. KCI deployed radon test kits in all frequently-occupied ground contact rooms, and other areas, (if applicable) in accordance with AARST guidance.

A floor plan map of the building with the test locations is included as Attachment A of this report.

As a quality control measure, KCI also included duplicate samples, field blanks, lab transit blanks, and office blanks in accordance with AARST recommendations. In addition, KCI submitted test kits to Bowser-Morner, Inc. as spike samples. The spiked tests were exposed to a known radon concentration by Bowser-Morner prior to being returned to the laboratory for analysis.

KCI returned to the site on December 16, 2021 to retrieve the radon sampling test kits. KCI shipped all radon tests via overnight delivery to Airchek, Inc. for analysis by gamma-ray spectroscopy. Airchek, Inc. is a NRSB certified analytical laboratory for radon analysis (certification # ARL1402) located at 1936 Butler Bridge Road, Mills River, North Carolina.

Evaluation of Testing Conditions:

These tests represent:

- Initial testing.

These tests were conducted to:

- Evaluate radon concentrations at the facility.

According to AARST, *Protocol for Conducting Measurements of Radon and Radon Decay Products in Schools and Large Buildings*, ideal testing conditions would be when the building is fully occupied and the heating system is active. For this test, the facility's HVAC system was operating in heating mode; therefore, KCI concludes that this test was conducted during ideal testing conditions.

KCI recorded observations of the following conditions in each room during the time of deployment and collection of the radon test kits:

- Indoor temperature,
- HVAC Operation,
- Dehumidifier operation,
- Humidifier operation,
- Ceiling fan operation, and
- Open windows or doors.

KCI also compiled weather data for the testing period and conducted observations of relevant field conditions. During the test period, weather records indicate low temperatures were in the low 30°Fs and high temperatures ranged from the mid 50°Fs to the high 60°Fs. Maximum sustained winds ranged from 3-12 miles per hour. Average humidity was around 50% with 0.0 inches of precipitation (rain) was recorded during testing period.

Results:

The sampling locations and analytical results are listed on Table 1 (Attachment B). The quality control sample locations and analytical results are listed on Table 2 (Attachment B). Sampling locations and associated test kit identification numbers and relevant field observations are listed on Table 3 (Attachment B). The laboratory analytical results are included in Attachment C. Laboratory results and exposure data for the spike samples are also included in Attachment C.

The results of the radon test analysis indicated the following:

| Radon Concentration | Room | Result |
|----------------------------|------------------|---------------|
| ≥4.0 pCi/L | 10 | 5.9 |
| <4.0 pCi/L | See Attachment B | |

| Quality Control Samples | |
|--------------------------------|--|
| Results of Blank Canisters: | The office blanks, and lab transit blanks had test results of less than the laboratory detection limit of 0.3 pCi/L. |
| Adequate Laboratory Precision? | Review of the duplicate sample analysis indicates that adequate laboratory measurement precision was achieved. |
| Spike Sample Analysis: | The Spike Sample analysis results indicate the laboratory is operating within statistical control limits. |

Our professional services have been performed in accordance with customary principles and practices in the field of industrial hygiene and engineering. If you have any questions or comments regarding this report, please feel free to contact me at (410) 891-1769.

Sincerely,



Tyler P. McCleaf
Radon Measurement Provider
#111004 RT
KCI Technologies, Inc.

Attachments: A- Floor Plan with Test Locations
 B- Table 1-3, Radon Test Summary Spreadsheets
 C- Laboratory Analytical Results

ATTACHMENT A

Floor Plan With Test Locations

ATTACHMENT B

Radon Test Summary Spreadsheets

Table Notes:

AC- Activated Charcoal

ACI- Air Check, Inc.

D- Duplicate

FB- Field Blank

KCI- KCI Technologies, Inc.

OB- Office Blank

PM- Project Manager

OC- Quality Control

| Table 1- Radon Testing Results | | |
|------------------------------------|-------------------|--------|
| MacDonald Knoll ECC | | |
| Test Period: 12/13/2021-12/16/2021 | | |
| Kit Number | Room / Area | Result |
| 9341734 | 8 | 1.3 |
| 9341736 | GYM | 1.5 |
| 9341740 | 6 | 1.2 |
| 9341742 | HEALTH ROOM | 2.8 |
| 9341743 | MPR | < 0.3 |
| 9341745 | 15 | 0.8 |
| 9341747 | 7 | 2 |
| 9341748 | KITCHEN OFFICE | 1.3 |
| 9341760 | 13 | 1.1 |
| 9341762 | 16 | 0.8 |
| 9341769 | 12 | 0.9 |
| 9341776 | 5 | 1.4 |
| 9341779 | 10 | 5.9 |
| 9341780 | 17 | 0.5 |
| 9341782 | 9 | 1.3 |
| 9341783 | MPR | 1.1 |
| 9341784 | SHERRY O | 1.5 |
| 9341786 | COORDINATOR | 2 |
| 9341790 | 11 | 0.7 |
| 9341791 | OFFICE | 0.8 |
| 9341793 | 1 | 1.7 |
| 9341799 | MPR OFFICE | 1.1 |
| 9341800 | MPR OFFICE | 1.2 |
| 9346985 | 4 | 1.6 |
| 9346987 | 3 | 1.8 |
| 9346994 | 14 | 1.2 |
| 9346998 | OFFICE | 0.6 |
| 9348374 | 5 | 1.6 |
| 9348381 | BUILDING SERVICES | 3.7 |
| 9348384 | 2B | 2.4 |
| 9348389 | 2A | 2.3 |
| 9348392 | NURSE | 0.7 |

| Table 2- Radon Testing Results | | | |
|------------------------------------|---------|--------------|--------|
| MacDonald Knolls ECC | | | |
| Test Period: 12/13/2021-12/16/2021 | | | |
| | | | |
| Kit Number | QC Type | Room / Area | Result |
| 9348374 | D | 5 | 1.6 |
| 9341743 | FB | MPR | < 0.3 |
| 9341800 | D | MPR Office | 1.2 |
| 9341791 | D | Office | 0.8 |
| 9347000 | OB | OFFICE BLANK | < 0.3 |
| 9347992 | TB | TRAVEL BLANK | < 0.3 |

| Summary of Missed Locations | | |
|--------------------------------------|-------------------------------|--------|
| MacDonald Knolls ECC | | |
| Test Period: 12/13/2021 - 12/16/2021 | | |
| Kit Number | Room/Area | Result |
| NA | Office 1 in South Wing-Locked | NA |
| NA | Office 2 in South Wing-Locked | NA |
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| Summary of Missing, Compromised and ≥ 4 piC/L Tests | | |
|--|-----------|--------|
| MacDonald Knolls ECC | | |
| Test Period: 12/13/2021 - 12/16/2021 | | |
| Kit Number | Room/Area | Result |
| 9341779 | 10 | 5.9 |
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Table Note:
* Missing or Compromised Sample

ATTACHMENT C

Laboratory Analytical Results

Radon test result report for:
**MACDONALD KNOLLS ECC
 MAIN**

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|---------|-------------------|-----------------------|----------------------|-----------|------------|
| 9341793 | 1 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.7 ± 0.3 | 2021-12-17 |
| 9341779 | 10 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 5.9 ± 0.5 | 2021-12-17 |
| 9341790 | 11 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 0.7 ± 0.3 | 2021-12-17 |
| 9341769 | 12 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 0.9 ± 0.3 | 2021-12-17 |
| 9341760 | 13 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 1.1 ± 0.3 | 2021-12-17 |
| 9346994 | 14 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 1.2 ± 0.3 | 2021-12-17 |
| 9341745 | 15 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 0.8 ± 0.3 | 2021-12-17 |
| 9341762 | 16 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 0.8 ± 0.3 | 2021-12-17 |
| 9341780 | 17 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 0.5 ± 0.3 | 2021-12-17 |
| 9348389 | 2A | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 2.3 ± 0.3 | 2021-12-17 |
| 9348384 | 2B | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 2.4 ± 0.3 | 2021-12-17 |
| 9346987 | 3 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.8 ± 0.3 | 2021-12-17 |
| 9346985 | 4 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.6 ± 0.3 | 2021-12-17 |
| 9341776 | 5 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.4 ± 0.3 | 2021-12-17 |
| 9348374 | 5 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.6 ± 0.3 | 2021-12-17 |
| 9341740 | 6 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.2 ± 0.3 | 2021-12-17 |
| 9341747 | 7 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 2.0 ± 0.3 | 2021-12-17 |
| 9341734 | 8 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.3 ± 0.3 | 2021-12-17 |
| 9341782 | 9 | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.3 ± 0.3 | 2021-12-17 |
| 9348381 | BUILDING SERVICES | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 3.7 ± 0.3 | 2021-12-17 |
| 9341786 | COORDINATOR | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 2.0 ± 0.3 | 2021-12-17 |
| 9341736 | GYM | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.5 ± 0.3 | 2021-12-17 |
| 9341742 | HEALTH ROOM | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 2.8 ± 0.3 | 2021-12-17 |
| 9341748 | KITCHEN OFFICE | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.3 ± 0.3 | 2021-12-17 |
| 9341783 | MPR | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.1 ± 0.3 | 2021-12-17 |
| 9341743 | MPR | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | < 0.3 | 2021-12-17 |
| 9341799 | MPR OFFICE | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.1 ± 0.3 | 2021-12-17 |
| 9341800 | MPR OFFICE | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 1.2 ± 0.3 | 2021-12-17 |
| 9348392 | NURSE | 2021-12-13 @ 10:00 am | 2021-12-16 @ 8:00 am | 0.7 ± 0.3 | 2021-12-17 |
| 9346998 | OFFICE | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 0.6 ± 0.3 | 2021-12-17 |
| 9341791 | OFFICE | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 0.8 ± 0.3 | 2021-12-17 |
| 9341784 | SHERRY O | 2021-12-13 @ 10:00 am | 2021-12-16 @ 9:00 am | 1.5 ± 0.3 | 2021-12-17 |

EXPOSURE IN BOWSER-MORNER RADON CHAMBER

CLIENT KCI Technologies, Inc. Job Number 203404

NOMINAL Conditions: Radon Conc 16.2 pCi/L Rel. Hum 28.8 % Temp. 59.9 F

Date Start: 12/24/21 Date Stop: 12/27/21 Date Start: _____ Date Stop: _____

Time Start: 0809 Time Stop: 0809 Time Start: _____ Time Stop: _____

Device No.'s: (2) Char Bags- Device No.'s: _____

9341721, 9341722

G4 left

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

Device No.'s: _____ Device No.'s: _____

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

Device No.'s: _____ Device No.'s: _____

Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

December 31, 2021

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

SK
MA MCPS - Spike Sample Lab Results. Measured values are satisfactory, i.e., within $\pm 25\%$ of the chamber's reference value (16.2 pCi/L).

| Kit # | Room Id | Started | Ended | pCi/L | Analyzed |
|--------------|----------------|----------------------|----------------------|----------------|-----------------|
| 9341721 | 1 | 2021-12-24 @ 8:00 am | 2021-12-27 @ 8:00 am | 11.6 \pm 0.9 | 2021-12-31 |
| 9341722 | 1 | 2021-12-24 @ 8:00 am | 2021-12-27 @ 8:00 am | 15.4 \pm 1.2 | 2021-12-31 |

Air Chek 1936 Butler Bridge Rd, Mills River, NC 28759-3892 Phone: (828) 684-0893 Fax: (828) 684-8498



Radon Test Kit Chain of Custody

Project Name: MCPS Radon - December 2021 Schools

Name of Schools:

1. Ewing at Cloverleaf Center
2. Bethesda Main. & Tran.
3. Clarksburg ES Annex
4. Clarksburg Main. & Tran.
5. Taylor Learning Center
6. Darnestown ES
7. Shady Grove Main. & Tran.

| | Date | Initials |
|----------------------------------|------------|----------|
| Radon Test Kits Deployed | 12/14/2021 | JM |
| Radon Test Kits Collected | 12/17/2021 | JM |
| Radon Test Kits Shipped to Lab* | 12/17/2021 | JM |
| Radon Test Kits Received by Lab* | 12/18/2021 | JM |

*All samples sent to Air Check, Inc., 1936 Butler Bridge Rd, Mills River, NC 28759