



MCPS RADON TESTING – EXECUTIVE SUMMARY

Site Name	Twinbrook Elementary School
Date of Test Report	4/6/2022
Round of Testing	Initial Follow-up Post Remediation 2 Year Testing 5 Year Testing HVAC Upgrade Window Replacement New Addition New Facility
# Rooms Tested	60
# Rooms ≥ 4.0 pCi/L	0
Lowest Value	<0.3 pCi/L
Highest Value	1.9 pCi/L

Project Status:
Initial testing completed; no further action needed.



April 6, 2022

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

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

Location: Twinbrook ES
5911 Ridgeway Ave.
Rockville, MD 20851

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 Twinbrook ES, located at 5911 Ridgeway Ave. Rockville, MD 20851 (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 February 7, 2022 and deployed sixty eight (68) 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 February 10, 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 concentration levels 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 30s and high temperatures ranged from the mid 30s to the mid 50s Fahrenheit. Maximum sustained winds ranged from 3-12 miles per hour. Average humidity was around 23% with 0.1 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		
Twinbrook ES		
Test Period: 02/7/2022 - 02/10/2022		
Kit Number	Room / Area	Result
11106132	100	1.0
11107349	101	1.2
11107368	102	0.6
11107348	103	0.5
11107384	104	< 0.3
11107367	105	< 0.3
11107366	107	0.9
11107301	108	0.9
11107347	109	< 0.3
11105799	110	< 0.3
11107316	111	< 0.3
11107358	111	< 0.3
11107351	112	1.2
11107350	113	< 0.3
11114530	113	< 0.3
11114527	115	< 0.3
11107340	116	0.7
11114528	117	< 0.3
11107339	118	0.8
11107354	118	< 0.3
11107359	118	1.5
11114529	119	< 0.3
11107373	200	0.6
11107374	201	1.0
11107381	202	< 0.3
11107375	203	< 0.3
11107365	204	< 0.3
11107380	205	< 0.3
11107355	207	0.6
11107360	207	< 0.3
11107353	209	0.7
11114521	300	0.9
11114514	301	< 0.3
11114520	302	0.7
11114519	303	< 0.3
11114518	304	0.9
11114513	305	0.9
11114516	306	1.0
11114522	307	0.9
11114523	308	1.4
11114515	309	1.5
11114517	309	< 0.3

Table 1- Radon Testing Results		
Twinbrook ES		
Test Period: 02/7/2022 - 02/10/2022		
Kit Number	Room / Area	Result
11114512	310	< 0.3
11114524	311	< 0.3
11114525	401	< 0.3
11114502	ASST PRINCIPALS OFFICE	< 0.3
11114507	B1	< 0.3
11114506	B3	< 0.3
11114508	B5	< 0.3
11114509	B7	< 0.3
11114510	BASEMENT PRINTER CLOSET	0.6
11107382	BUILDING SERVICES	< 0.3
11107371	CAF	0.8
11107341	COM	1.0
11107357	COMP	0.6
11114504	FILE ROOM	1.1
11107361	GYM	1.1
11107362	GYM	0.9
11114503	HEALTH ROOM	0.6
11114505	MAIN OFFICE	0.9
11107331	MC	0.8
11114526	MULTIPURPOSE ROOM	< 0.3
11114531	MULTIPURPOSE ROOM	1.1
11107356	PIANO ROOM	1.1
11114501	PRINCIPALS OFFICE	1.0
11114511	SMALL GROUP ROOM	0.7
11107383	STAFF LOUNGE	1.9
11107376	WR	1.5

Table 2- Radon Testing Results			
Twinbrook ES			
Test Period: 02/7/2022 - 02/10/2022			
Kit Number	QC Type	Room / Area	Result
11107316	D	111	< 0.3
11107359	D	118	1.5
11107354	FB	118	< 0.3
11107355	D	207	0.6
11114511	D	Small Group Room	0.7
11114523	D	308	1.4
11114517	FB	309	< 0.3
11114526	D	Multipurpose Room	< 0.3
11113478	OB	OFFICE BLANK	< 0.3
11113477	TB	TRAVEL BLANK	< 0.3

ATTACHMENT C

Laboratory Analytical Results

Radon test result report for:

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
11114530	113	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11114527	115	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11114528	117	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11114529	119	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114521	300	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	0.9 ± 0.4	2022-02-14
11114514	301	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114520	302	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	0.7 ± 0.4	2022-02-15
11114519	303	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-15
11114518	304	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	0.9 ± 0.3	2022-02-14
11114513	305	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	0.9 ± 0.3	2022-02-14
11114516	306	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	1.0 ± 0.3	2022-02-14
11114522	307	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	0.9 ± 0.3	2022-02-14
11114523	308	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	1.4 ± 0.4	2022-02-15
11114515	309	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	1.5 ± 0.3	2022-02-14
11114517	309	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114512	310	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-15
11114524	311	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114525	401	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114502	ASST PRINCIPALS OFFICE	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11114507	B1	2022-02-07 @ 8:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114506	B3	2022-02-07 @ 8:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114508	B5	2022-02-07 @ 8:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-14
11114509	B7	2022-02-07 @ 8:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-15
11114510	BASEMENT PRINTER CLOSET	2022-02-07 @ 8:00 am	2022-02-10 @ 9:00 am	0.6 ± 0.3	2022-02-15
11114504	FILE ROOM	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	1.1 ± 0.4	2022-02-14
11114503	HEALTH ROOM	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	0.6 ± 0.4	2022-02-15
11114505	MAIN OFFICE	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	0.9 ± 0.4	2022-02-15
11114531	MULTIPURPOSE ROOM	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	1.1 ± 0.4	2022-02-15
11114526	MULTIPURPOSE ROOM	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-15
11114501	PRINCIPALS OFFICE	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	1.0 ± 0.4	2022-02-15
11114511	SMALL GROUP ROOM	2022-02-07 @ 8:00 am	2022-02-10 @ 9:00 am	0.7 ± 0.3	2022-02-15

Radon test result report for:**TWINBROOK ES****1**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
11106132	100	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	1.0 ± 0.4	2022-02-15
11107349	101	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	1.2 ± 0.4	2022-02-15
11107368	102	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	0.6 ± 0.3	2022-02-15
11107348	103	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	0.5 ± 0.3	2022-02-14
11107384	104	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	< 0.3	2022-02-15
11107367	105	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11107366	107	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	0.9 ± 0.4	2022-02-15
11107301	108	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	0.9 ± 0.4	2022-02-15
11107347	109	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11105799	110	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11107316	111	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11107358	111	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11107351	112	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.2 ± 0.4	2022-02-15
11107350	113	2022-02-07 @ 8:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11107340	116	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.7 ± 0.4	2022-02-15
11107339	118	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.8 ± 0.3	2022-02-14
11107354	118	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11107359	118	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.5 ± 0.4	2022-02-15
11107373	200	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.6 ± 0.4	2022-02-15
11107374	201	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.0 ± 0.4	2022-02-15
11107381	202	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11107375	203	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11107365	204	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11107380	205	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-14
11107355	207	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.6 ± 0.4	2022-02-14
11107360	207	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11107353	209	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.7 ± 0.4	2022-02-15
11107382	BUILDING SERVICES	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	< 0.3	2022-02-15
11107371	CAF	2022-02-07 @ 9:00 am	2022-02-10 @ 9:00 am	0.8 ± 0.4	2022-02-15
11107341	COM	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.0 ± 0.4	2022-02-15
11107357	COMP	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.6 ± 0.4	2022-02-14
11107361	GYM	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.1 ± 0.4	2022-02-15
11107362	GYM	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.9 ± 0.4	2022-02-15
11107331	MC	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	0.8 ± 0.4	2022-02-15
11107356	PIANO ROOM	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.1 ± 0.4	2022-02-14
11107383	STAFF LOUNGE	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.9 ± 0.4	2022-02-15
11107376	WR	2022-02-07 @ 9:00 am	2022-02-10 @ 8:00 am	1.5 ± 0.4	2022-02-15

EXPOSURE IN BOWSER-MORNER RADON CHAMBER

CLIENT KCI Technologies, Inc. Job Number 204186

NOMINAL Conditions: Radon Conc 25.8 pCi/L Rel. Hum 50.1 % Temp. 70.9 F

Date Start: 2/18/22 Date Stop: 2/21/22 Date Start: _____ Date Stop: _____

Time Start: 0911 Time Stop: 0911 Time Start: _____ Time Stop: _____

Device No.'s: (3) Char Bags -
11113484, 1112998, 20107126 Device No.'s: _____

23 Right

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 µR/h Elevation = 820 ft**

MCPS - Spike Sample Lab Results. Measured values are satisfactory, i.e., within $\pm 25\%$ of the chamber's reference value (25.7 pCi/L).

Kit Number	Start Date	Start Time	End Date	End Time	Temp.	Facility	Building	Room	Project ID	Floor	Result
11113484	2022-02-18	9:00 am	2022-02-21	9:00 am	71	OFFICE	MAIN	SK1		1	27.9
11122998	2022-02-18	9:00 am	2022-02-21	9:00 am	71	OFFICE	MAIN	SK2		1	26.0
20107126	2022-02-18	9:00 am	2022-02-21	9:00 am	71	OFFICE	MAIN	SK3		1	27.6



Radon Test Kit Chain of Custody

Project Name: MCPS Radon – February 2022 Schools

Name of Schools:

1. Lincoln Center
2. Wootton HS
3. Rockville HS
4. Richard Montgomery HS
5. Rocking Horse Rd. Center
6. Blair G. Ewing Center
7. Twinbrook ES
8. Rock Creek Valley ES
9. Luxmanor ES
10. Tilden MS

	Date	Initials
Radon Test Kits Deployed	02/07/2022	
Radon Test Kits Collected	02/10/2022	
Radon Test Kits Shipped to Lab*	02/10/2022	
Radon Test Kits Received by Lab*	02/14/2022	

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