

Coleman Creek Consulting, Inc.

INITIAL RADON AIR SAMPLING OF PETERSON ELEMENTARY SCHOOL FOR KLAMATH COUNTY SCHOOL DISTRICT 2845 GREENSPRINGS DRIVE, KLAMATH FALLS, OREGON

INTRODUCTION

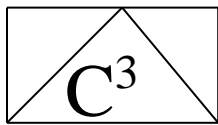
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCS D) to perform radon air sampling as required by State Statute ORS 332.166-167. KCS D is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose of the initial radon air sampling was to collect radon air samples from all regularly occupied rooms within school buildings, with the exception of storage, restrooms, kitchen, locker rooms, and compare analytical results with the EPA recommended “Action Level” concentration for radon. Short-term radon air sampling was selected for this project.

RADON INFORMATION AND HEALTH EFFECTS

Radon is a naturally occurring radioactive gas that is produced by natural deposits of uranium in soil, and is found world-wide. Uranium naturally decays into Radium, and Radium can produce Radon gas. Radon gas can travel up through soil and enter buildings in contact with soil. Radon gas entering a building may become concentrated in the lowest part of the building in areas with little fresh air mixing. If radon is inhaled into lungs, particle decay processes can release radiation, potentially damaging lung tissue, and over time leading to lung cancer. The Environmental Protection Agency (EPA) has estimated that Radon is the primary cause of lung cancer among non-smokers. EPA recommends reducing the concentration of Radon in indoor environments to below the Action Level of 4.0 pCi/L (pico-curies per Liter of air).

INITIAL RADON AIR SAMPLING

David W. Fawcett of CCC trained KCS D employees, including school custodians in radon sampling procedures December 4, 2020. Jim Jones, Peterson Elementary School (PES) Custodian placed radon air test kits in the PES buildings at the beginning of the day, December 7, 2020. A total of 45 locations were sampled according to guidelines established in the Oregon Health Authority (OHA) “Testing for Elevated Radon in Oregon Schools, A Protocol and Plan”, dated 2016. Mr. Jones returned to PES December 10, 2020, at the beginning of the day, and collected all radon test kits placed for sampling. See Radon Air Sample Record Sheets (pages 4-5) for locations of all areas sampled. All samples collected were packaged by Mr. Fawcett, and sent overnight to Air Chek, Inc., in Mills River, North Carolina for analysis.



Coleman Creek Consulting, Inc.

LABORATORY ANALYSIS RESULTS

The radon air test kit samples collected from PES buildings were reported ranging from <0.3 to 0.7 pCi/L (picocuries per liter of air). A complete listing of laboratory results and locations is found in the Air Chek, Inc. Laboratory Analysis Report in Appendix A.

QUALITY ASSURANCE

To ensure that test results are reliable and accurate, quality assurance samples, including duplicate test kits (placed in same room), blank test kits (not sampled at all), and spike sampling (exposing test kits to a measured amount of radon prior to laboratory submission) were all employed during Radon sampling. The number of duplicate, blank, and spike test kits utilized during sampling followed OHA testing protocol guidelines.

DUPLICATE TEST KITS

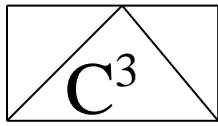
Four duplicate test kits were placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheet. The four duplicate test kit sets were all reported with <0.3 pCi/L, with the exception of one pair reported with <0.3/0.7 pCi/L. When compared with matched pair or “duplicate” test kits, three of the pairs were well within the expected range of 0-25% Relative Percent Difference, with identical reported <0.3 pCi/L Radon concentrations. The fourth pair was reported with a concentration <2.0 pCi/L, indicating Radon concentrations were too low to apply the Relative Percent Difference test.

BLANK TEST KITS

Two blank test kits were submitted to Air Chek with the other PES Radon test kits. Both blank test kits were reported with <0.3 pCi/L. Both blank test kits were reported none detected for Radon.

SPIKE TEST KIT ANALYSIS

One test kit was submitted to Bowser-Morner for Radon Spike processing. The test kit was exposed to 25.7 pCi/L for three days from December 4 through December 7, 2020. See Appendix B for the Bowser-Morner Radon Exposure test information. The “Spiked” test kit was submitted to Air Chek for analysis along with the other PES Radon test kits. The Spike sample was reported with 16.4 pCi/L. The relative percentage error was calculated to be -36%, in the out of control range (greater than -30%). The Spike lab Bowser-Moerner was contacted, and did not report any unusual occurrence during Spike activities. The analytical lab (Air Chek) was contacted, and no unusual occurrences were noted during test kit analysis. Spike test kits were shipped twice during cold temperatures, and that may have had an effect on the Spike sample results. In addition, the complete KCS D Spike sample results exhibit a rather uniform grouping, with results ranging from 13.0 to 17.3 pCi/L, all below the Spiked concentration of 25.7 pCi/L. The Spike sample is identified as Serial #9418695 on the Laboratory Analysis Report in Appendix A.



RADON RESULTS AND FUTURE ACTIONS

The 2016 OHA Testing of Elevated Radon in Oregon Schools Protocol and Plan describes future steps to take based on initial Radon sample results. The following is a description of recommended actions based on Radon concentrations reported.

1. If <2.0 pCi/L Radon is reported, ORS 332.166-167 requires Radon re-test every 10 years.
2. If 2.0 pCi/L to 4.0 pCi/L Radon is reported, consider lowering the Radon concentration in the room.
3. If 4.0 pCi/L to 8.0 pCi/L Radon is reported, perform follow-up Radon measurement in the affected room(s) using a long-term test. Conduct over the school year as much as possible. If that result is equal to or greater than 4.0 pCi/L, Radon concentration in the room should be lowered.
4. If equal to or greater than 8.0 pCi/L Radon is reported, conduct a second short-term test and average the result with the initial Radon result. If the average result of the two short-term tests is equal to or greater than equal to or greater than 4.0 pCi/L, Radon concentration in the room should be lowered.

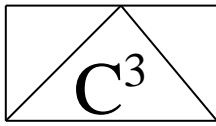
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in Peterson Elementary School building was reported with Radon concentrations ranging from <0.3 to 0.7 pCi/L. All Radon test kit samples were reported < 2.0 pCi/L, indicating that a re-test should be performed in 10 years.

CCC appreciates the opportunity to provide initial radon air testing and consulting to Klamath County School District.

Sincerely,

David W. Fawcett
Director of Consulting Operations



Coleman Creek Consulting, Inc.

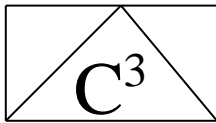
RADON AIR SAMPLE RECORD SHEET

SCHOOL: Peterson Elementary School
ADDRESS: 4856 Clinton Avenue
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Jim Jones

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418661	Main		1 – Office	0730	0730
9418662	Main		2 – Copy Room	0732	0731
9418663	Main		3 – Principal Office	0735	0733
9418664	Main		4 – VP Office	0736	0734
9418665	Main		5 – Room 2	0740	0735
9418666	Main		6 – Room 3	0744	0736
9418667	Main		7 – Room 4	0745	0737
9418668	Main		8 – Room 6	0747	0738
9418669	Main		9 – Room 8	0748	0739
9418670	Main		10 – Room 7	0750	0741
9418671	Main	Yes	10 – Room 7	0750	0741
9418672	Main		11 – Room 5	0752	0742
9418673	Main		12 – Room 31	0756	0744
9418674	Main		13 – 3rd Grade Intervention	0757	0744
9418675	Main		14 – Room 33	0759	0745
9418676	Main		15 – Room 32	0701	0746
9418677	Main		16 – Library	0804	0747
9418678	Main		17 – Staff Room	0805	0747
9418679	Main		18 – Nurse Office	0806	0748
9418680	Main		19 – Room 10	0812	0750
9418681	Main		20 – Room 9	0815	0752
9418682	Main	Yes	20 – Room 9	0815	0752
9418684	Main		21 – Room 12	0816	0753
9418685	Main		22 – Room 11	0818	0754
9418686	Main		23 – Room 14	0819	0755

Comments: **Spike Sample =**
Blank Sample = 9418683



Coleman Creek Consulting, Inc.

RADON AIR SAMPLE RECORD SHEET

SCHOOL: Peterson Elementary School
ADDRESS: 4856 Clinton Avenue
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Jim Jones

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418687	Main		24 – Room 13	0825	0758
9418688	Main		25 – Room 16	0830	0800
9418689	Main		26 – Room 15	0835	0801
9418690	Main		27 – Room 18	0837	0802
9418691	Main		28 – Room 17	0838	0803
9418692	Main		29 – Cafeteria at Hall	0840	0810
9418693	Main		30 – Cafeteria at Ramp	0840	0810
9418694	Main	Yes	30 – Cafeteria at Ramp	0840	0810
9418696	Main		31 – Cafeteria at Stage	0840	0810
9418697	Main		32 – Room 19	0858	0811
9418698	Main		33 – Room 21	0859	0812
9418699	Main		34 – Gym North	0915	0817
9418700	Main		35 – Gym North	0915	0817
9418701	Main		36 – Gym South	0915	0818
9418702	Portable		37 – Portable Staff Lounge	0920	0824
9418703	Portable		38 – Portable Day Care	0920	0824
9418704	New Bldg		39 – Room 109	0930	0830
9418705	New Bldg		40 – Room 112	0931	0831
9418706	New Bldg	Yes	40 – Room 112	0931	0831
9418708	New Bldg		41 – Room 113	0932	0832
9418709	New Bldg		42 – Room 101	0934	0833
9418710	New Bldg		43 – Room 102	0935	0834
9418711	New Bldg		44 – Room 107	0936	0835
9418712	New Bldg		45 – Room 108	0937	0836

Comments: **Spike Sample = 9418695**
Blank Sample = 9418707

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:**PETERSON ES****20571000**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418661	OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418662	COPY RM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418663	PRINCIPAL	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418664	VP	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418665	2	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418666	3	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418667	4	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418668	6	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418669	8	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.5 ± 0.4	2020-12-15
9418670	7	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418671	7	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418672	9	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418673	31	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418674	INTERVENT.	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418675	33	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418676	32	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418677	LIBRARY	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418678	LOUNGE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418679	NURSE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418680	10	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418681	9	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418682	9	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418683	9	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418684	12	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418685	11	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418686	14	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418687	13	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418688	16	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418689	15	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418690	18	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418691	17	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.5 ± 0.4	2020-12-15
9418692	CAFETERIA	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418693	CAFETERIA	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418694	CAFETERIA	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.7 ± 0.4	2020-12-15
9418695	CAFETERIA	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	16.4 ± 1.0	2020-12-15
9418696	CAFETERIA	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418697	19	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
PETERSON ES
20571000

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418698	21	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15

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

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
PETERSON ES
20571004

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418699	GYM N	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4	2020-12-15
9418700	GYM N	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418701	GYM S	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15

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

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
PETERSON ES
20571003

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418702	PORT. STAFF	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418703	PORT. DAY	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15

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

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
PETERSON ES
20571000

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418704	109	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418705	112	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418706	112	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418707	112	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418708	113	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418709	101	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418710	102	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	0.5 ± 0.4	2020-12-15
9418711	107	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418712	108	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15

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

APPENDIX B

BOWSER-MORNER RADON SPIKE EXPOSURE

EXPOSURE IN BOWSER-MORNER RADON CHAMBER

CLIENT Coleman Creek Consulting, Inc. Job Number 198582

NOMINAL Conditions: Radon Conc 25.7 pCi/L Rel. Hum 59.0 % Temp. 70.3 F

Date Start: 12/4/20 Date Stop: 12/7/20

Date Start: _____ Date Stop: _____

Time Start: 0923 Time Stop: 0923
(Group 1)

Time Start: _____ Time Stop: _____

Device No.'s: (12) Char Bags -
9417935, 9417970, 9418007,
9418060, 9418096, 9418127,
9418163, 9418190, 9418226,
9418250, 9418286, 9418321

Device No.'s: _____

R5 Left

Date Start: ^{rem} 12/4/20 Date Stop: 12/7/20

Date Start: _____ Date Stop: _____

Time Start: 0927 Time Stop: 0927
(Group 2)

Time Start: _____ Time Stop: _____

Device No.'s: (13) Char Bags -
9418370, 9418418, 9418465, 9418500,
9418566, 9418601, 9418660,
9418695, 9418771, 9418747,
9418806, 9418846, 9418875

Device No.'s: _____

R5 Right

Date Start: _____ Date Stop: _____

Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____

Time Start: _____ Time Stop: _____

Device No.'s: _____

Device No.'s: _____

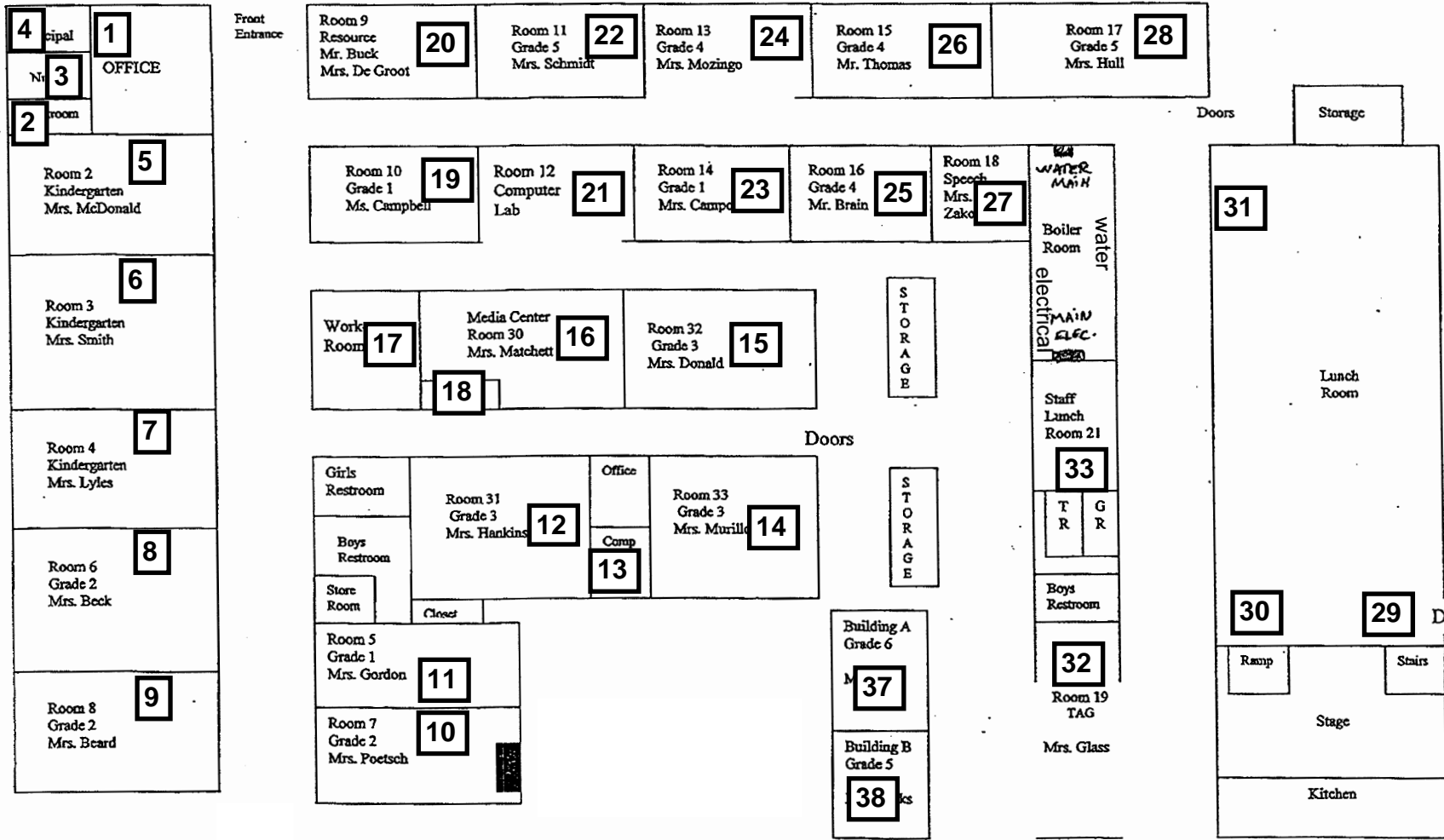
Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

APPENDIX C

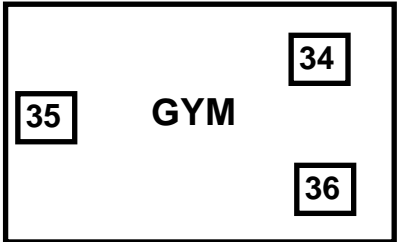
RADON SAMPLING LOCATION DIAGRAM

PETERSON ELEMENTARY SCHOOL

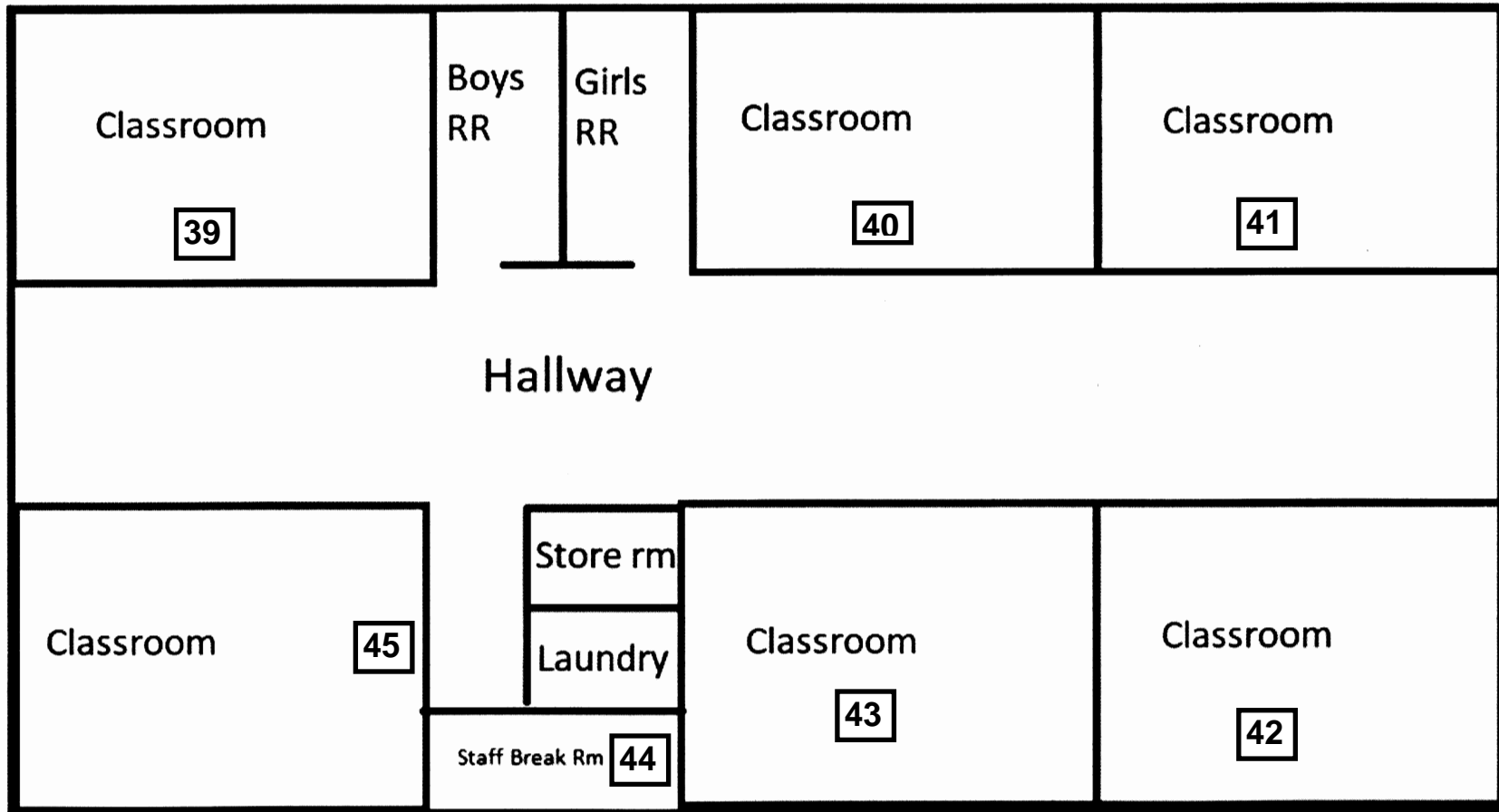
Radon Sample Locations



12 = Radon Test Kit Location



Peterson new classroom building



40 = Radon Test Kit Location