

Coleman Creek Consulting, Inc.

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

INTRODUCTION

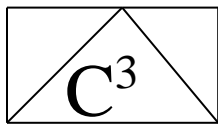
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCS D) to perform radon air sampling as required by State Statute ORS 332.166-167. KCS D is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose 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. Darrell Walker, Shasta Elementary School (SES) Custodian placed radon air test kits in the PES buildings at the beginning of the day, December 7, 2020. A total of 50 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. Walker returned to SES 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 4-6) 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 SES building were reported ranging from <0.3 to 0.9 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

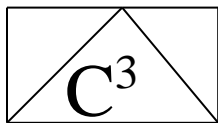
Five duplicate test kits were placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheet. The five duplicate test kit sets were all reported with <0.3 pCi/L, with the exception of one pair reported with 0.7/<0.3 pCi/L. When compared with matched pair or “duplicate” test kits, four 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 fifth 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 SES Radon test kits. The blank test kits were reported with <0.3 pCi/L. The blank test kits were reported none detected for Radon.

SPIKE TEST KIT ANALYSIS

Two test kits were submitted to Bowser-Morner for Radon Spike processing. The test kits were 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 kits were submitted to Air Chek for analysis along with the other TES Radon test kits. The Spike samples were reported with 14.2 pCi/L and 14.7 pCi/L. The relative percentage error for both Spike samples was calculated to be -45% and -43%, both 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 samples are identified as Serial #9418747 and Serial #9418771 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.

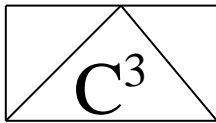
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in Shasta Elementary School buildings was reported with Radon concentrations ranging from <0.3 to 0.9 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.

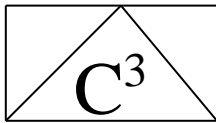
RADON AIR SAMPLE RECORD SHEET

SCHOOL: Shasta Elementary School
ADDRESS: 1951 Madison Street
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Darrell Walker

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418713	Main		1 – Cafeteria	0620	0620
9418714	Main		2 – Main Office	0624	0625
9418715	Main		3 – Principal Office	0630	0629
9418716	Main		4 – Isolation Room	0634	0634
9418717	Main		5 – VP Office	0636	0637
9418718	Main		6 – Staff Lounge	0640	0640
9418719	Main		7 – Room 7	0643	0645
9418720	Main		8 – Room 8	0645	0648
9418721	Main		9 – Room 9	0648	0652
9418722	Main		10 – Library	0651	0655
9418723	Main	Yes	10 – Library	0653	0658
9418724	Main		11 – Bagley	0655	0703
9418725	Main		12 – Counselor	0657	0706
9418726	Main		13 – Collins	0700	0708
9418727	Main		14 – Copy Room	0703	0710
9418728	Main		15 – Room 4	0706	0714
9418729	Main		16 – Room 5	0709	0717
9418730	Main		17 – Room 6	0713	0720
9418731	Main		18 – Gym	0717	0723
9418732	Main		19 – Gym	0721	0726
9418733	Main		20 – Room 7	0725	0730
9418734	Main	Yes	20 – Room 7	0727	0733

Comments: **Spike Sample =**
Blank Sample = 9418735



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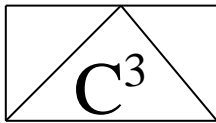
RADON AIR SAMPLE RECORD SHEET

SCHOOL: Shasta Elementary School
ADDRESS: 1951 Madison Street
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Darrell Walker

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418736	Main		21 – Room 8	0729	0736
9418737	Main		22 – Room 9	0732	0740
9418738	Main		23 – Gym Office	0734	0744
9418739	Main		24 – Ross Office	0737	0746
9418740	Main		25 – Computer Lab	0740	0748
9418741	Main		26 – Speech Office	0743	0750
9418742	Main		27 – Room	0749	0753
9418743	Main		28 – Room	0754	0755
9418744	Main		29 – Quad Middle	0757	0756
9418745	Main		30 – Room	0759	0757
9418746	Main	Yes	30 – Room	0801	0759
9418748	Main		31 – Room	0805	0802
9418749	Main		32 – Room	0835	0804
9418750	Main		33 – Room	0849	0806
9418751	Main		34 – Quad Middle	0844	0808
9418752	Main		35 – Room	0847	0810
9418753	Main		36 – Room	0850	0812
9418754	Main		37 – Room	0856	0814
9418755	Main		38 – Room	0900	0816
9418756	Main		39 – Quad Middle	0903	0818
9418757	Main		40 – Room	0905	0820
9418758	Main	Yes	40 – Room	0907	0821

Comments: **Spike Sample = 9418747**
Blank Sample = 9418759



Coleman Creek Consulting, Inc.

RADON AIR SAMPLE RECORD SHEET

SCHOOL: Shasta Elementary School
ADDRESS: 1951 Madison Street
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Darrell Walker

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418760	Main		41 – Room 13	0914	0823
9418761	Main		42 – Band Room	0918	0825
9418762	Portable		43 – Watterburg	0926	0830
9418763	Portable		44 – Rodgers	0928	0832
9418764	Portable		45 – Lokey	0932	0834
9418765	Portable		46 – Walker	0935	0836
9418766	Portable		47 – Morris	0938	0838
9418767	Portable		48 – Morris	0942	0839
9418768	Old Gym		49 – Old Gym SW	0947	0842
9418769	Old Gym		50 – Old Gym NE	0950	0843
9418770	Old Gym	Yes	50 – Old Gym North	0953	0844

Comments: **Spike Sample = 9418771**
Blank Sample =

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:**SHASTA ES****20571100**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418713	CAFETERIA	2020-12-07 @ 6:00 am	2020-12-10 @ 6:00 am	< 0.3	2020-12-15
9418714	RECEPTION	2020-12-07 @ 6:00 am	2020-12-10 @ 6:00 am	0.9 ± 0.4	2020-12-15
9418715	PRINCIPAL	2020-12-07 @ 7:00 am	2020-12-10 @ 6:00 am	0.6 ± 0.4	2020-12-15
9418716	HEALTH	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.9 ± 0.4	2020-12-15
9418717	VP	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418718	LOUNGE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418719	1	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.8 ± 0.4	2020-12-15
9418720	2	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418721	3	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418722	LIBRARY	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418723	LIBRARY	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418724	BAGGALEY	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418725	COUNSELOR	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418726	COLLINS	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418727	MAIL	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418728	4	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418729	5	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418730	6	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418731	GYM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418732	GYM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418733	7	2020-12-07 @ 7:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418734	7	2020-12-07 @ 7:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418735	7	2020-12-07 @ 7:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418736	8	2020-12-07 @ 7:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418737	9	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.8 ± 0.4	2020-12-15
9418738	GYM OFF.	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4	2020-12-15
9418739	ROSS	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418740	COMPUTER	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418741	SPEECH	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418742	24	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418743	23	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418744	QUAD 2ND	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418745	21	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418746	21	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418747	21	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	14.2 ± 0.9	2020-12-15
9418748	22	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418749	20	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:

SHASTA ES

20571100

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418750	19	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.5 ± 0.4	2020-12-15
9418751	QUAD 1ST	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418752	18	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418753	17	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418754	16	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418755	15	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418756	QUAD K	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4	2020-12-15
9418757	14	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.7 ± 0.4	2020-12-15
9418758	14	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418759	14	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418760	13	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418761	BAND	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.8 ± 0.4	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:
SHASTA ES
20571101

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418762	WATTERB.	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418763	RODGERS	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15

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December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

SHASTA ES

20571102

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418764	LOKEY	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418765	WALKER	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15

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December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
SHASTA ES
20571103

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418766	MORRIS	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418767	JOHNSON	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15

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December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

SHASTA ES

20571104

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418768	OLD GYM	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418769	OLD GYM	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418770	OLD GYM	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418771	OLD GYM	2020-12-07 @ 10:00 am	2020-12-10 @ 9:00 am	14.7 ± 0.9	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 Time Start: _____ Time Stop: _____

(Group 1)

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 Time Start: _____ Time Stop: _____

(Group 2)

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: _____

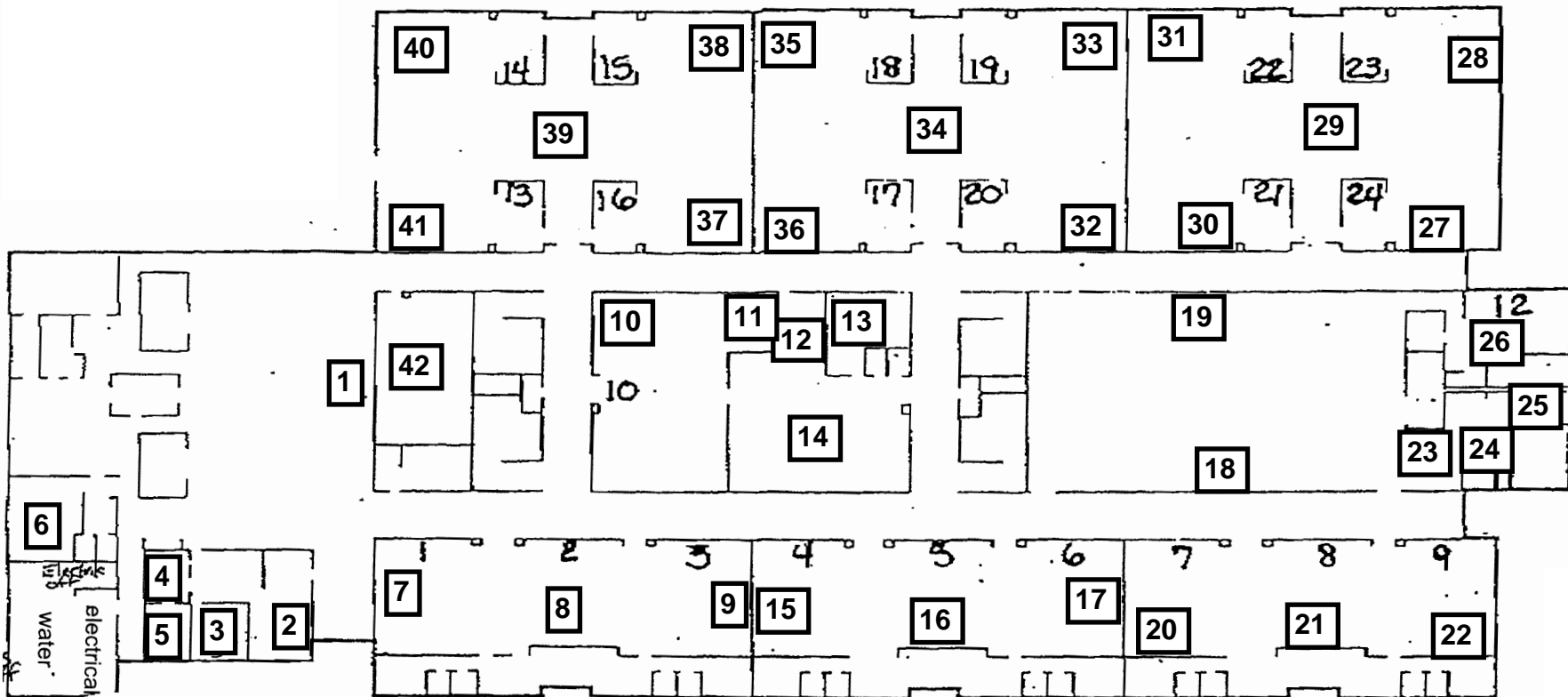
Device No.'s: _____ Device No.'s: _____

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

APPENDIX C

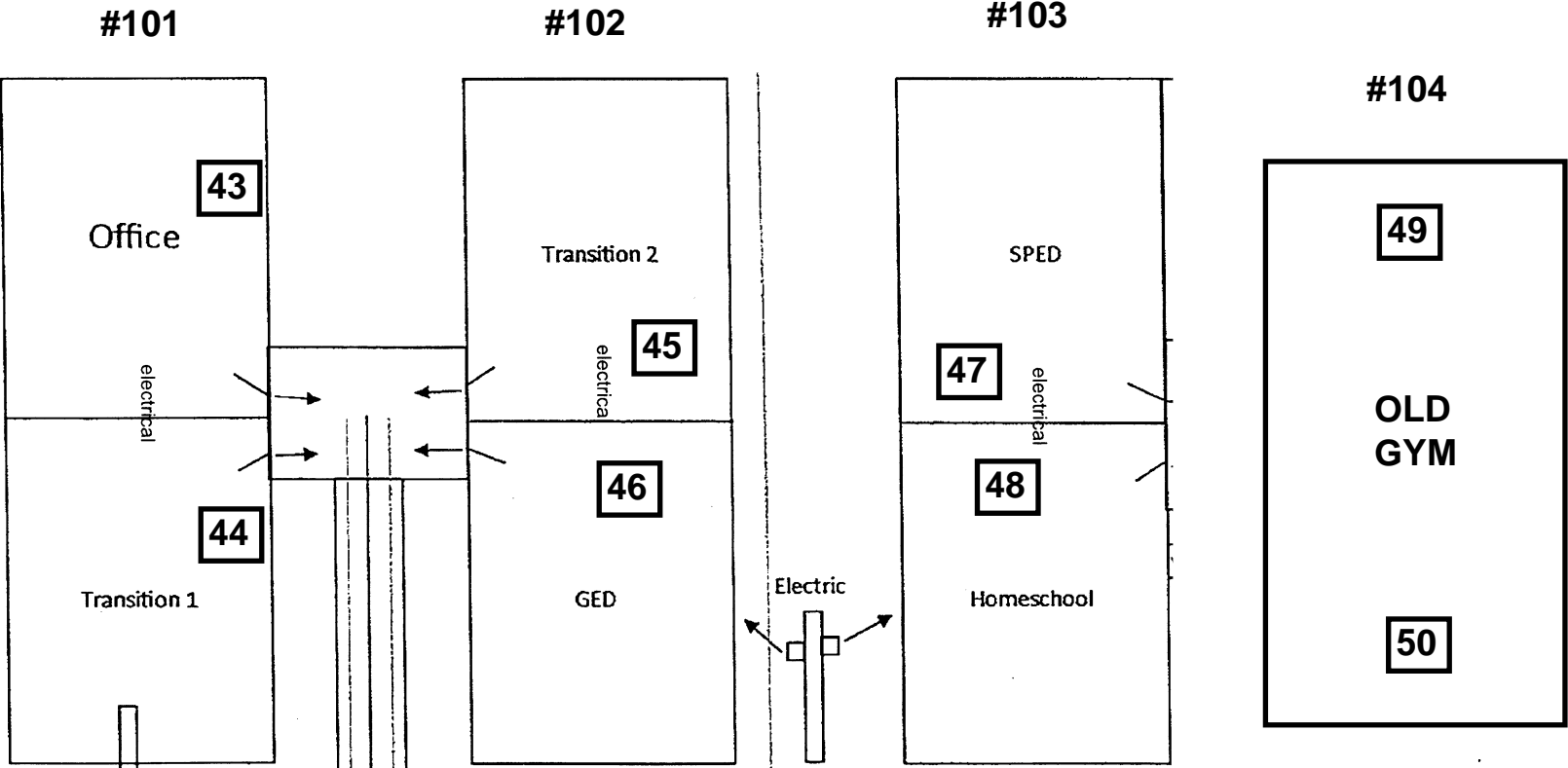
RADON SAMPLING LOCATION DIAGRAM

SHASTA ELEMENTARY SCHOOL Radon Sample Locations



12 = Radon Test Kit Location

**SHASTA/FALCON HEIGHTS SCHOOL
Radon Sample Locations**



44 = Radon Test Kit Location