

Coleman Creek Consulting, Inc.

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

INTRODUCTION

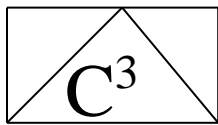
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCS D) to perform radon air sampling as required by State Statute ORS 332.166-167. KCS D is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose 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. Jason Roach, Chiloquin High School (CHS) Custodian placed radon air test kits in the CHS buildings at the beginning of the day, December 7, 2020. A total of 41 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. Roach returned to CHS 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 CHS buildings 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

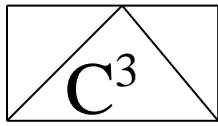
A total of four duplicate test kits were placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheets. The four duplicate test kit sets were reported with paired concentrations of <0.3/<0.3 pCi/L, <0.3/0.7 pCi/L, 0.6/0.6, and <0.3/<0.3 pCi/L. The Relative Percent Difference for each pair was 0%, 72%, 0% and 0%. Three of the pairs were within the expected range of 0-25% Relative Percent Difference, with the other pair 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 CHS Radon test kits. Both blank test kits were reported with <0.3 pCi/L. All blank tests 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 CHS Radon test kits. The Spike sample was reported with 14.3 pCi/L. The relative percentage error was calculated to be -44%, 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 #9418096 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.

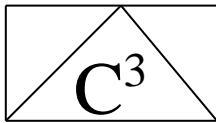
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in Chiloquin High School buildings were 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.

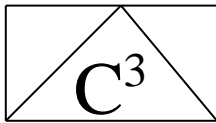
RADON AIR SAMPLE RECORD SHEET

SCHOOL: Chiloquin High School
ADDRESS: 300 Elm Street
Chiloquin, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Jason Roach

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418062	Main		1 – Lobby South	0755	0845
9418063	Main		2 – Food Prep South	0800	0847
9418064	Main		3 – Music Office	0805	0850
9418065	Main		4 – Music Room	0807	0852
9418066	Main		5 – Weight Room	0810	0854
9418067	Main		6 – Gym West	0815	0855
9418068	Main		7 – Gym East	0817	0856
9418069	Main		8 – Gym NE	0820	0857
9418070	Main		9 – Metal Shop E	0828	0901
9418071	Main		10 – Metal Shop W	0830	0902
9418072	Main	Yes	10 – Metal Shop W	0830	0903
9418073	Main		11 – Industrial Tech	0835	0904
9418074	Main		12 – Room B5	0838	0907
9418075	Main		13 – Room B4	0840	0909
9418076	Main		14 – Room B3	0843	0910
9418077	Main		15 – Room B2	0845	0912
9418078	Main		16 – Room B1	0847	0914
9418079	Main		17 – Room A5 Office	0851	0918
9418080	Main		18 – Room A5	0853	0920
9418081	Main		19 – Room A4	0857	0922
9418082	Main		20 – Room A4 Office	0900	0924
9418083	Main	Yes	20 – Room A4 Office	0900	0924
9418085	Main		21 – Room A3	0905	0926
9418086	Main		22 – Room A2	0907	0928
9418087	Main		23 – Room A1	0910	0930

Comments: **Spike Sample =**
Blank Sample = 9418084



Coleman Creek Consulting, Inc.

RADON AIR SAMPLE RECORD SHEET

SCHOOL: Chiloquin High School
ADDRESS: 300 Elm Street
Chiloquin, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Jason Roach

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418088	Main		24 – Health Room	0940	0932
9418089	Main		25 – Custodial Office	0942	0934
9418090	Main		26 – SRO Room	0945	0936
9418091	Main		27 – Staff Lounge	0947	0938
9418092	Main		28 – Front Office	0950	0940
9418093	Main		29 – Reception	0952	0942
9418094	Main		30 – Principal Office	0958	0944
9418095	Main	Yes	30 – Principal Office	0958	0946
9418097	Main		31 – Room D1	1003	0948
9418098	Main		32 – Room D2	1005	0950
9418199	Main		33 – Room D3	1007	0952
9418100	Main		34 – Room D4	1008	0954
9418101	Main		35 – Room D5	1010	0956
9418102	Main		36 – Room D5 Office	1012	0958
9418103	Main		37 – Library	1014	1000
9418104	Main		38 – Paint Room	1016	1002
9418105	Main		39 – Big Gym NW	1035	0830
9418106	Big Gym		40 – Big Gym East	1037	0832
9418107	Big Gym		40 – Big Gym East	1037	0832
9418109	Big Gym		41 – Big Gym West	1039	0835

Comments: **Spike Sample = 9418096**
Blank Sample = 9418108

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:**CHILOQUIN HS****20571600**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418062	LOBBY	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	0.5 ± 0.4	2020-12-15
9418063	FOOD PREP	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	0.6 ± 0.4	2020-12-15
9418064	MUSIC OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418065	MUSIC	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418066	WEIGHT	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	0.6 ± 0.4	2020-12-15
9418067	GYM W	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	0.6 ± 0.4	2020-12-15
9418068	GYM E	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	0.8 ± 0.4	2020-12-15
9418069	GYM NE	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418070	SHOP E	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418071	SHOP W	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418072	SHOP W	2020-12-07 @ 8:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418073	TECH	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418074	B-5	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	0.8 ± 0.4	2020-12-15
9418075	B-4	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	0.7 ± 0.4	2020-12-15
9418076	B-3	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418077	B-2	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418078	B-1	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	0.6 ± 0.4	2020-12-15
9418079	A-5 OFFICE	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418080	A-5 OFFICE	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418081	A-4	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418082	A-4	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418083	A-4	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	0.7 ± 0.4	2020-12-15
9418084	A-4	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418085	A-3	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418086	A-2	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418087	A-1	2020-12-07 @ 9:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418088	HEALTH	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15
9418089	CUSTODIAL	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15
9418090	SRO	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	0.6 ± 0.4	2020-12-15
9418091	LOUNGE	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	0.9 ± 0.4	2020-12-15
9418092	OFFICE	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15
9418093	RECEPTION	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	0.9 ± 0.4	2020-12-15
9418094	PRINCIPAL	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	0.6 ± 0.4	2020-12-15
9418095	PRINCIPAL	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	0.6 ± 0.4	2020-12-15
9418096	PRINCIPAL	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	14.3 ± 0.9	2020-12-15
9418097	D-1	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	0.7 ± 0.4	2020-12-15
9418098	D-2	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

CHILOQUIN HS

20571600

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418099	D-3	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15
9418100	D-4	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15
9418101	D-5	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	???? UI	2020-12-15
9418102	D-5 OFFICE	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15
9418103	LIBRARY	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 am	0.7 ± 0.4	2020-12-15
9418104	PAINT	2020-12-07 @ 10:00 am	2020-12-10 @ 10:00 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:

CHILOQUIN HS

20571602

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418105	BIG GYM	2020-12-07 @ 11:00 am	2020-12-10 @ 10:00 am	< 0.3	2020-12-15
9418106	BIG GYM	2020-12-07 @ 11:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418107	BIG GYM	2020-12-07 @ 11:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418108	BIG GYM	2020-12-07 @ 11:00 am	2020-12-10 @ 9:00 am	< 0.3	2020-12-15
9418109	BIG GYM	2020-12-07 @ 11:00 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 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: _____

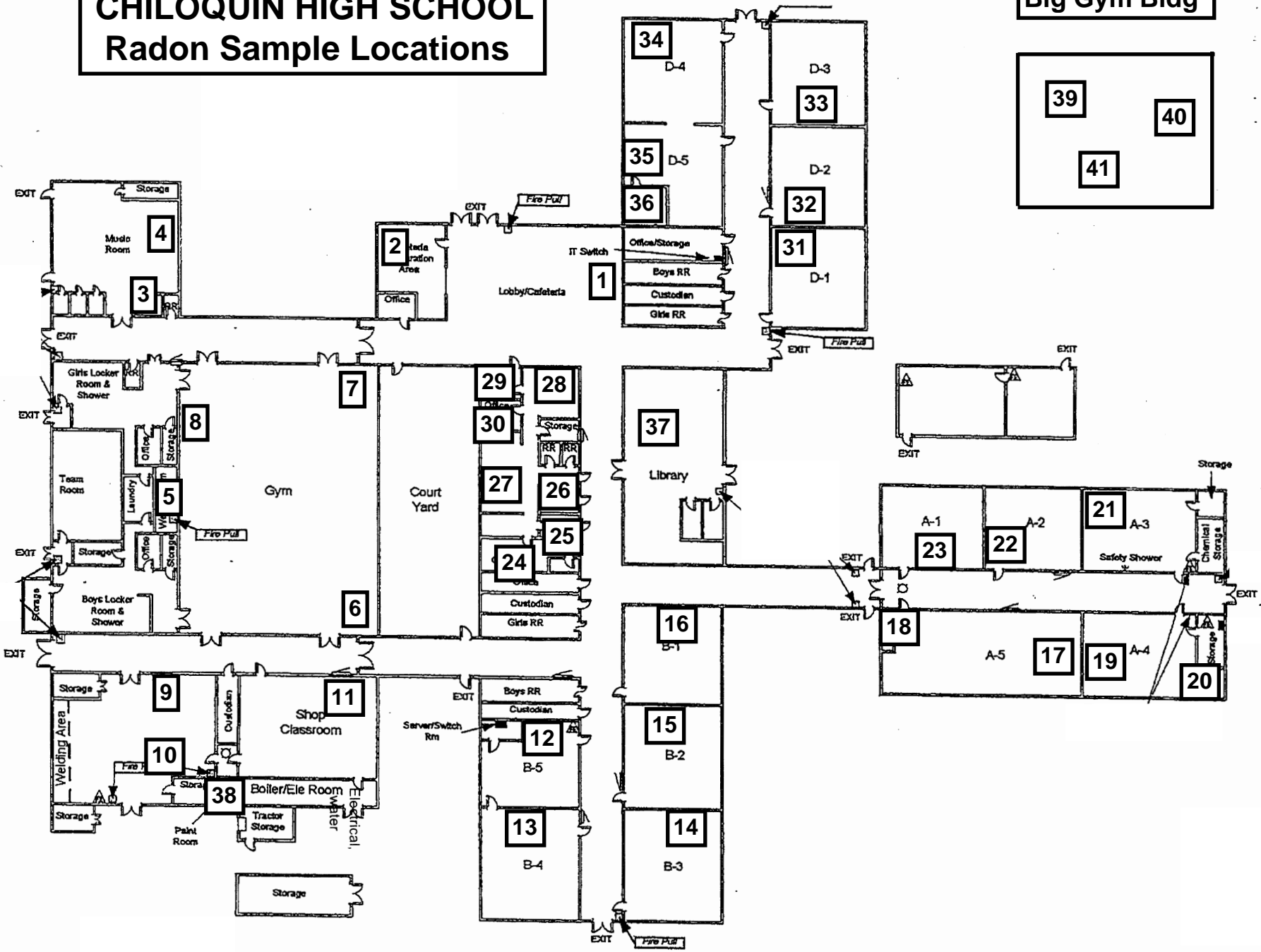
Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

APPENDIX C

RADON SAMPLING LOCATION DIAGRAM

CHILOQUIN HIGH SCHOOL Radon Sample Locations

Big Gym Bldg



12 = Radon Test Kit Location