

Coleman Creek Consulting, Inc.

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

INTRODUCTION

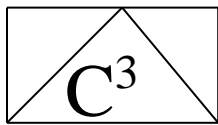
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCSO) to perform radon air sampling as required by State Statute ORS 332.166-167. KCSO is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose 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 KCSO employees, including school custodians in radon sampling procedures December 4, 2020. Tracy Christianson, Gearhart Elementary School (GES) teacher placed radon air test kits in the GES building at the beginning of the day, December 7, 2020. A total of 16 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. Ms. Christianson returned to the GES building December 10, 2020, at the beginning of the day, and collected all radon test kits placed for sampling. See Radon Air Sample Record Sheet (page 4) 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.



LABORATORY ANALYSIS RESULTS

The radon air test kit samples collected from GES building were reported ranging from <0.3 to 2.1 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

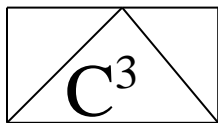
A single duplicate test kit was placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheet. The duplicate test kit set was reported with paired concentrations of 0.8/<0.3 pCi/L. The duplicate pair was reported with concentrations <2.0 pCi/L, indicating Radon concentrations were too low to apply the Relative Percent Difference test.

BLANK TEST KITS

The blank test kit submitted to Air Chek with the other GES Radon test kits. The blank test kit was reported with <0.3 pCi/L. The blank test kit was 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 TES 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 KCSD Spike sample results exhibit a rather uniform grouping, with results ranging from 13.0 to 17.0 pCi/L, all below the Spiked concentration of 25.7 pCi/L. The Spike sample is identified as Serial #9418190 on the Laboratory Analysis Report in Appendix A.



Coleman Creek Consulting, Inc.

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.

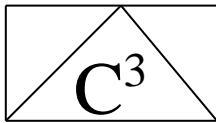
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in Gearhart Elementary School buildings were reported with Radon concentrations ranging from <0.3 to 2.1 pCi/L. All Radon test kit samples were reported < 4.0 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: Gearhart Elementary School
ADDRESS: 61110 Metler
Bly, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Tracy Christianson

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418173	Apartment		1 – Apartment LR	0800	0800
9418174	Apartment		2 – Apartment Bedroom	0800	0800
9418175	Apartment		3 – Apartment Bedroom	0800	0800
9418176	School		4 – Multipurpose Room	0800	0800
9418177	School		5 – Library	0800	0800
9418178	School		6 – Room 8	0800	0800
9418179	School		7 – Office Reception	0800	0800
9418180	School		8 – Principal	0800	0800
9418181	School		9 – Health Room	0800	0800
9418182	School		10 – Staff Room	0800	0800
9418183	School	Yes	10 – Staff Room	0800	0800
9418184	School		11 – Room 1	0800	0800
9418185	School		12 – Room 2	0800	0800
9418186	School		13 – Room 3	0800	0800
9418187	School		14 – Room 4	0800	0800
9418188	School		15 – Room 5	0800	0800
9418189	School		16 – Room 6	0800	0800

Comments: **Spike Sample = 9418190**
Blank Sample = 9418191

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:
GEARHART ES
20570400

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418173	APARTMENT	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.8 ± 0.5	2020-12-15
9418174	APARTMENT	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.0 ± 0.4	2020-12-15
9418175	APARTMENT	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.4 ± 0.5	2020-12-15
9418176	MULTI	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.9 ± 0.5	2020-12-15
9418177	LIBRARY	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	2.1 ± 0.5	2020-12-15
9418178	8	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418179	OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418180	PRINCIPAL	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418181	HEALTH	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.8 ± 0.4	2020-12-15
9418182	STAFF	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.8 ± 0.4	2020-12-15
9418183	STAFF	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418184	1	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.7 ± 0.4	2020-12-15
9418185	2	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.5 ± 0.4	2020-12-15
9418186	3	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.9 ± 0.5	2020-12-15
9418187	4	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.4 ± 0.5	2020-12-15
9418188	5	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418189	6	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.8 ± 0.4	2020-12-15
9418190	6	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	16.4 ± 1.0	2020-12-15
9418191	6	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15

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: _____

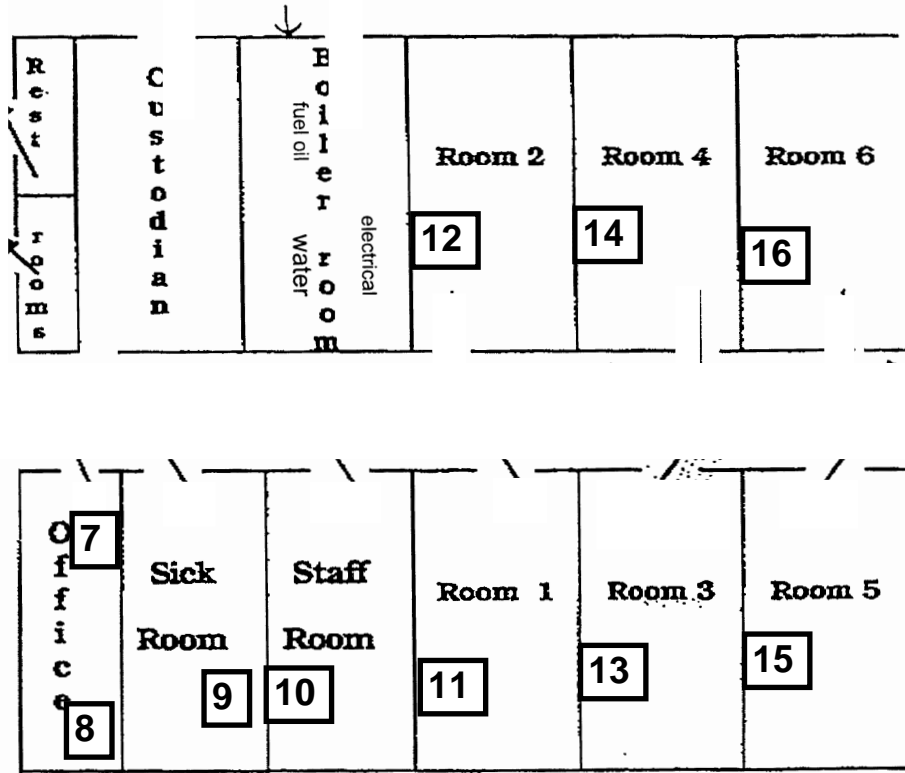
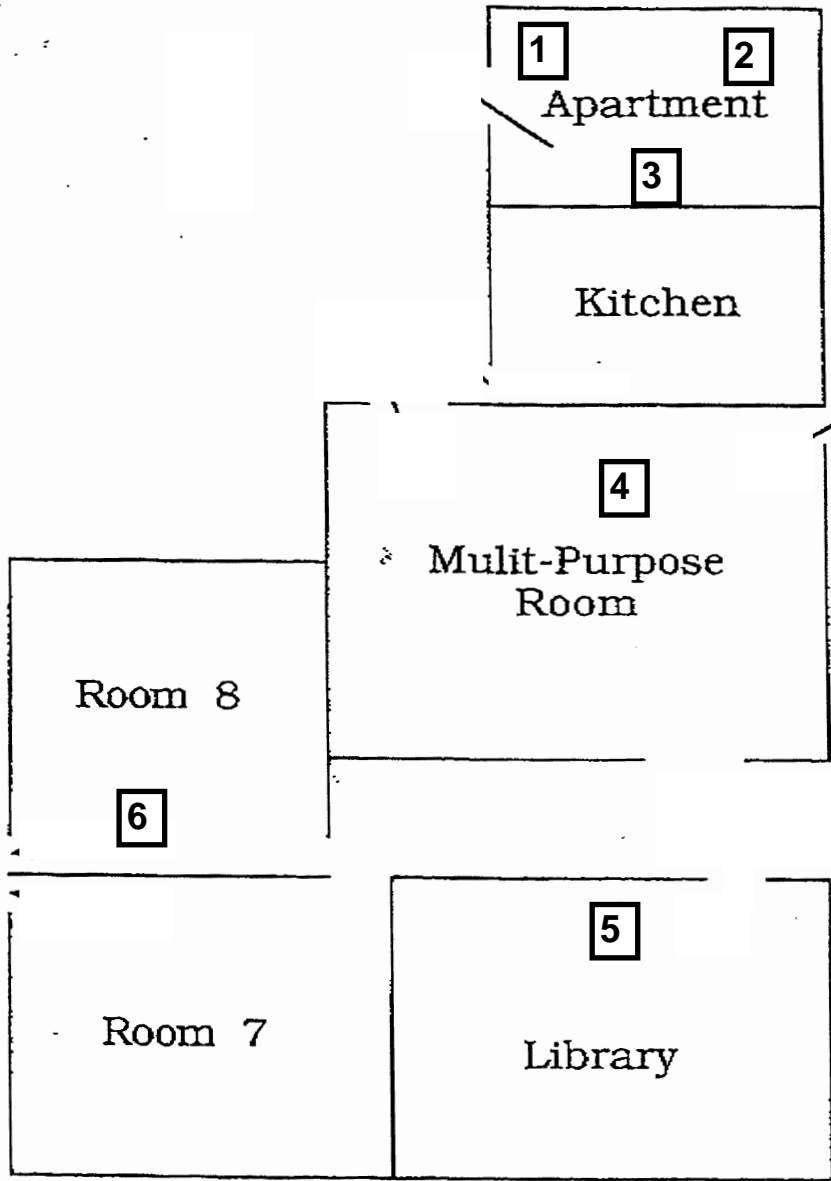
Device No.'s: _____ Device No.'s: _____

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

GEARHART ELEMENTARY SCHOOL Radon Sample Locations



6 = Radon Test Kit Location