

Coleman Creek Consulting, Inc.

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

INTRODUCTION

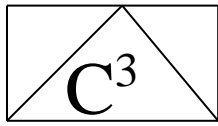
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCSO) to perform radon air sampling as required by State Statute ORS 332.166-167. KCSO is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose 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. Bruce Tapley, Merrill Elementary School (MES) Custodian placed radon air test kits in the MES buildings at the beginning of the day, December 7, 2020. A total of 24 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. Tapley returned to MES 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.



Coleman Creek Consulting, Inc.

LABORATORY ANALYSIS RESULTS

The radon air test kit samples collected from MES building were reported ranging from <0.3 to 1.3 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

Two duplicate test kits were placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheet. The two duplicate test kit sets were reported with the following paired results <0.3/0.8 pCi/L and <0.3/0.7 pCi/L. Both paired duplicate sets were reported with a concentration <2.0 pCi/L, indicating Radon concentrations were too low to apply the Relative Percent Difference test.

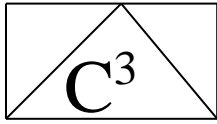
BLANK TEST KITS

One blank test kit was submitted to Air Chek with the other MES Radon test kits. The blank test kit was reported with <0.3 pCi/L. The blank test kit was reported none detected for Radon.

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.



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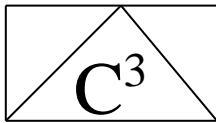
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in Merrill Elementary School building was reported with Radon concentrations ranging from <0.3 to 1.3 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: Merrill Elementary School
ADDRESS: 406 W. 2nd Street
Merrill, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Bruce Tapley

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418633	Main		1 – Speech Office	0710	0710
9418634	Main		2 – Small Office	0713	0712
9418635	Main		3 – Room 3	0718	0714
9418636	Main		4 – Room 4	0720	0716
9418637	Main		5 – Room 1	0723	0718
9418638	Portable		6 – Modular	07 27	0723
9418639	Main		7 – Cafeteria	0733	0726
9418640	Main		8 – Nurse Office	0735	0728
9418641	Main		9 – Library	0737	0731
9418642	Main		10 – Room 5	0740	0733
9418643	Main	Yes	10 – Room 5	0744	0734
9418644	Main		11 – Room 7	0746	0735
9418645	Main		12 – Room 8	0750	0737
9418646	Main		13 – Room 9	0756	0738
9418647	Main		14 – Room 10	0800	0740
9418648	Main		15 – Room 11	0803	0741
9418649	Main		16 – Room 6	0807	0743
9418650	Main		17 – Gym	0809	0744
9418651	Main		18 – Gym	0811	0746
9418652	Main		19 – Staff Room	0814	0748
9418653	Main		20 – Office	0816	0750
9418654	Main	Yes	20 – Office	0818	0751
9418656	Main		21 – Principal Office	0820	0752
9418657	Main		22 – VP Office	0822	0753
9418658	Main		23 – Health Room	0825	0755
9418659	Main		24 – PE Office	0827	0757

Comments: **Spike Sample = 9418660**
Blank Sample = 9418655

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

MERRILL

20570900

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418633	SPEECH	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	1.2 ± 0.4	2020-12-15
9418634	SM OFFICE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	1.3 ± 0.5	2020-12-15
9418635	3	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.8 ± 0.5	2020-12-15
9418636	4	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418637	1	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.5 ± 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:

MERRILL

20570901

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418638	MODULAR	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 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

Radon test result report for:**MERRILL****20570900**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418639	CAFETERIA	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418640	NURSE	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	0.7 ± 0.5	2020-12-15
9418641	4	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4	2020-12-15
9418642	5	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418643	5	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.8 ± 0.4	2020-12-15
9418644	6	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418645	7	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418646	8	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4	2020-12-15
9418647	10	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418648	11	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4	2020-12-15
9418649	6	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418650	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418651	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418652	STAFF	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.2 ± 0.4	2020-12-15
9418653	OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418654	OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.7 ± 0.4	2020-12-15
9418655	OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418656	PRINCIPAL	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418657	VP	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	1.0 ± 0.4	2020-12-15
9418658	HEALTH	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4	2020-12-15
9418659	PE OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.8 ± 0.4	2020-12-15
9418660	PE OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	15.9 ± 1.0	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: _____

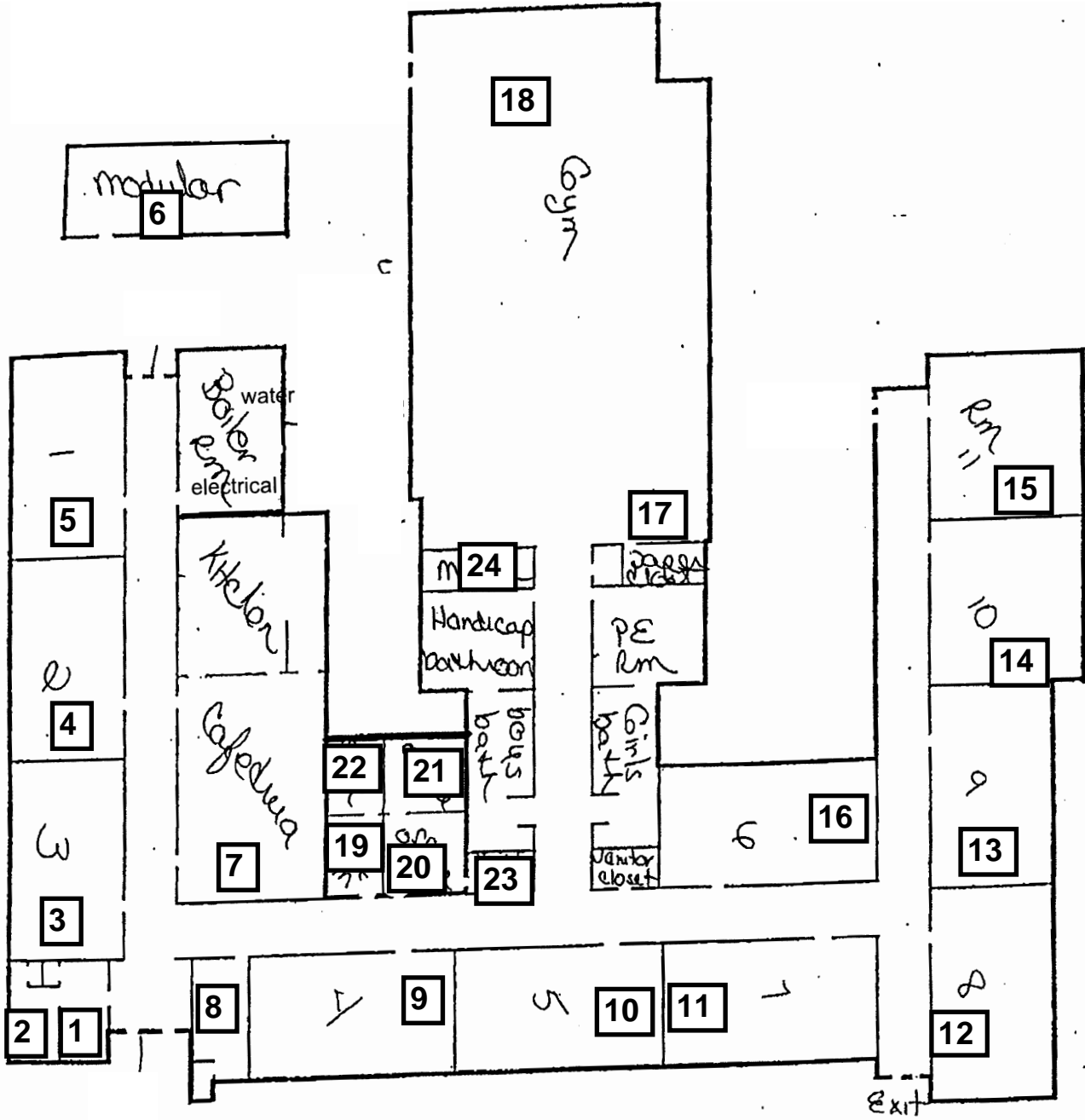
Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

APPENDIX C

RADON SAMPLING LOCATION DIAGRAM

MERRILL ELEMENTARY SCHOOL

Radon Sample Locations



12 = Radon Test Kit Location