

Coleman Creek Consulting, Inc.

**INITIAL RADON AIR SAMPLING
OF
BRIXNER JR. HIGH SCHOOL
FOR
KLAMATH COUNTY SCHOOL DISTRICT
2845 GREENSPRINGS DRIVE, KLAMATH FALLS, OREGON**

INTRODUCTION

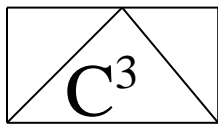
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCS D) to perform radon air sampling as required by State Statute ORS 332.166-167. KCS D is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose 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. Kim Pine, Brixner Jr. High School (Brixner) Custodian placed radon air test kits in the Brixner 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. Pine returned to Brixner 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.



LABORATORY ANALYSIS RESULTS

The radon air test kit samples collected from Brixner 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

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 all reported with <0.3 pCi/L. When compared with matched pair or “duplicate” test kits, all four were well within the expected range of 0-25% Relative Percent Difference, with identical reported <0.3 pCi/L Radon concentrations.

BLANK TEST KITS

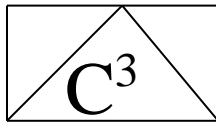
Two blank test kits were submitted to Air Chek with the other Brixner Radon test kits. Both blank test kits were reported with <0.3 pCi/L. All blank tests were reported none detected for Radon.

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 TES Radon test kits. The Spike sample was reported with 15.8 pCi/L. The relative percentage error was calculated to be -38%, 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 17.3 pCi/L, all below the Spiked concentration of 25.7 pCi/L. The Spike sample is identified as Serial #9418007 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.



Coleman Creek Consulting, Inc.

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.

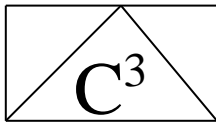
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

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

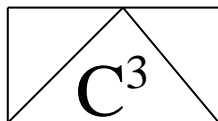
RADON AIR SAMPLE RECORD SHEET

SCHOOL: Brixner Jr. High School
ADDRESS: 4727 Homedale Road
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Kim Pine

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9417973	Original		1 – Cafeteria at Kitchen	0700	0600
9417974	Original		2 – Cafeteria at Room 17	0700	0700
9417975	Original		3 – Cafeteria at Room 14	0700	0700
9417976	Original		4 – Cafeteria at Office	0700	0700
9417977	Original		5 – VP Office	0700	0700
9417978	Original		6 – Principal Office	0700	0700
9417979	Original		7 – Counselor Office	0700	0700
9417980	Original		8 – Office Adjacent to Counselor	0700	0700
9417981	Original		9 – Office Reception	0700	0700
9417982	Original		10 – Conference Room	0700	0700
9417983	Original	Yes	10 – Conference Room	0700	0700
9417984	Original		11 – Room 10	0700	0700
9417985	Original		12 – Library West	0700	0700
9417986	Original		13 – Library North	0700	0700
9417987	Original		14 – Room 13	0700	0700
9417988	Original		15 – Room 12	0700	0700
9417989	Original		16 – Room 11	0700	0700
9417990	Original		17 – Library East	0700	0700
9417991	Original		18 – Room 9	0700	0700
9417992	Original		19 – Room 8	0700	0700
9417993	Original		20 – Room 7	0700	0700
9417994	Original	Yes	20 – Room 7	0800	0700
9417996	Original		21 – Room 6	0800	0700
9417997	Original		22 – Room 5	0800	0700
9417998	Original		23 – Room 4	0800	0700

Comments: Spike Sample =
Blank Sample = 9417995



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RADON AIR SAMPLE RECORD SHEET

SCHOOL: Brixner Jr. High School
ADDRESS: 4727 Homedale Road
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Kim Pine

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9417999	Original		24 – Room 3	0800	0700
9418000	Original		25 – Room 2	0800	0700
9418001	Original		26 – Room 1	0800	0700
9418002	Original		27 – Room 14	0800	0700
9418003	Original		28 – Room 15	0800	0700
9418004	Original		29 – Room 16	0800	0700
9418005	Original		30 – Room 17 North	0800	0700
9418006	Original	Yes	30 – Room 17 North	0800	0700
9418008	Original		31 – Room 17 East	0800	0700
9418009	Original		32 – Room 17 at Kitchen	0800	0700
9418010	Original		33 – Music North	0800	0700
9418011	Original		34 – Music West	0800	0700
9418012	Original		35 – Music South	0800	0700
9418013	Original		36 – Room 19	0800	0700
9418014	Original		37 – Gym North	0800	0700
9418015	Original		38 – Weight Room	0800	0700
9418016	Original		39 – Gym West	0800	0700
9418017	Original		40 – Conner Office	0800	0700
9418018	Original	Yes	40 – Conner Office	0800	0700
9418020	Original		41 – Berleen Back	0800	0700
9418021	Original		42 – Berleen Office	0800	0700
9418022	Portable		43 – Portable	0900	0700
9418023	Shop		44 – Near Small Room	0900	0800
9418024	Shop		45 – Computer Room	0900	0800
9418025	Shop		46 – Front Room	0900	0800

Comments: **Spike Sample = 9418007**
Blank Sample = 9418019

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:**BRIXNER JR. HS****20571300**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9417973	CAFETERIA	2020-12-07 @ 7:00 am	2020-12-10 @ 6:00 am	< 0.3	2020-12-15
9417974	CAFETERIA	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417975	CAFETERIA	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417976	CAFETERIA	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417977	OFFICE -VP	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417978	PRINCIPAL	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417979	COUNSELOR	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417980	OFFICE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417981	INSIDE OFFICE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417982	CONFERENCE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417983	CONFERENCE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417984	10	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417985	LIBRARY W	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417986	LIBRARY N	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.5 ± 0.4	2020-12-15
9417987	13	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417988	12	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417989	11	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.7 ± 0.4	2020-12-15
9417990	LIBRARY E	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417991	9	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417992	8	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.7 ± 0.4	2020-12-15
9417993	7	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417994	HALL N	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417995	6	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417996	6	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417997	6	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9417998	4	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	0.6 ± 0.4	2020-12-15
9417999	3	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418000	2	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418001	1	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418002	14	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418003	15	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418004	16	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418005	17 N	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418006	17 N	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418007	17 N	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	15.8 ± 1.0	2020-12-15
9418008	17 E	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418009	17 KIT	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

BRIXNER JR. HS

20571300

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418010	MUSIC N	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418011	MUSIC W	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418012	MUSIC S	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418013	19	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418014	GYM N	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418015	WEIGHT	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418016	GYM W	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418017	GYM OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418018	GYM OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418019	GYM OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418020	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418021	COACH	2020-12-07 @ 8:00 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

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

BRIXNER JR. HS

20571302

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418022	PORT.	2020-12-07 @ 9:00 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

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

BRIXNER JR. HS

20571303

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418023	SHOP	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418024	SHOP	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418025	SHOP	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

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 50.0 % 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

^{rem}
Date Start: 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

BRIXNER JUNIOR HIGH SCHOOL

Radon Sample Locations

