

Coleman Creek Consulting, Inc.

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

INTRODUCTION

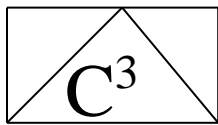
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCS D) to perform radon air sampling as required by State Statute ORS 332.166-167. KCS D is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose 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. Dan Spoon, District Office (DO) Custodian placed radon air test kits in the DO building at the beginning of the day, December 7, 2020. A total of 37 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. Spoon returned to DO 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.



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LABORATORY ANALYSIS RESULTS

The radon air test kit samples collected from HES 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 three duplicate test kits were placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheets. The three duplicate test kit sets were all reported with <0.3/<0.3 pCi/L. When compared with matched pair or “duplicate” test kits, all duplicate pairs were within the expected range of 0-25% Relative Percent Difference.

BLANK TEST KITS

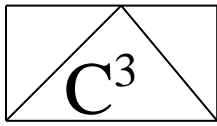
Two blank test kits were submitted to Air Chek with the other HMS Radon test kits. Both blank test kits were reported with <0.3 pCi/L. All blank tests were reported none detected for Radon.

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 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 17.3 pCi/L, all below the Spiked concentration of 25.7 pCi/L. The Spike sample is identified as Serial #9418846 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.



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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.

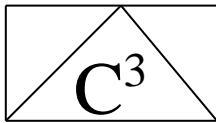
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in the District Office building 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.

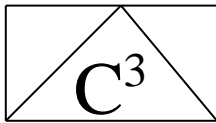
RADON AIR SAMPLE RECORD SHEET

SCHOOL: District Office Building
ADDRESS: 2845 Greensprings Drive
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Dan Spoon

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418812	Main		1 – Room 101 Reception	0648	0646
9418813	Main		2 – Room 128	0652	0648
9418814	Main		3 – Room 128B	06535	0649
9418815	Main		4 – Room 128C	0654	0650
9418816	Main		5 – Room D125 Breakroom	0658	0652
9418817	Main		6 – Room 126	0702	0653
9418818	Main		7 – Room 124	0703	0655
9418819	Main		8 – Room 120	0705	0657
9418820	Main		9 – Warehouse Office	0708	0658
9418821	Main		10 – Loft Area	0714	0659
9418822	Main	Yes	10 – Loft Area	0714	0700
9418823	Main		11 – Print Shop	0718	0702
9418824	Main		12 – Room 115	0720	0704
9418825	Main		13 – Room 111	0722	0706
9418826	Main		14 – Room 110	0724	0707
9418827	Main		15 – Room 109	0726	0709
9418828	Main		16 – Room 106	0727	0712
9418829	Main		17 – Room 105	0729	0713
9418830	Main		18 – Room 104	0731	0715
9418831	Main		19 – Room 113	0735	0717
9418832	Main		20 – Room 114	0738	0719
9418833	Main	Yes	20 – Room 114	0738	0719

Comments: **Spike Sample =**
Blank Sample = 9418834



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RADON AIR SAMPLE RECORD SHEET

SCHOOL: District Office Building
ADDRESS: 2845 Greensprings Drive
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Dan Spoon

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418835	Main		21 – Room 118	0741	0721
9418836	Main		22 – Bland	0746	0723
9418837	Main		23 – Superintendent	0747	0724
9418838	Main		24 – Room 204	0749	0726
9418839	Main		25 – Room 204B	0751	0727
9418840	Main		26 – Room 207	0753	0728
9418841	Main		27 – Room 207B	0754	0729
9418842	Main		28 – Room 208	0757	0733
9418843	Main		29 – Board Room	0759	0735
9418844	Main		30 – Room 215	0801	0736
9418845	Main	Yes	30 – Room 215	0801	0736
9418847	Main		31 – Room 212	0805	0738
9418848	Main		32 – Room 214	0806	0739
9418849	Main		33 – Room 210	0808	0742
9418850	Main		34 – Room 217B	0811	0744
9418851	Main		35 – Room 217	0812	0745
9418852	Main		36 – Room 218	0815	0746
9418853	Main		37 – Room 209	0817	0748

Comments: **Spike Sample = 9418846**
Blank Sample = 9418854

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:
DISTRICT OFFICE
20572300

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418812	101	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418813	128	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418814	128B	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418815	128C	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418816	D125	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418817	126	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418818	124	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418819	120	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418820	WAREHOUSE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418821	PRINT OFF.	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418822	PRINT OFF.	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418823	PRINT SHOP	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418824	115	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418825	111	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418826	110	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418827	109	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418828	106	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418829	105	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418830	104	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418831	113	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418832	114	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418833	114	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418834	114	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418835	118	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418836	BLAND	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	0.7 ± 0.4	2020-12-15
9418837	SUPER	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418838	204	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418839	204B	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418840	207	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418841	207B	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418842	208	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418843	BOARD RM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418844	215	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418845	215	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418846	215	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	16.4 ± 1.0	2020-12-15
9418847	212	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418848	214	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
DISTRICT OFFICE
20572300

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418849	210	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418850	2127B	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418851	217	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418852	218	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418853	209	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418854	209	2020-12-07 @ 8:00 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 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: _____

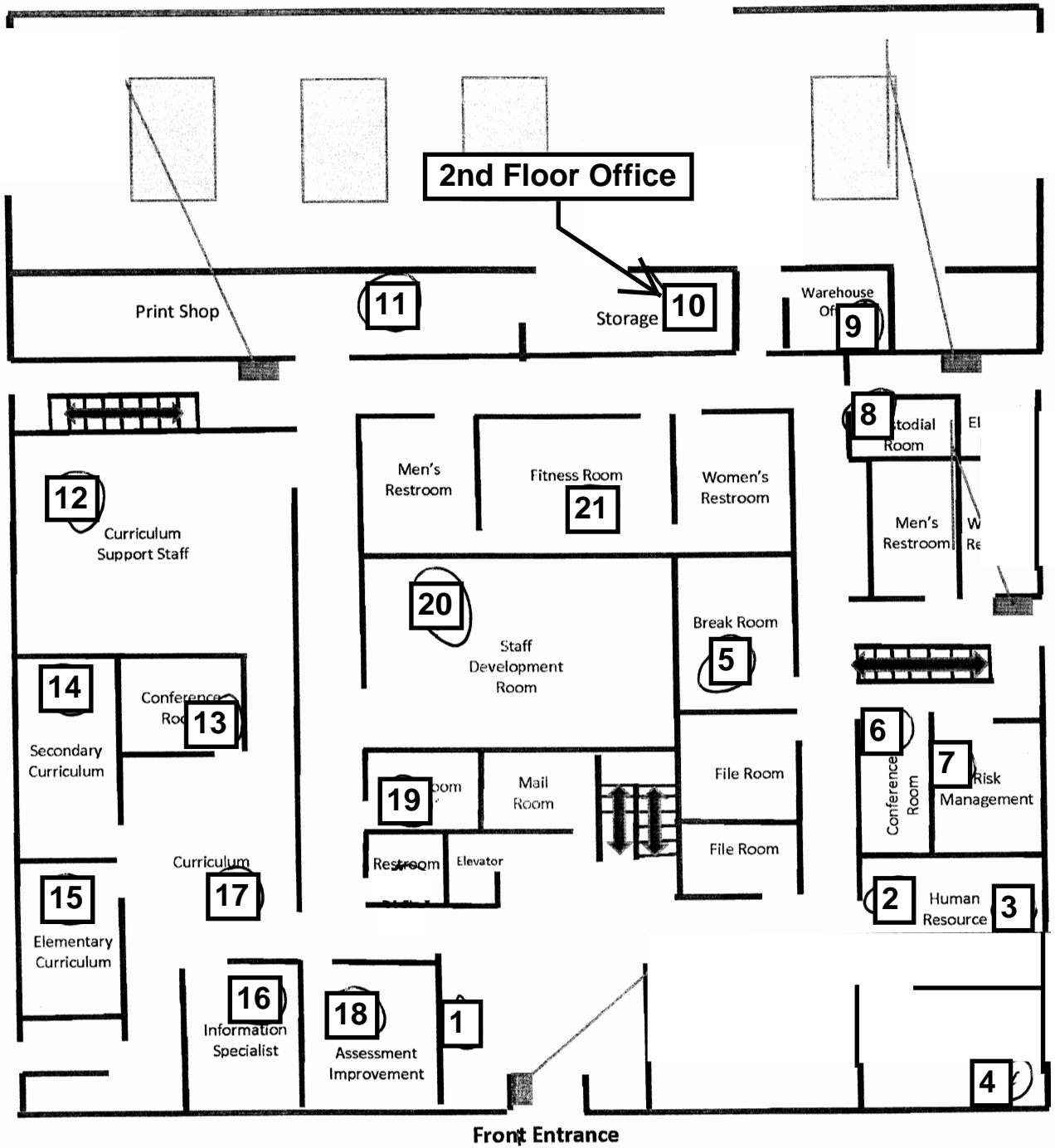
Device No.'s: _____ Device No.'s: _____

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

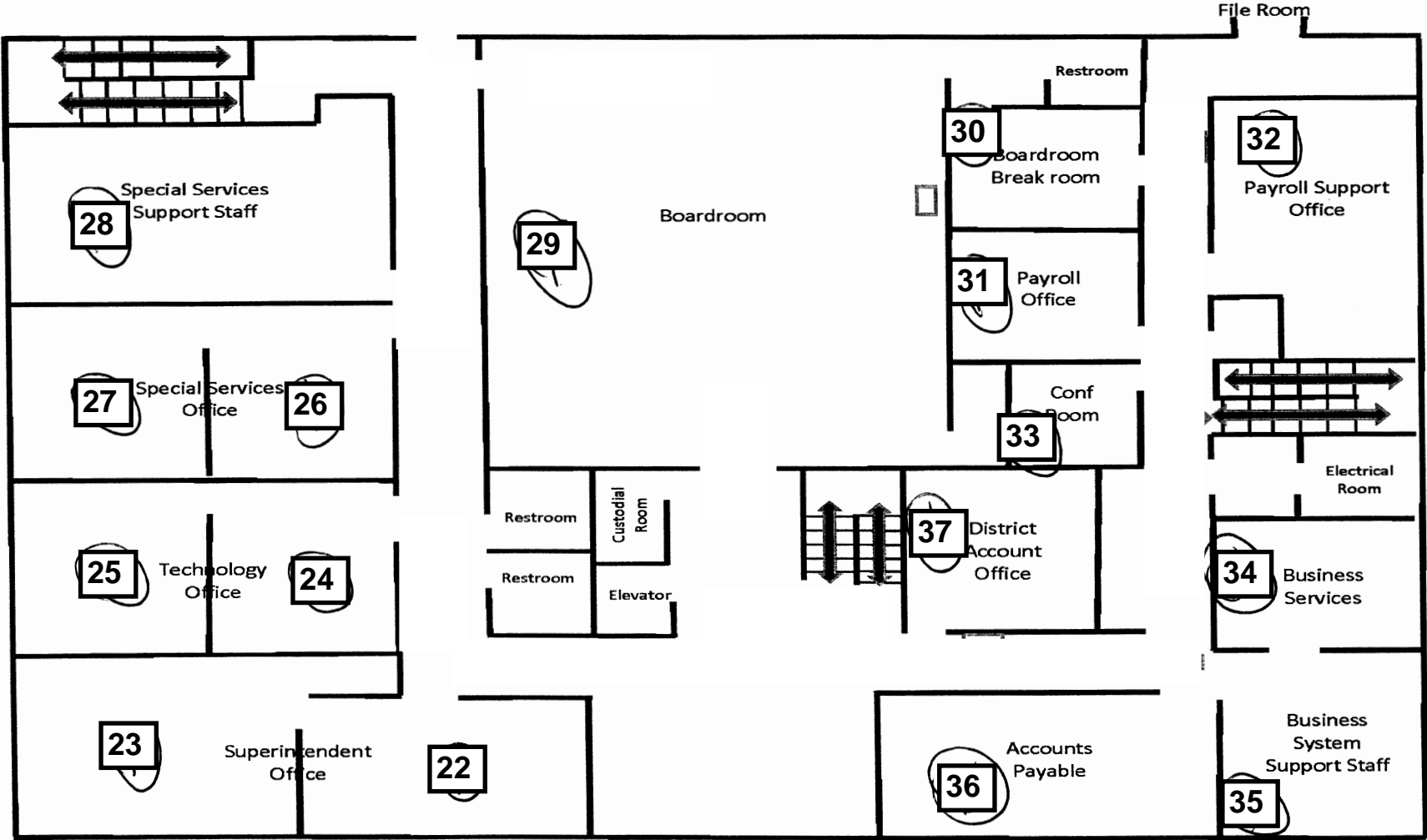
DISTRICT OFFICE BUILDING - RADON SAMPLE LOCATIONS



12 = Radon Test Kit Location

DISTRICT OFFICE BUILDING - 2ND FLOOR

Radon Sample Locations



22 = Radon Test Kit Locations