

12 Zephyr Cove Elementary School

12.1 Summary



Short-term radon measurements were conducted in this school from March 17-19, 2009. The results obtained from these tests reflect the conditions that existed within this school and within these dates.

These conditions include the operation of active soil depressurization systems that had previously been installed in this structure.

Tests were conducted in accordance with the US EPA's Guidance Document Radon Measurements in Schools, Revised Edition, EPA 402-R-92-014, July 1993.

These tests included all frequently occupied ground floor rooms within all structures on the campus. Additional details on the methodology of these tests as well as room selection can be found in Section 1.2 of this report.

Locations tested:	38
Locations where devices retrieved:	38
Locations with short-term results at or above 4.0 pCi/L:	0
Rooms at or above 4.0 pCi/L:	Not applicable
Survey anomalies:	None observed

Quality control and quality assurance measures that were taken for this school, which are detailed in Section 13, indicate that confidence can be placed in the survey results for this facility.

12.2 Results

The results provided below in both tabular and pictorial form represent the radon levels within these locations that were present at the time of the survey and under the condition in which the building was being operated, including its HVAC system. There are no locations that were at or above the 4.0 pCi/L action level.

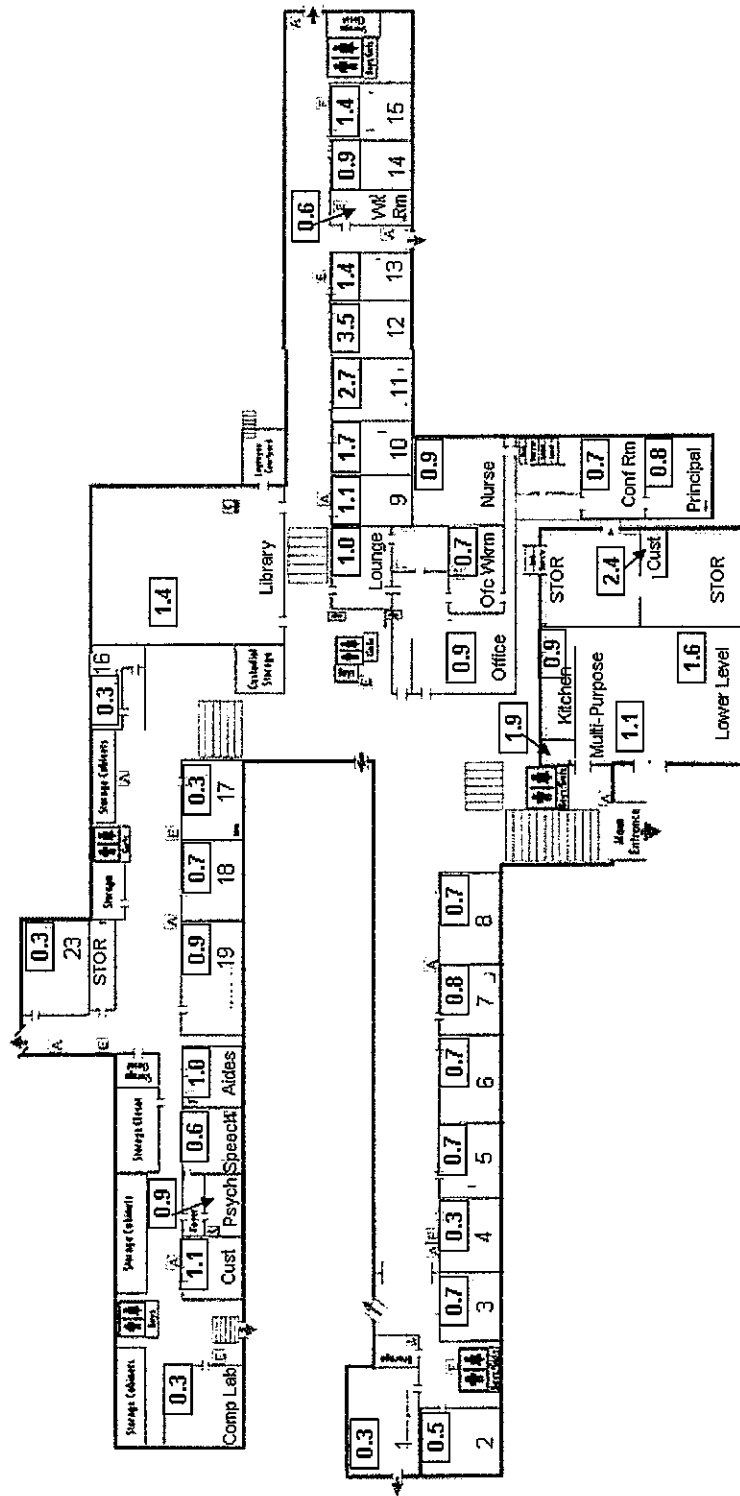
All times indicated are Eastern Daylight Savings Time. Results indicated as <0.3 pCi/L are at the lower level of detection for the devices.

Table 13: Zephyr Cove Elementary School Radon Survey Results

Room	Device	Start Date	Start Time	End Date	End Time	Result (pCi/L)
1	4328456	2009-03-17	7:00 pm	2009-03-19	11:00 pm	< 0.3
2	4328448	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.5
3	4328446	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.7
4	4328455	2009-03-17	7:00 pm	2009-03-19	11:00 pm	< 0.3
5	4328449	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.7
6	4328450	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.7
7	4328434	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.8
8	4328429	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.7
9	4328422	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.1
10	4328493	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.7
11	4328423	2009-03-17	7:00 pm	2009-03-19	11:00 pm	2.7
12	4328425	2009-03-17	7:00 pm	2009-03-19	11:00 pm	3.5
13	4328433	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.4
14	4328491	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.9
15	4328427	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.4
16	4328453	2009-03-17	8:00 pm	2009-03-19	11:00 pm	< 0.3
17	4328447	2009-03-17	8:00 pm	2009-03-19	11:00 pm	< 0.3
18	4328443	2009-03-17	8:00 pm	2009-03-19	11:00 pm	0.7
19	4328442	2009-03-17	8:00 pm	2009-03-19	11:00 pm	0.9
23	4328462	2009-03-17	8:00 pm	2009-03-19	11:00 pm	< 0.3
Aide Room	4328494	2009-03-17	8:00 pm	2009-03-19	11:00 pm	1.0
Computer Lab	4328454	2009-03-17	8:00 pm	2009-03-19	11:00 pm	< 0.3
Conference Rm	4328424	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.7
Custodian Ofc	4328437	2009-03-17	7:00 pm	2009-03-19	11:00 pm	2.4
Custodian Ofc 2	4328490	2009-03-17	8:00 pm	2009-03-19	11:00 pm	1.1
Kitchen	4328421	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.9
Kitchen Ofc	4328435	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.9
Library	4328452	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.4
Lounge	4328436	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.0
Multi-Purpose 1	4328441	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.1
Multi-Purpose 2	4328492	2009-03-17	7:00 pm	2009-03-19	11:00 pm	1.6
Nurse	4328445	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.9
Ofc Workroom	4328440	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.7
Office	4328430	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.9
Principal	4328431	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.8
Psych	4328496	2009-03-17	8:00 pm	2009-03-19	11:00 pm	0.9
Speech	4328439	2009-03-17	8:00 pm	2009-03-19	11:00 pm	0.6
Workroom	4328428	2009-03-17	7:00 pm	2009-03-19	11:00 pm	0.6

Figure 12: Zephyr Cove Elementary School Radon Survey Results

Results represented in pCi/L
Red results ≥ 4.0 pCi/L



Zephyr Cove Elementary School
Short-term Radon Survey
March 17-19, 2009
Conducted by:
Colorado Vintage Companies, Inc.

12.3 Discussion

The measurements obtained for this school were conducted with several active soil depressurization systems in operation. These systems had been installed for the purpose of reducing indoor radon and as a result of previous short-term measurements having indicated elevated radon potential for this particular school.

No locations were found to be at or above 4.0 pCi/L within this survey. However, these results are contingent upon the continued operation of these radon mitigation systems.

In reviewing the results one can see that although less than 4.0 pCi/L, Room 12 had a reading of 3.5 pCi/L, which with potential variances in measurements as well as weather conditions, it is recommended that the operation of the HVAC system as well as the ASD system, that services this room, be reviewed.

12.4 Recommendations

- Review active soil depressurization system that serves room 12 to insure it is operating.
- Review HVAC system that serves Room 12.
 - Insure both the presence and capacity of air supply to this room
 - Adjust supply to maintain a 0.010 inch of water column positive pressurization within these rooms relative to the sub-grade.
 - Verify that positive pressure is maintained in all other rooms that are served by the air handler that serves Rooms 12. If not, increase capacity of the air handler to insure positive pressure through adjustments to fresh air make-up and/or fan speed.

Maintenance

Given the potential for this school to have elevated radon levels, a program should be instituted that:

1. Retest all ground floor rooms, once every year as recommended by US EPA protocols
2. Retest rooms after renovations, which would affect air flow and air supply, occur. This would include but not be limited to situations when:
 - HVAC system is modified, (Retest rooms affected by HVAC that is modified)
 - Partition walls are added within a room,
 - Insure that renovations include provisions for balanced air supply and return from newly created room.
 - Additions occur at this campus, whether they are new buildings or portable classrooms.
3. Maintain fresh air make-up in conformance with ASHRAE standards and state codes for schools and to insure an interior positive building pressure during occupied hours.

4. Develop a database either specifically for this school or district wide for all schools that allows for the retention of future test results that clearly delineate:
 1. Location
 2. Date of test
 3. Purpose of test (routine, post-mitigation or post renovation, etc.)
 4. Method by which room nomenclature is maintained or a clear means of determining when names are changed or rooms added.

