



## Radon Plan & Protocols

The 2015 Legislature passed House Bill (HB) 2931 so that elevated radon levels in Oregon schools would be known. House Bill 2931 later became Oregon Revised Statute (ORS) 332.166-167. As directed by this statute, all school districts in Oregon must develop a plan to accurately measure school buildings for elevated radon levels. Under the statute, school districts must submit a plan to Oregon Health Authority (OHA) by September 1, 2016. Per ORS 332.166-167, actual testing of the school was done February 2020 and the testing results were sent to OHA and posted on the HCCS website.

This plan will develop the protocols necessary for compliance. OHA's Testing for Elevated Radon in Oregon Schools, specifically Appendices A will be used to guide this effort. Below is the plan developed for the Hope Chinese Charter School (HCCS).

Per ORS 332.166-167, School Radon Measurement Teams (i.e. personnel appointed to measure a school site for elevated radon) must, at a minimum, conduct initial measurements in all frequently occupied rooms in contact with the soil or located above a basement. Testing occurred in all frequently occupied spaces simultaneously. Examples include: offices, classrooms, and break rooms. A minimum of one detector for every 2,000 sq. ft. of open floor space or portion was used. United States Environmental Protection Agency (USEPA) studies indicate that radon levels on upper floors are not likely to exceed the levels found in ground-contact rooms. Testing rooms on the ground-contact floor or above unoccupied basements is sufficient to determine if radon is a problem in a school. Areas such as the cafeteria and classroom 8 did not need to be tested.

HCCS did a preliminary radon test on July 18, 2016, in which a radon test kit was deployed in the lower level of the HCCS facility. The result of the test was 1.2 picocuries per liter (pCi/L) which is well below the EPA threshold of 4 pCi/L. These results are consistent with data from the Oregon Health Authority that indicates the school's zip code (97005) of having a low risk of radon. This test result can be found in Appendix B.

HCCS did more comprehensive testing with passive short-term test devices per ORS 332.166-167 March of 2020 (See Appendix A for testing protocols) including placement on 2/23 thru 2/26/2020 and test results can be found in Appendix C). The test confirmed readings well below the EPA threshold of 4 pCi/L in all rooms except office 6 (PE office). This room registered a reading of 12.8 pCi/L which places it in the EPA recommended action level and is subject to additional confirmation testing and possible radon reduction measures with the first follow-up test starting within 30 days of the original test and following the same Quality Assurance procedures and requirements (i.e. percentages of duplicates/blanks/spikes), including quality assurance calculations. This room will continue to be used as the EPA recommends relocating individuals in rooms that have radon levels near 100 pCi/L and this room is significantly lower than this measurement. This plan, specifically regarding office 6, will be updated as we get additional information.

The next whole building test will occur in five years or the 2024-25 school year as per current national guidelines (ORS 332.166-167 requires testing every ten years) or sooner if major renovations are completed.



## GLOSSARY

**Radon** - A gaseous radioactive decay product of radium.

**Blanks** - Measurements made by analyzing unexposed (closed) detectors that accompanied exposed detectors to the field. The School District use of blanks is to assess any change in analysis result caused by exposure other than in the environment to be measured. Background levels may be due to leakage of radon into the detector, detector response to gamma radiation, or other causes.

**Closed-Building Conditions** - Means keeping all windows closed, keeping doors closed except for normal entry and exit, and not operating fans or other machines which bring in air from outside. Fans that are part of a radon-reduction system or small exhaust fans operating for only short periods of time may run during the test.

**Duplicates** - Duplicate measurements provide a check on the precision of the measurement result and allow the user to make an estimate of the relative precision. Large precision errors may be caused by detector manufacture or improper data transcription or handling by suppliers, laboratories, or technicians performing placements. Precision error can be an important component of the overall error. The precision of duplicate measurements are monitored and recorded as quality records.

**Spikes** – Measurements used to assess the accuracy of a lab analysis and/or how accurately detectors supplied by a laboratory (i.e. test kit manufacturer) measure radon. “Spikes” are test kits that have been exposed to a known concentration of radon in a chamber approved by the National Radon Proficiency Program (NRPP) or National Radon Safety Board (NRSB). The process for completing this aspect of a radon measurement effort’s Quality Assurance/Quality Control plan is laid out in the Radon Test Placement Strategy and Protocol Checklist below.



## Appendix A: Test Kit Placement Guide

Once the number of test kits is determined, they will be placed in the frequently-occupied rooms as identified in the “What Rooms Should Be Tested?” section above.

- a. Be sure to check these items before placing the radon test kits:
  - Closed building conditions have been maintained in the building for 12 hours.
  - HVAC system is operating as it normally would when students and faculty are present.
  - Testing is being done during a time that students and faculty are present.
- b. As detectors are placed in the rooms determined during section 1, thorough and accurate data needs to be recorded on the device log and floor plan (see sample below).

Protocol for all test kits include the following; be sure that each detector placed is:

- in a location where it will be undisturbed
- out of direct sunlight
- three feet from all doors and windows
- four inches from all other objects
- at least 1 foot from all exterior walls
- at least 20 inches to 6 feet from the floor
- out of direct air flow from vents
- four feet from heat source

To protocol above, School Measurement Teams in other states simply place the test kit on the teacher’s desk or up (out of the way of students) on a bookshelf.

- c. Specific protocol for duplicate measurements. If the test kit you are placing is duplicate measurement also be sure to:
  - Placed duplicate (side-by-side) test kit 4-5 inches away from test kit for that room.
- d. Specific protocol for blank measurements. If the test kit you are placing is a blank measurement, also be sure to:
  - Unwrap blanks, open, but then immediately close and reseal them.



- Place the test kit next to the detector kit(s) for the room 4-5 inches away.

e. Specific protocol for spiked test kits.

- Arrange for the spiked test kits to arrive back from the Certified Performance Test Chamber to the School Measurement Team as close to the day that kits are retrieved from the school as possible. [See *Quality Assurance Procedures for a School Radon Measurement Program* in OHA's Testing for Elevated Radon in Oregon Schools.]

f. Testing Period.

The minimum length of time test kits should be left out is 48 hours, but not exceed seven days. [It's best to follow test kit manufacturer's instructions for more specific recommendations.] It's best if devices should be left in place for four days to ensure optimum results.

Many schools place short-term kits on Monday morning and pick them up on Thursday morning. Retrieving Kits: Once the testing period has ended, all test kits placed at a school site (detectors, duplicates, and blanks) need to be retrieved. This should be done on the same date. Complete the data sheet when retrieving detectors.

- Record ending date and time (kits were picked up) information, per the "Test Kit Placement Log" [Appendix D of OHA's Testing for Elevated Radon in Oregon Schools.]
- Record ending information on the test kit package (if required).

g. Prepare and mail all kits.

- Seal and prepare test kits to be mailed to the lab by the manufacturer's instructions.
- Include those spiked kits (not identified as such) in the same box(es) as other kit types.
- Mail all test kits (detectors, duplicates, blanks, spikes) to the Radon Measurement Laboratory using a mail service that guarantees delivery to the laboratory within two days at maximum, but **preferably overnight** shipping.

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Signature/title

Date

**Please mail, email or fax the signed document:**

MAIL TO: Oregon Radon Awareness Program  
800 NE Oregon St, Suite 640  
Portland, OR 97232-2162

FAX TO: 971-673-0979  
EMAIL TO: [radon.program@state.or.us](mailto:radon.program@state.or.us)

## Appendix B - Radon

July 25, 2016

**\*\* LABORATORY ANALYSIS REPORT \*\***

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**Attention: P4777 / RICHARD CASON / ALPHA ENVIRONMENTAL SVCS INC**Kit #: 4793024 Result:  $1.2 \pm 0.2$  pCi/l

Location: Basement

Ray Hoy

3500 Sw 104th Ave

Beaverton, OR 97005-1941

Analysis Note :

Analyzed : 2016-07-23 at 12:00 pm

Started : 2016-07-18 at 5:00 pm

Ended : 2016-07-21 at 8:00 am

Hours/MST% : 63 hours 11.3% 60°F

## Appendix C - Radon



March 10, 2020

Robyn Stolin  
Facility Manager  
3500 SW 104th Avenue  
Beaverton, Oregon 97005

Via email: robyn.stolin@hopeccs.org

Regarding: Radon Assessment and Testing Services  
Hope Chinese Charter School  
3500 SW 104th Avenue  
Beaverton, Oregon 97005  
PBS Project 27038.000, Phase 0001

Dear Mr. Stolin:

From February 24 through February 27, 2020, PBS Engineering and Environmental Inc. (PBS) performed short-term radon testing at Hope Chinese Charter School, located at 3500 SW 104th Avenue in Beaverton, Oregon.

The Environmental Protection Agency (EPA) recommends, and the Oregon Health Authority (OHA) requires, that school buildings be tested for radon and that any radon concentrations be maintained below 4.0 picocuries per liter (pCi/L) of air. PBS used Air Chek, Inc., brand single-use, short-term radon test kits to measure radon levels in frequently occupied rooms that are in contact with the ground or above unoccupied basements or crawlspaces.

The following table lists all samples in which radon levels were found to be above the EPA action level.

**Test Kits with Radon 4.0 pCi/L or above**

Test Kit Number	Sample Location	Radon Level (pCi/L)
9378126	Office 6, PE Office	12.8

PBS recommends verification that any ventilation to Office 6 (PE Office) is functioning and for follow-up tests to be placed to check the accuracy of the initial results.

See the attached laboratory analysis report for more details.

In addition to the EPA recommendation that radon concentrations not exceed 4.0 pCi/L, OHA recommends that the following steps be conducted based on the results of a room's initial short-term test:

- **If the result is less than 2.0 pCi/L**, school districts are required to test again every 10 years, per Oregon Revised Statute 332.166-167.
- **If the result is between 2.0 pCi/L and 4.0 pCi/L**, consider fixing (i.e., lowering) the radon in that room.



- **If the result is from 4.0 pCi/L to 8.0 pCi/L**, perform a follow-up measurement of that room using a long-term test. This test should be conducted over as much of a nine-month school year as possible, when the room is likely to be occupied. If that result is equal to or greater than 4.0 pCi/L, the radon in the room should be fixed (i.e., lowered).
- **If the initial short-term test result is equal to or greater than 8.0 pCi/L**, conduct a second short-term test and average its result with the initial short-term test result. If the average of the two is equal to or greater than 4.0 pCi/L, radon in the room should be fixed (i.e., lowered).

Note: A great difference in the results of the short-term tests may indicate a flaw in the testing process. Investigate and consider retesting. For situations in which one of the test results is equal to or greater than 4.0 pCi/L, if the higher result is two or more times the lower result, repeat the test.

### **LIMITATIONS OF SCOPE**

This study was limited to the tests and locations as previously indicated. The site as a whole may have other environmental concerns that will not be characterized by this study. The findings and conclusions of this work are not scientific certainties, but probabilities based on professional judgment concerning the significance of the data gathered during the course of this investigation. PBS is not able to represent conditions on the site or adjoining sites beyond those detected or observed by PBS.

Please feel free to contact me at 503.417.7724 or [marli.heininger@pbsusa.com](mailto:marli.heininger@pbsusa.com) with any questions or comments.

Sincerely,

Marli Heininger  
Industrial Hygiene Technician

Attachment: Air Chek Laboratory Analysis Report

Radon test result report for:**MAIN  
MAIN**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9378119	CLASSROOM A	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378120	CLASSROOM B	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378123	CLASSROOM C	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	2.4 ± 0.3	2020-02-28
9378124	CLASSROOM C DUP	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	2.6 ± 0.3	2020-02-28
9378112	CLASSROOM D	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.9 ± 0.3	2020-02-28
9378132	COPY ROOM	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378129	KITCHEN OFF BLNK	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378125	KITCHEN OFFICE	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378133	OFFICE 1	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	1.0 ± 0.3	2020-02-28
9378131	OFFICE 2	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378130	OFFICE 3	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	0.5 ± 0.3	2020-02-28
9378118	OFFICE 4	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.7 ± 0.3	2020-02-28
9378127	OFFICE 5	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378128	OFFICE 5 DUP	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378126	OFFICE 6	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	12.8 ± 0.8	2020-02-28
9378134	RECEPTION	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	0.9 ± 0.3	2020-02-28
9378106	ROOM 1	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378116	ROOM 10	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.5 ± 0.3	2020-02-28
9378113	ROOM 11	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378115	ROOM 12	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378108	ROOM 12 BLANK	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378109	ROOM 2	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378110	ROOM 2 DUP	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378107	ROOM 3	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378111	ROOM 4	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378114	ROOM 5	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378117	ROOM 6	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28
9378121	ROOM 7	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378122	ROOM 9	2020-02-24 @ 8:00 am	2020-02-27 @ 11:00 am	0.6 ± 0.3	2020-02-28
9378135	STAFF CONFERENCE	2020-02-24 @ 9:00 am	2020-02-27 @ 11:00 am	< 0.3	2020-02-28