



Philomath Public Schools

Benton County School District 17J, 1620 Applegate Street, Philomath OR 97370 (541) 929-3169

Radon Testing Plan

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 schools must be done on or before January 1, 2021 and the testing results sent to OHA and posted on the school or school district's website. This plan will develop the protocols necessary for compliance. OHA's Testing for Elevated Radon in Oregon Schools, specifically Appendices A and D will be used to guide this effort. Below is the plan developed for the **Philomath School District 17J**.

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 or a crawlspace. Testing will occur in all frequently occupied spaces simultaneously per school site. Examples include: offices, classrooms, conference rooms, gyms, auditoriums, cafeterias & break rooms. A minimum of one detector for every 2000 sq. ft. of open floor space or portion thereof is required. 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 or crawlspaces is sufficient to determine if radon is a problem in a school. Areas such as rest rooms, hallways, stairwells, elevator shafts, utility closets, kitchens storage closets do not need to be tested.

Initial and follow-up testing, as needed, will use passive test devices. Active devices (electrically powered, continuous radon monitors) may be used in follow-up testing of locations, if needed, where it is important to determine that radon levels vary according to the time of day. Because testing under closed conditions is important to obtain meaningful results from short-term tests, the District will schedule testing during the coldest months of the year. "Closed building conditions" are defined as 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. Testing will occur between October and March in any given school year. Short term testing will be used with passive test kits will be used in "closed building conditions". Test Kits will be placed during weekdays with HVAC (heating, ventilation, air conditioning) systems operating as they do normally. The following is a detailed protocol instruction checklist:

1. A Test Kit Placement Log and a Test Kit Location Floor Plan will be prepared for each school in which radon measurements are made. Schools will use their emergency/fire escape plan as a template. Test kit location will be accurately recorded on both a Log and Floor Plan.



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2. Test kits or testing services must meet the current requirements of the national certifying organizations, National Radon Proficiency Program (NRPP, www.nrpp.info) or the National Radon Safety Board (NRSB, www.nrsb.org). Testing must be done following the directions on the test kit.
3. Per ORS 332.166-167, school radon measurement teams must, at a minimum, conduct initial measurements in all frequently occupied rooms in contact with the soil or located above a basement or a crawlspace. Room examples include offices, classrooms, conference rooms, gyms, auditoriums, cafeterias and break rooms.
4. The number of test kits used to measure radon (detectors) must be determined by counting the number of appropriate rooms. One detector kit is used for each room that is 2000 square feet or less. Additional test kits are needed for larger rooms.
5. Added to this number will be the test kits needed for Quality Assurance purposes.
6. Test kits will be placed in all rooms in contact with the soil or located above a basement or crawlspace that are frequently occupied by students and school staff.
7. Testing will occur during the time that students and teachers are normally present (during weekdays).
8. In addition to placing detectors, additional test kits will be provided to serve as quality assurance measures (duplicate, blank, and spike measurements). Quality Assurance procedures will be conducted as described in OHA's Testing for Elevated Radon in Oregon Schools.
9. All test kits placed in the school site (detectors, duplicates, and blanks) must be noted on the Device Placement Log and Floor Plan by their serial number.
10. Test kits should be placed.
 - a. Where they are least likely to be disturbed or covered up.
 - b. At least three feet from doors, windows to outside or ventilation ducts.
 - c. At least one foot from exterior walls.
 - d. At least 20 inches to six feet from floor.
 - e. About every 2,000 square feet for large spaces (e.g., a 3500 square foot gymnasium would require two test kits)

Along with the five-item placement protocol above, School Radon Measurement Teams can simply place the test kit on the teacher's desk or up on a bookshelf, out of the way of students. To prevent tampering, kits may be suspended from a wall or ceiling (using string and thumb-tack/tape). If they are suspended, they should be 20 inches to 6 feet above the floor, at least 1 foot below the ceiling.

11. Test kits must **NOT** be placed:
 - a. Near drafts resulting from heating, ventilating vents, air conditioning vents, fans, doors,



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- and windows.
- b. In direct sunlight.
 - c. In areas of high humidity such as bathrooms, kitchens, laundry rooms, etc.
 - d. Where they may be disturbed at any time during the test
12. Testing with short-term test kits must be used under closed conditions (closed windows/doors except for normal exit/entry).
- a. Closed conditions: Short-term tests should be made under closed conditions in order to obtain more representative and reproducible results. Open windows and doors permit the movement of outdoor air into a room. When closed conditions in a room are not maintained during testing, the subsequent dilution of radon gas by outdoor air may produce a measurement result that falls below the action level in a room that actually has a potential for an elevated radon level. Schools shall only be tested for radon during periods when the HVAC system is operating as it does normally.
 - b. All external doors should be closed except for normal use – structural and weatherization defects need to be repaired prior to testing.
 - c. Closed conditions must be verified when placing and retrieving test kits.
13. Short-term test kits will be placed during colder months (October through March).
- a: Colder months: Because testing under closed conditions is important to obtain meaningful results from short-term tests, the District will schedule testing during the coldest months of the year. During these months, windows and exterior doors are more likely to be closed. In addition, the heating system is more likely to be operating. This usually results in the reduced intake of outside air. Moreover, studies of seasonal variations of radon measurements in schools found that short-term measurements may more likely reflect the average radon level in a room for the school year when taken during the winter heating season.
 - b: The District will check and document local weather forecasts prior to placing test kits. Do not conduct short-term measurements (2-5 days) during severe storms or period of high winds. The definition of severe storm by the National Weather Service is one that generates winds of 58 mph and/or $\frac{3}{4}$ inch diameter hail and may produce tornadoes.
14. Test Kits will be placed during weekdays with HVAC (heating, ventilation, air conditioning) systems operating as they do normally.

Suggested timeline:

Monday morning – Place kits (detectors/duplicates/blanks) per Test Kit Placement Log created for school. Record data, as needed, on Log.

Thursday morning – Pick up kits, record as needed, ship with (previously requested & received) spiked test kits to Radon Measurement Laboratory.

- a. Air conditioning systems that recycle interior air may be operated.
- b. Window air conditioning units may be operated in a re-circulating mode, but must be greater than 20 feet from the test kit.



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- c. Ceiling fans, portable humidifiers, dehumidifiers and air filters must be more than 20 feet from the test kit.
- d. Portable window fans should be removed or sealed in place.
- e. Fireplaces or combustion appliances (except for water heaters/cooking appliances) may not be used unless they are the primary source of heat for the building.
- f. If radon mitigation systems are in place in the school, they should be functioning.

15. The District will not conduct initial measurements under the following conditions:

a. During abnormal weather or barometric conditions (e.g., storms and high winds). If major weather or barometric changes are expected, it is recommended that the 2 to 5-day testing be postponed. USEPA studies show that barometric changes affect indoor radon concentrations. For example, radon concentrations can increase with a sudden drop in barometric pressure associated with storms.

b. During structural changes to a school building and/or the renovation of the building's envelope or replacement of the HVAC system

16. After receiving the results of the initial testing, School Radon Measurement Teams will follow the "Interpreting initial results" section of the OHA's Testing for Elevated Radon in Oregon Schools.

Follow-up Measurements

Follow-up testing (in rooms with initial short-term measurement of 4.0 pCi/L or higher) should start within one month after receiving the initial test results. Follow-up testing must be made in the same location in a room. When conducting follow-up testing using short-term methods will be done in the same conditions as the initial measurement. Follow-up testing using passive short-term test kits should follow the same Quality Assurance procedures and requirements (i.e. percentages of duplicates/blanks/spikes), including quality assurance calculations. Follow directions under Radon Test Placement Strategy and Protocol Checklist and Test Kit Placement again.

Report of Results & Distribution

ORS 332.166-167 requires that school districts make all test results available: to the district's school board; the Oregon Health Authority (to post on its website), and readily available to parents, guardians, students, school employees, school volunteers, administrators and community representatives at the school office, district office or on a website for the school or school district.



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US EPA, OHA Oregon Radon Awareness Program, and numerous non-governmental groups recommend that the school district take action to reduce the radon level in those rooms where the average of the initial and follow-up short-term kit results OR the result of the long-term kit used in follow-up is 4.0 pCi/L or more.

Initial testing will be conducted in accordance with ORS 332.166-167 before January 1, 2021. Because buildings age and ground beneath them settles, radon entry may increase due to cracks in the foundation. For that reason, ORS 332.166-167 requires that schools be tested once every 10 years regardless of initial testing results or whether mitigation was done.

Suggested times, for retesting, in addition to that required under ORS 332.166-167, are as follows:

1. Current national guidelines (ANSI/AARST, 2014) recommend that school buildings be re-tested every five years.
2. If radon mitigation measures have been implemented in a school, retest these systems as a periodic check to ensure that the radon mitigation measures are working. EPA does not provide a specific interval, but OHA recommends that schools with radon mitigation measures retest every 5 years.
3. Retest after major renovations to the structure of a school building or after major alterations to a school's HVAC system. These renovations and alterations may increase radon levels within a school building.
4. If major renovations to the structure of a school building or major alterations to a school's HVAC system are planned, retest the school before initiating the renovation. If elevated radon is present, radon-resistant techniques can be included as part of the renovation.



Philomath Public Schools

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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.



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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.

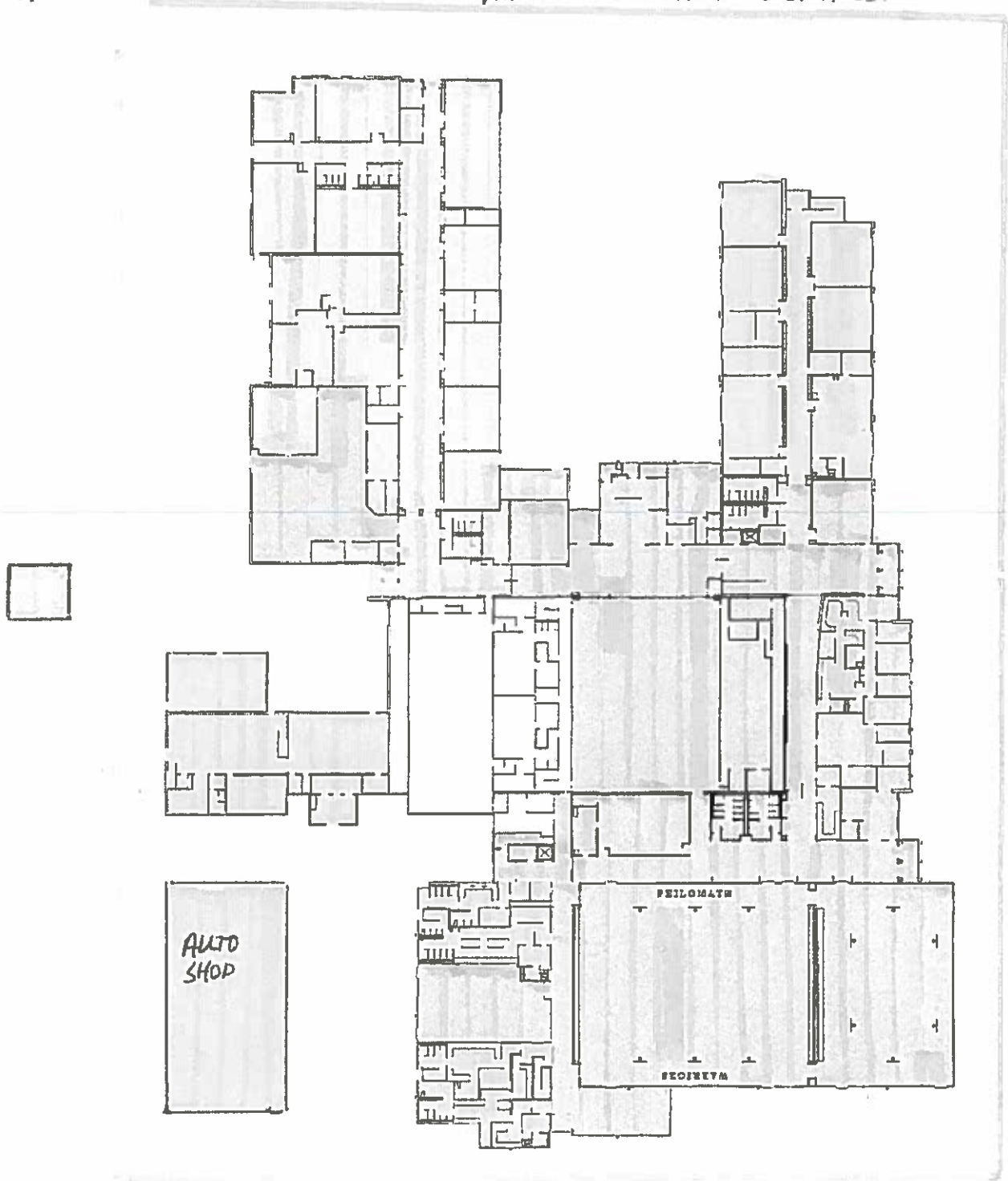
c. Specific protocol for duplicate measurements. If the test kit you are placing is duplicate measurement also be sure to:

- Placed duplicate (side-by-side) test kit 4-5 inches away from test kit for that room.

Philomath High School

PLR_s

PARKING LOT RESPONSIBILITIES.



PARKING LOT RESPONSIBILITIES.

BATTING
CAGE

FORESTRY

Step-by-step guide for planning radon testing in Oregon schools

Per ORS 332.166-167, Oregon school districts shall develop a plan for testing schools under their jurisdiction for elevated levels of radon. They shall submit it to the Oregon Health Authority on or before **Sept. 1, 2016**.

Below is a recommended step-by-step guide for planning for radon testing at a specific school site. It's intended to be used with the other information in this document.

By going through well thought-out “dry-run” on paper, staff (e.g., school radon measurement teams) will likely be able to identify timelines, costs (staff time and test kit costs) and unforeseen barriers. Knowing these, before testing begins, may result in more accurate test results and decreased costs.

1. Identify rooms to be tested

ORS 332.166-167 specifies that “at a minimum, any frequently occupied room in contact with the ground or located above a basement or a crawlspace” should be tested.

Examples of such rooms include offices, classrooms, computer rooms, conference rooms, gyms, auditoriums, cafeterias and break rooms. This does not mean storage rooms, bathrooms, stairways, hallways, kitchens or elevator shafts.

Staff should procure a copy of the school’s emergency escape map. It can be used as the floor plan, since it usually provides the most accurate and up-to-date information. The map can be used to identify the frequently occupied rooms at a particular school site. As discussed below, that map can also be used to indicate which test kit types will go in which room.

Make sure all rooms in the building floor plan are individually labeled; create labels for them if they are not.

2. Determine the number of test kits needed.

Philomath High School

a) Count all frequently occupied rooms, as defined in ORS 332.166-167.

48 Total number of rooms

b) Determine the number of test (detectors) kits needed to test the entire school site:

43 (number of rooms up to 2,000 sq ft) x 1 test kit = 43

2 (number of rooms between 2,001 and 4,000 sq ft) x 2 test kits = 4

2 (number of rooms between 4,001 and 6,000 sq ft) x 3 test kits = 6

1 (number of rooms over 6,000 sq ft) x 4 test kits = 4

Total number of detector kits needed to test the school site = 57

3. Determine the number of quality control measurements needed

- a) Determine the number of **duplicate** measurements that need to be deployed during measurement. Rooms to be tested (48) x 0.10 (10%) = 5
[NOTE: Round up to the next whole number. Remember, you need a minimum of one duplicate kit per building.]
- b) Determine the number of **blank** measurements that need to be deployed during measurement. Rooms to be tested (48) x 0.05 (5%) = 2
[NOTE: Round up to the next whole number. Remember, you need a minimum of one blank kit per building.]
- c) Determine the number of **spike** measurements that need to be deployed during measurement. Rooms to be tested (48) x 0.03 (3%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one spike kit per school site.]

4. Determine total number of test kits needed to perform all required tasks.

- 57 Number of detector kits determined in Section 2b.
- 5 Number of duplicate tests determined in Section 3a.
- 3 Number of blank tests determined in Section 3b.
- 2 Number of spike tests determined in Section 3c.

TOTAL= 67 Number of test kits needed to test the school site

5. Use your school’s floor plan to create a “Test Kit Placement Log(s)”

The school radon measurement teams can use a template of the school’s emergency escape plan to decide in which rooms the different types of test kits (detectors, blanks and duplicates) will be placed. These documents will guide the planning of a radon testing effort as well as the actual testing itself.

Use your school’s floor plan [see template on page 56 of “Testing for Elevated Radon in Oregon Schools” protocol and plan] to create “Test Kit Placement Log(s)” [see example on on page 54 of the “Testing for Elevated Radon in Oregon Schools” protocol and plan] for the school, which indicates where the detectors, duplicates and blanks are to be placed when initial testing of the school for elevated radon begins.

Important: Because each building on a school site should have a minimum of one detector, one duplicate and one blank, a separate “Test Kit Placement Log” should be created for each building on the school site.



PHILOMATH SCHOOL DISTRICT
DISTRICT OFFICES

2 SCALE: NONE

Step-by-step guide for planning radon testing in Oregon schools

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Below is a recommended step-by-step guide for planning for radon testing at a specific school site. It's intended to be used with the other information in this document.

By going through well thought-out “dry-run” on paper, staff (e.g., school radon measurement teams) will likely be able to identify timelines, costs (staff time and test kit costs) and unforeseen barriers. Knowing these, before testing begins, may result in more accurate test results and decreased costs.

1. Identify rooms to be tested

ORS 332.166-167 specifies that “at a minimum, any frequently occupied room in contact with the ground or located above a basement or a crawlspace” should be tested.

Examples of such rooms include offices, classrooms, computer rooms, conference rooms, gyms, auditoriums, cafeterias and break rooms. This does not mean storage rooms, bathrooms, stairways, hallways, kitchens or elevator shafts.

Staff should procure a copy of the school’s emergency escape map. It can be used as the floor plan, since it usually provides the most accurate and up-to-date information. The map can be used to identify the frequently occupied rooms at a particular school site. As discussed below, that map can also be used to indicate which test kit types will go in which room.

Make sure all rooms in the building floor plan are individually labeled; create labels for them if they are not.

2. Determine the number of test kits needed. *Philomath School District Office*

a) Count all frequently occupied rooms, as defined in ORS 332.166-167.

11 Total number of rooms

b) Determine the number of test (detectors) kits needed to test the entire school site:

11 (number of rooms up to 2,000 sq ft) x 1 test kit = 11

_____ (number of rooms between 2,001 and 4,000 sq ft) x 2 test kits = 0

_____ (number of rooms between 4,001 and 6,000 sq ft) x 3 test kits = 0

_____ (number of rooms over 6,000 sq ft) x 4 test kits = 0

Total number of detector kits needed to test the school site = 11

3. Determine the number of quality control measurements needed

- a) Determine the number of **duplicate** measurements that need to be deployed during measurement. Rooms to be tested (11) x 0.10 (10%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one duplicate kit per building.]
- b) Determine the number of **blank** measurements that need to be deployed during measurement. Rooms to be tested (11) x 0.05 (5%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one blank kit per building.]
- c) Determine the number of **spike** measurements that need to be deployed during measurement. Rooms to be tested (11) x 0.03 (3%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one spike kit per school site.]

4. Determine total number of test kits needed to perform all required tasks.

11 Number of detector kits determined in Section 2b.

2 Number of duplicate tests determined in Section 3a.

1 Number of blank tests determined in Section 3b.

1 Number of spike tests determined in Section 3c.

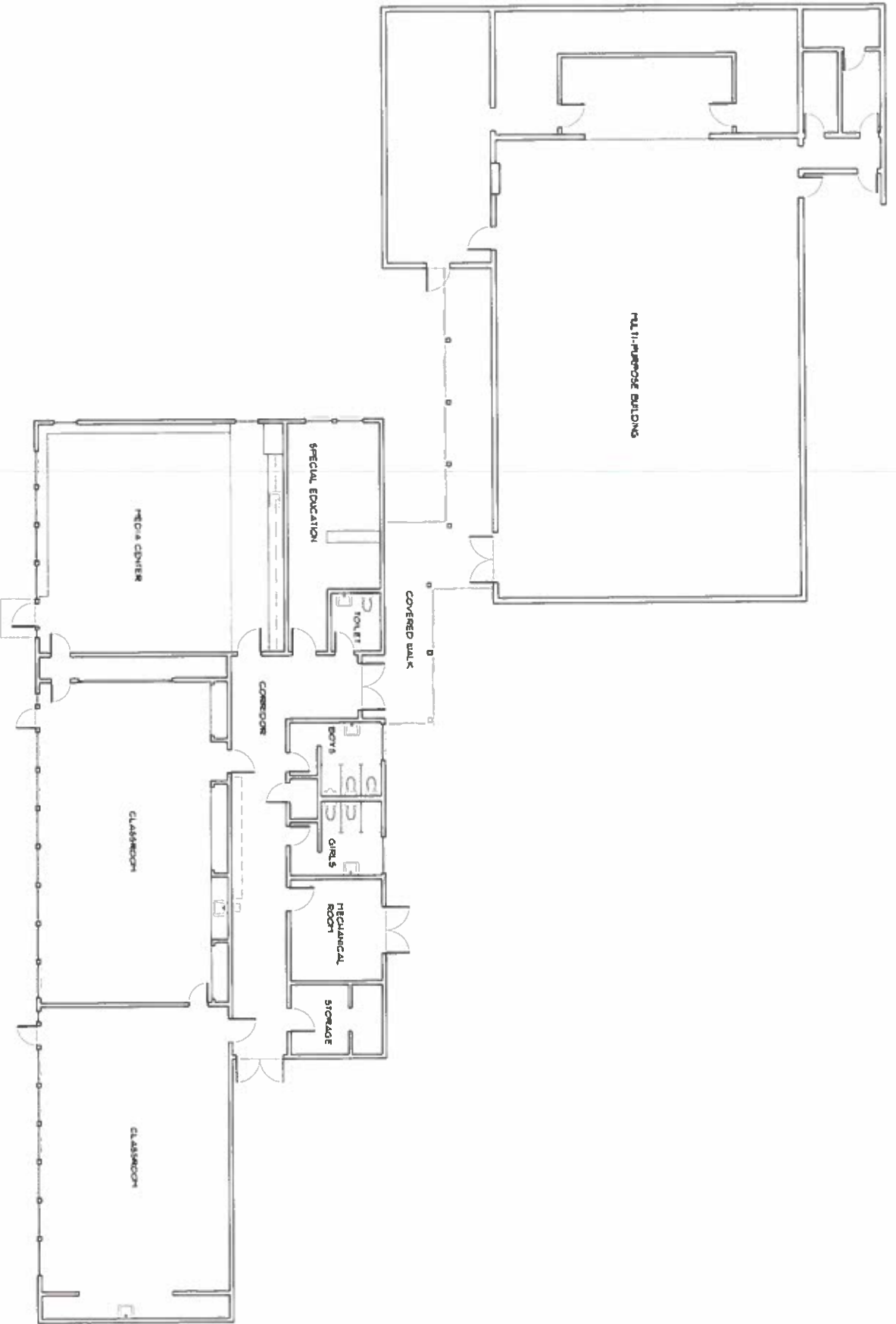
TOTAL= 15 Number of test kits needed to test the school site

5. Use your school's floor plan to create a "Test Kit Placement Log(s)"

The school radon measurement teams can use a template of the school's emergency escape plan to decide in which rooms the different types of test kits (detectors, blanks and duplicates) will be placed. These documents will guide the planning of a radon testing effort as well as the actual testing itself.

Use your school's floor plan [see template on page 56 of "Testing for Elevated Radon in Oregon Schools" protocol and plan] to create "Test Kit Placement Log(s)" [see example on on page 54 of the "Testing for Elevated Radon in Oregon Schools" protocol and plan] for the school, which indicates where the detectors, duplicates and blanks are to be placed when initial testing of the school for elevated radon begins.

Important: Because each building on a school site should have a minimum of one detector, one duplicate and one blank, a separate "Test Kit Placement Log" should be created for each building on the school site.



1

BLODGETT ELEMENTARY SCHOOL

SCALE: NONE

Step-by-step guide for planning radon testing in Oregon schools

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Below is a recommended step-by-step guide for planning for radon testing at a specific school site. It's intended to be used with the other information in this document.

By going through well thought-out “dry-run” on paper, staff (e.g., school radon measurement teams) will likely be able to identify timelines, costs (staff time and test kit costs) and unforeseen barriers. Knowing these, before testing begins, may result in more accurate test results and decreased costs.

1. Identify rooms to be tested

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Examples of such rooms include offices, classrooms, computer rooms, conference rooms, gyms, auditoriums, cafeterias and break rooms. This does not mean storage rooms, bathrooms, stairways, hallways, kitchens or elevator shafts.

Staff should procure a copy of the school’s emergency escape map. It can be used as the floor plan, since it usually provides the most accurate and up-to-date information. The map can be used to identify the frequently occupied rooms at a particular school site. As discussed below, that map can also be used to indicate which test kit types will go in which room.

Make sure all rooms in the building floor plan are individually labeled; create labels for them if they are not.

2. Determine the number of test kits needed.

Blodgett Elementary School

- a) Count all frequently occupied rooms, as defined in ORS 332.166-167.

6 Total number of rooms

- b) Determine the number of test (detectors) kits needed to test the entire school site:

5 (number of rooms up to 2,000 sq ft) x 1 test kit = 5

1 (number of rooms between 2,001 and 4,000 sq ft) x 2 test kits = 2

 (number of rooms between 4,001 and 6,000 sq ft) x 3 test kits = 0

 (number of rooms over 6,000 sq ft) x 4 test kits = 0

Total number of detector kits needed to test the school site = 7

3. Determine the number of quality control measurements needed

- a) Determine the number of **duplicate** measurements that need to be deployed during measurement. Rooms to be tested (6) x 0.10 (10%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one duplicate kit per building.]
- b) Determine the number of **blank** measurements that need to be deployed during measurement. Rooms to be tested (6) x 0.05 (5%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one blank kit per building.]
- c) Determine the number of **spike** measurements that need to be deployed during measurement. Rooms to be tested (6) x 0.03 (3%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one spike kit per school site.]

4. Determine total number of test kits needed to perform all required tasks.

7 Number of detector kits determined in Section 2b.

1 Number of duplicate tests determined in Section 3a.

1 Number of blank tests determined in Section 3b.

1 Number of spike tests determined in Section 3c.

TOTAL= 10 Number of test kits needed to test the school site

5. Use your school's floor plan to create a "Test Kit Placement Log(s)"

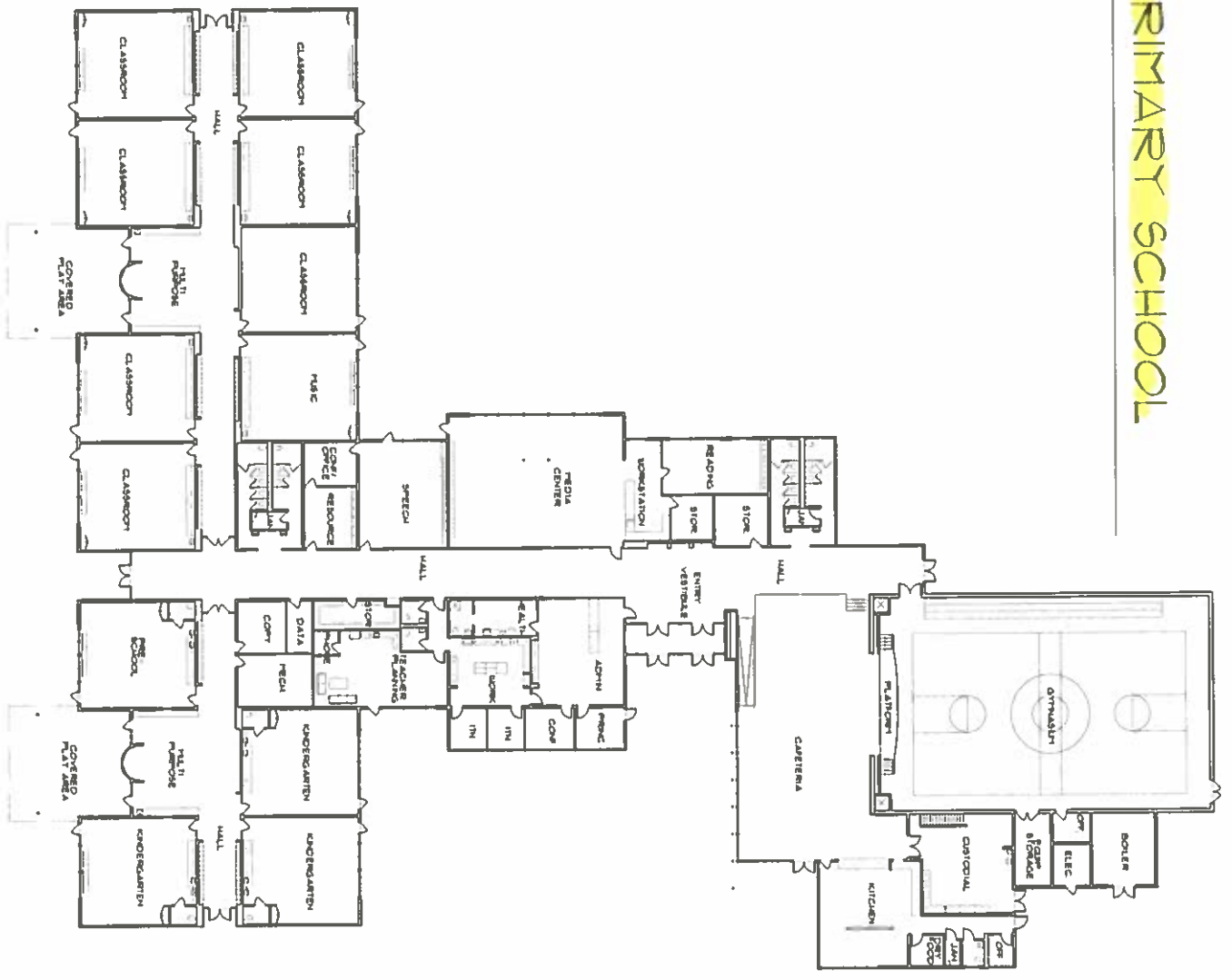
The school radon measurement teams can use a template of the school's emergency escape plan to decide in which rooms the different types of test kits (detectors, blanks and duplicates) will be placed. These documents will guide the planning of a radon testing effort as well as the actual testing itself.

Use your school's floor plan [see template on page 56 of "Testing for Elevated Radon in Oregon Schools"] protocol and plan] to create "Test Kit Placement Log(s)" [see example on on page 54 of the "Testing for Elevated Radon in Oregon Schools" protocol and plan] for the school, which indicates where the detectors, duplicates and blanks are to be placed when initial testing of the school for elevated radon begins.

Important: Because each building on a school site should have a minimum of one detector, one duplicate and one blank, a separate "Test Kit Placement Log" should be created for each building on the school site.

CLEMENS PRIMARY SCHOOL

SCALE: NONE



Step-by-step guide for planning radon testing in Oregon schools

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Below is a recommended step-by-step guide for planning for radon testing at a specific school site. It's intended to be used with the other information in this document.

By going through well thought-out “dry-run” on paper, staff (e.g., school radon measurement teams) will likely be able to identify timelines, costs (staff time and test kit costs) and unforeseen barriers. Knowing these, before testing begins, may result in more accurate test results and decreased costs.

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Staff should procure a copy of the school's emergency escape map. It can be used as the floor plan, since it usually provides the most accurate and up-to-date information. The map can be used to identify the frequently occupied rooms at a particular school site. As discussed below, that map can also be used to indicate which test kit types will go in which room.

Make sure all rooms in the building floor plan are individually labeled; create labels for them if they are not.

2. Determine the number of test kits needed.

Clemens Primary School

- a) Count all frequently occupied rooms, as defined in ORS 332.166-167.

28 Total number of rooms

- b) Determine the number of test (detectors) kits needed to test the entire school site:

25 (number of rooms up to 2,000 sq ft) x 1 test kit = 25

 (number of rooms between 2,001 and 4,000 sq ft) x 2 test kits = 0

3 (number of rooms between 4,001 and 6,000 sq ft) x 3 test kits = 9

 (number of rooms over 6,000 sq ft) x 4 test kits = 0

Total number of detector kits needed to test the school site = 34

3. Determine the number of quality control measurements needed

- a) Determine the number of **duplicate** measurements that need to be deployed during measurement. Rooms to be tested (28) x 0.10 (10%) = 3
[NOTE: Round up to the next whole number. Remember, you need a minimum of one duplicate kit per building.]
- b) Determine the number of **blank** measurements that need to be deployed during measurement. Rooms to be tested (28) x 0.05 (5%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one blank kit per building.]
- c) Determine the number of **spike** measurements that need to be deployed during measurement. Rooms to be tested (28) x 0.03 (3%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one spike kit per school site.]

4. Determine total number of test kits needed to perform all required tasks.

- 34 Number of detector kits determined in Section 2b.
- 3 Number of duplicate tests determined in Section 3a.
- 2 Number of blank tests determined in Section 3b.
- 1 Number of spike tests determined in Section 3c.

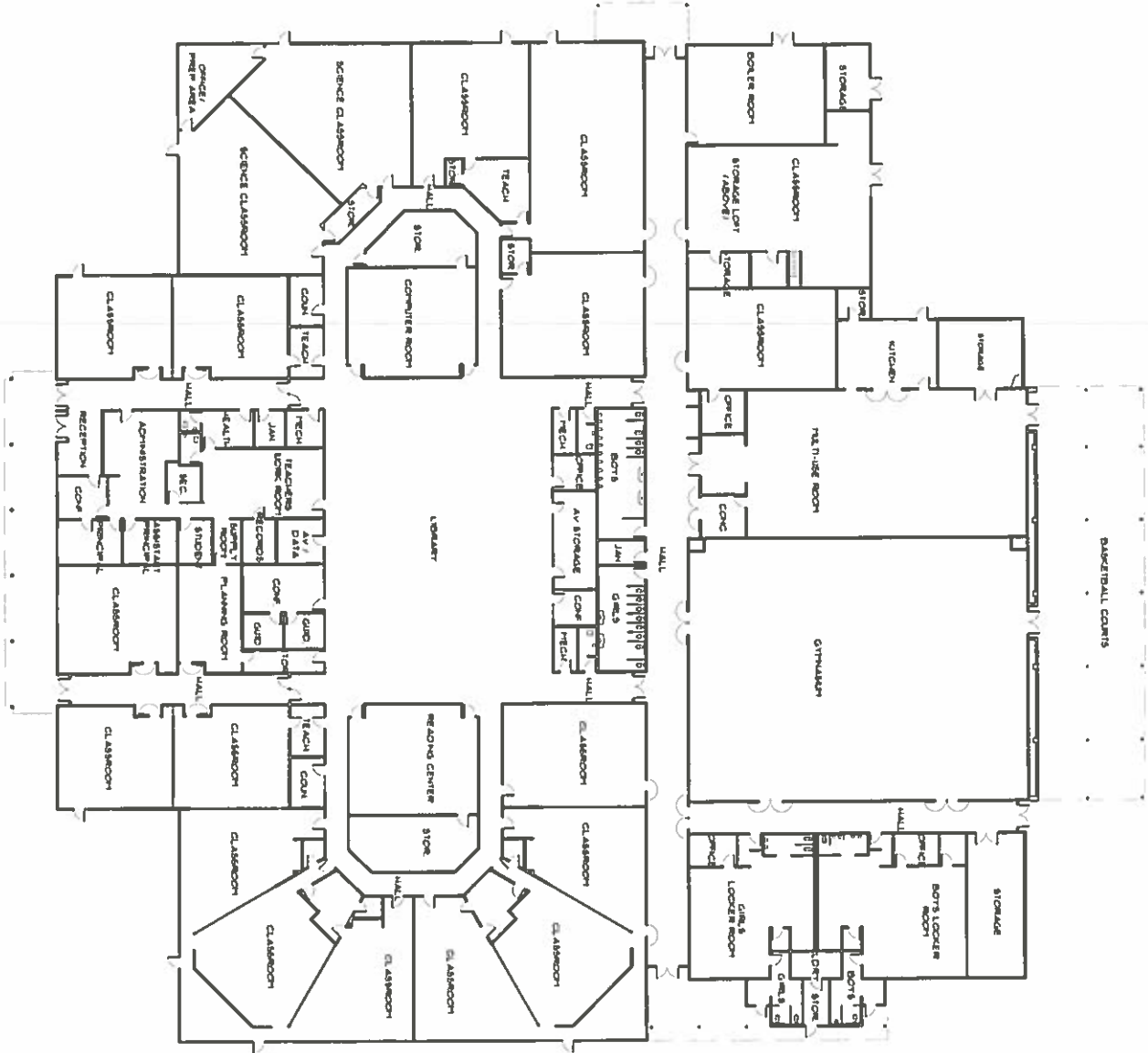
TOTAL= 40 Number of test kits needed to test the school site

5. Use your school's floor plan to create a "Test Kit Placement Log(s)"

The school radon measurement teams can use a template of the school's emergency escape plan to decide in which rooms the different types of test kits (detectors, blanks and duplicates) will be placed. These documents will guide the planning of a radon testing effort as well as the actual testing itself.

Use your school's floor plan [see template on page 56 of "Testing for Elevated Radon in Oregon Schools" protocol and plan] to create "Test Kit Placement Log(s)" [see example on page 54 of the "Testing for Elevated Radon in Oregon Schools" protocol and plan] for the school, which indicates where the detectors, duplicates and blanks are to be placed when initial testing of the school for elevated radon begins.

Important: Because each building on a school site should have a minimum of one detector, one duplicate and one blank, a separate "Test Kit Placement Log" should be created for each building on the school site.



1

PHILOMATH MIDDLE SCHOOL

SCALE: NONE

Step-by-step guide for planning radon testing in Oregon schools

Per ORS 332.166-167, Oregon school districts shall develop a plan for testing schools under their jurisdiction for elevated levels of radon. They shall submit it to the Oregon Health Authority on or before **Sept. 1, 2016**.

Below is a recommended step-by-step guide for planning for radon testing at a specific school site. It's intended to be used with the other information in this document.

By going through well thought-out “dry-run” on paper, staff (e.g., school radon measurement teams) will likely be able to identify timelines, costs (staff time and test kit costs) and unforeseen barriers. Knowing these, before testing begins, may result in more accurate test results and decreased costs.

1. Identify rooms to be tested

ORS 332.166-167 specifies that “at a minimum, any frequently occupied room in contact with the ground or located above a basement or a crawlspace” should be tested.

Examples of such rooms include offices, classrooms, computer rooms, conference rooms, gyms, auditoriums, cafeterias and break rooms. This does not mean storage rooms, bathrooms, stairways, hallways, kitchens or elevator shafts.

Staff should procure a copy of the school's emergency escape map. It can be used as the floor plan, since it usually provides the most accurate and up-to-date information. The map can be used to identify the frequently occupied rooms at a particular school site. As discussed below, that map can also be used to indicate which test kit types will go in which room.

Make sure all rooms in the building floor plan are individually labeled; create labels for them if they are not.

2. Determine the number of test kits needed.

Philomath Middle School

a) Count all frequently occupied rooms, as defined in ORS 332.166-167.

46 Total number of rooms

b) Determine the number of test (detectors) kits needed to test the entire school site:

43 (number of rooms up to 2,000 sq ft) x 1 test kit = 43

1 (number of rooms between 2,001 and 4,000 sq ft) x 2 test kits = 2

1 (number of rooms between 4,001 and 6,000 sq ft) x 3 test kits = 3

1 (number of rooms over 6,000 sq ft) x 4 test kits = 4

Total number of detector kits needed to test the school site = 52

3. Determine the number of quality control measurements needed

- a) Determine the number of **duplicate** measurements that need to be deployed during measurement. Rooms to be tested (46) x 0.10 (10%) = 5
[NOTE: Round up to the next whole number. Remember, you need a minimum of one duplicate kit per building.]
- b) Determine the number of **blank** measurements that need to be deployed during measurement. Rooms to be tested (46) x 0.05 (5%) = 2
[NOTE: Round up to the next whole number. Remember, you need a minimum of one blank kit per building.]
- c) Determine the number of **spike** measurements that need to be deployed during measurement. Rooms to be tested (46) x 0.03 (3%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one spike kit per school site.]

4. Determine total number of test kits needed to perform all required tasks.

52 Number of detector kits determined in Section 2b.

5 Number of duplicate tests determined in Section 3a.

3 Number of blank tests determined in Section 3b.

2 Number of spike tests determined in Section 3c.

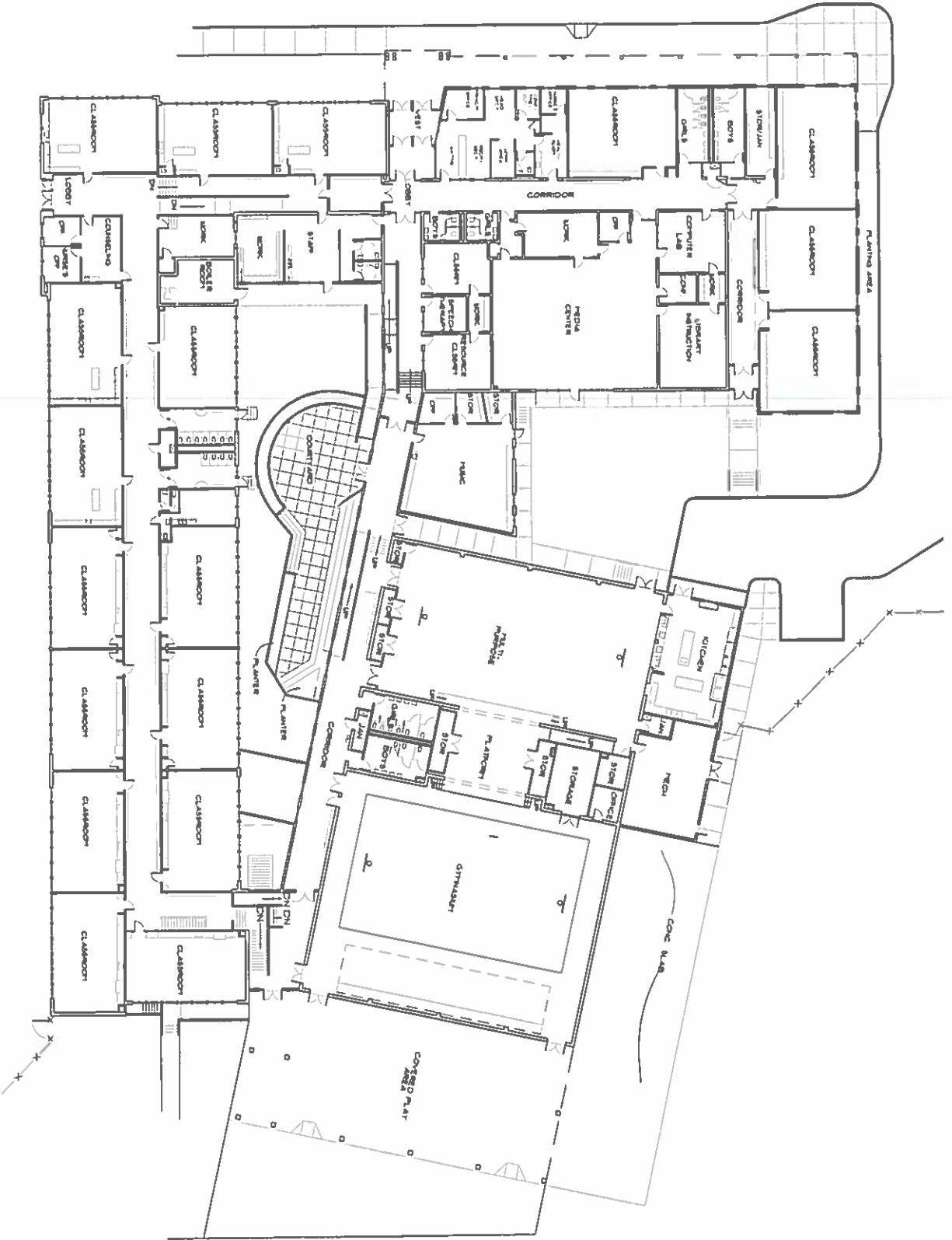
TOTAL= 62 Number of test kits needed to test the school site

5. Use your school's floor plan to create a "Test Kit Placement Log(s)"

The school radon measurement teams can use a template of the school's emergency escape plan to decide in which rooms the different types of test kits (detectors, blanks and duplicates) will be placed. These documents will guide the planning of a radon testing effort as well as the actual testing itself.

Use your school's floor plan [see template on page 56 of "Testing for Elevated Radon in Oregon Schools" protocol and plan] to create "Test Kit Placement Log(s)" [see example on on page 54 of the "Testing for Elevated Radon in Oregon Schools" protocol and plan] for the school, which indicates where the detectors, duplicates and blanks are to be placed when initial testing of the school for elevated radon begins.

Important: Because each building on a school site should have a minimum of one detector, one duplicate and one blank, a separate "Test Kit Placement Log" should be created for each building on the school site.



1

PHILOMATH ELEMENTARY SCHOOL

SCALE NONE

Step-by-step guide for planning radon testing in Oregon schools

Per ORS 332.166-167, Oregon school districts shall develop a plan for testing schools under their jurisdiction for elevated levels of radon. They shall submit it to the Oregon Health Authority on or before **Sept. 1, 2016**.

Below is a recommended step-by-step guide for planning for radon testing at a specific school site. It's intended to be used with the other information in this document.

By going through well thought-out “dry-run” on paper, staff (e.g., school radon measurement teams) will likely be able to identify timelines, costs (staff time and test kit costs) and unforeseen barriers. Knowing these, before testing begins, may result in more accurate test results and decreased costs.

1. Identify rooms to be tested

ORS 332.166-167 specifies that “at a minimum, any frequently occupied room in contact with the ground or located above a basement or a crawlspace” should be tested.

Examples of such rooms include offices, classrooms, computer rooms, conference rooms, gyms, auditoriums, cafeterias and break rooms. This does not mean storage rooms, bathrooms, stairways, hallways, kitchens or elevator shafts.

Staff should procure a copy of the school's emergency escape map. It can be used as the floor plan, since it usually provides the most accurate and up-to-date information. The map can be used to identify the frequently occupied rooms at a particular school site. As discussed below, that map can also be used to indicate which test kit types will go in which room.

Make sure all rooms in the building floor plan are individually labeled; create labels for them if they are not.

2. Determine the number of test kits needed.

Philomath Elementary School

a) Count all frequently occupied rooms, as defined in ORS 332.166-167.

42 Total number of rooms

b) Determine the number of test (detectors) kits needed to test the entire school site:

39 (number of rooms up to 2,000 sq ft) x 1 test kit = 39

1 (number of rooms between 2,001 and 4,000 sq ft) x 2 test kits = 2

1 (number of rooms between 4,001 and 6,000 sq ft) x 3 test kits = 3

1 (number of rooms over 6,000 sq ft) x 4 test kits = 4

Total number of detector kits needed to test the school site = 48

3. Determine the number of quality control measurements needed

- a) Determine the number of **duplicate** measurements that need to be deployed during measurement. Rooms to be tested (42) x 0.10 (10%) = 4
[NOTE: Round up to the next whole number. Remember, you need a minimum of one duplicate kit per building.]
- b) Determine the number of **blank** measurements that need to be deployed during measurement. Rooms to be tested (42) x 0.05 (5%) = 2
[NOTE: Round up to the next whole number. Remember, you need a minimum of one blank kit per building.]
- c) Determine the number of **spike** measurements that need to be deployed during measurement. Rooms to be tested (42) x 0.03 (3%) = 1
[NOTE: Round up to the next whole number. Remember, you need a minimum of one spike kit per school site.]

4. Determine total number of test kits needed to perform all required tasks.

48 Number of detector kits determined in Section 2b.

5 Number of duplicate tests determined in Section 3a.

3 Number of blank tests determined in Section 3b.

2 Number of spike tests determined in Section 3c.

TOTAL= 58 Number of test kits needed to test the school site

5. Use your school's floor plan to create a "Test Kit Placement Log(s)"

The school radon measurement teams can use a template of the school's emergency escape plan to decide in which rooms the different types of test kits (detectors, blanks and duplicates) will be placed. These documents will guide the planning of a radon testing effort as well as the actual testing itself.

Use your school's floor plan [see template on page 56 of "Testing for Elevated Radon in Oregon Schools" protocol and plan] to create "Test Kit Placement Log(s)" [see example on page 54 of the "Testing for Elevated Radon in Oregon Schools" protocol and plan] for the school, which indicates where the detectors, duplicates and blanks are to be placed when initial testing of the school for elevated radon begins.

Important: Because each building on a school site should have a minimum of one detector, one duplicate and one blank, a separate "Test Kit Placement Log" should be created for each building on the school site.

Radon test placement protocol checklist

Note: This document has been prepared to help schools and school districts conduct radon measurements in schools. The step-wise approach is aimed at helping school districts determine where to test, how many test kits are required, where to place test kits, and proper documentation of the process. This document is thus meant to be used as a general guideline, not a mandate. Each school will present a different situation. If specific questions or issues arise regarding testing in your school, contact the Oregon Radon Awareness Program at 971-673-0440 or email radon.program@state.or.us.

Important: Order all radon test kits for initial measurement at the same time. Kits should all be from the same manufacturing batch.

Test Kit Placement Guide

Once the number of test kits is determined, they need to be placed in the frequently occupied rooms as identified in the “What rooms should be tested?” section on page 17 of the “Testing for Elevated Radon in Oregon Schools” protocol and plan.

1. 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.
2. As detectors are placed in the rooms, determined thorough and accurate data needs to be recorded on the device log and floor plan (see samples in Appendix D of the “Testing for Elevated Radon in Oregon Schools” protocol and plan.)

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 one foot from all exterior walls;
- Between 20 inches and 6 feet from the floor;
- Out of direct air flow from vents;
- Four feet from the heat source.

School measurement teams in other states simply place the test kit on the teacher’s desk or out of the way of students on a bookshelf.

3. Specific protocol for duplicate measurements. If the test kit you are placing is a duplicate measurement also be sure to:

- Place duplicate (side-by-side) test kit four to five inches away from test kit for that room.

4. Specific protocol for blank measurements. If the test kit you are placing is a blank measurement, also be sure to:

- Unwrap blanks and open, but then immediately close and reseal them.
- Place the test kit next to the detector kit(s) for the room four to five inches away.

5. 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 as possible to the day that kits are retrieved from the school. [See “Quality assurance procedures for a school radon measurement program” on page 31 of the “Testing for Elevated Radon in Oregon Schools” protocol and plan.]

6. Testing period.

The test kits should be left out no less than 48 hours but no more than seven days. [It's best to follow test kit manufacturer's instructions for more specific recommendations.] It's best if devices are 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 the ending date and time that the kits were picked up per the “Sample Test Kit Placement Log” [Appendix D, page 54, of the “Testing for Elevated Radon in Oregon Schools” protocol and plan.]
- Record ending information on the test kit package (if required).

7. Prepare and mail all kits.

- Follow the manufacturer's instructions to seal and prepare test kits to be mailed to the lab.
- 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 specified on the test kit. Use a mail service that guarantees delivery to the laboratory within two days at maximum, but **preferably overnight**.

**Enrolled
House Bill 2931**

Sponsored by Representative KENY-GUYER, Senator DEMBROW; Representative BUEHLER

CHAPTER

AN ACT

Relating to testing radon levels; and declaring an emergency.

Be It Enacted by the People of the State of Oregon:

SECTION 1. (1) The Oregon Health Authority shall disseminate information related to elevated levels of radon to each school district in this state. Information disseminated under this section must include:

- (a) Information about radon and the dangers associated with elevated levels of radon;
 - (b) The level of radon at which the United States Environmental Protection Agency recommends schools take action to reduce indoor radon concentrations;
 - (c) Processes by which schools may be tested for elevated levels of radon; and
 - (d) Model plans developed pursuant to section 2 of this 2015 Act.
- (2) Dissemination of information under subsection (1)(c) of this section must take into account industry standards for testing buildings for elevated levels of radon.

(3) Upon request, the State Board of Education shall assist the authority in disseminating the information described in this section. Dissemination of information may occur by any reasonable means, including posting the information on a website maintained by the authority or the Department of Education and providing each school district with instructions on how to access the information.

SECTION 2. (1) A school district shall develop a plan for testing schools for elevated levels of radon. At a minimum, plans developed under this subsection must:

- (a) Provide for the testing of radon in any frequently occupied room in contact with the ground or located above a basement or a crawlspace; and
 - (b) Provide for the testing of radon in a school at least once every 10 years.
- (2) The Oregon Health Authority shall develop model plans for school districts to follow in implementing the requirements of this section. The authority shall seek the input of the Oregon School Boards Association in developing the model plans.
- (3) Results of a test performed under this section must be:
- (a) Provided to the district school board;
 - (b) Provided to the authority in a manner prescribed by the authority; and
 - (c) Made readily available to parents, guardians, students, school employees, school volunteers, administrators and community representatives at the school's office or school district's office or on a website for the school or school district.

(4) Information provided and made available under subsection (3) of this section must include the level of radon at which the United States Environmental Protection Agency recommends schools take action to reduce indoor radon concentrations.

SECTION 3. (1) A school district shall submit the plan developed under section 2 of this 2015 Act to the Oregon Health Authority on or before September 1, 2016.

(2) Notwithstanding section 2 (1)(b) of this 2015 Act, plans developed under section 2 of this 2015 Act shall require initial testing of schools for elevated levels of radon on or before January 1, 2021.

(3) Subsection (2) of this section does not apply to any school that has been tested for elevated levels of radon on or after January 1, 2006.

SECTION 4. This 2015 Act being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist, and this 2015 Act takes effect on its passage.

Passed by House July 1, 2015

.....
Timothy G. Sekerak, Chief Clerk of House

.....
Tina Kotek, Speaker of House

Received by Governor:

.....M.,....., 2015

Approved:

.....M.,....., 2015

Passed by Senate July 6, 2015

.....
Peter Courtney, President of Senate

.....
Kate Brown, Governor

Filed in Office of Secretary of State:

.....M.,....., 2015

.....
Jeanne P. Atkins, Secretary of State

Frequently asked questions about radon and schools

1. Does radon cause headaches, eye irritation or sick-building syndrome?
No.
2. Do children have a greater risk of cancer from radon exposure?
Children usually are more sensitive to environmental pollutants. However, no current data concludes that children are more at risk than adults from radon exposure.
3. Is there a hazard from touching/being near the radon test kit?
No, although kits should be kept away from very young children (toddlers) so they don't eat or chew on them.
4. Do building materials emit radon?
The primary source of radon in a building or home is from the soil underneath it. However, a few building materials such as granite, concrete, gypsum board (sheet rock), bricks and field stone may emit small amounts of radon gas. This is rarely the case because most of these materials are very dense. This means that if there is radon-producing radium in these materials, only a small amount of the radon gas near the surface ever makes it out into the environment.
5. Should testing be delayed if the school is planning major renovations to the building or the HVAC system?
Initial and follow-up tests should be conducted prior to major HVAC or building renovations. Testing can show if a radon mitigation system needs to be installed as a part of renovation. Testing must also be done after renovation.
6. Should upper floors of a school or building be tested? Does this mean that upper floors never have elevated levels?
Upper floors may indeed have elevated levels of radon. However, measurements in ground floor rooms are likely to be a good indicator of radon levels for all floors.
7. In schools with a basement level (below ground level), the first floor is often built at ground level. It is, therefore, in contact with the soil along its outside edge. Should this floor be tested?
This floor appears to have limited contact with the soil. However, the outside rooms may have openings permitting radon entry and should be tested if they are frequently occupied. ORS 332.166-167 requires testing of all frequently occupied rooms in contact with the soil or above a basement or crawlspace.
8. Nearby homes and schools have reported no elevated levels of radon. Should we still test?
Yes, radon levels vary with geology, building structure, HVAC systems, etc. The only way to know if radon is present is to test. ORS 332.166-167 states school buildings should be tested every 10 years; current national guidelines (ANSI/AARST, 2014) recommend that school buildings be re-tested every five years (or whenever there is significant renovation or change to a building's HVAC system).

9. What are the costs of radon testing in schools?
The cost may depend on the number of rooms to be tested and the type of test kit used. The average cost of radon testing in Oregon schools is approximately \$70 per tested room. This assumes schools purchase short-term test kits in bulk and that school staff perform the testing.
10. If a room's short-term initial test result is very high (e.g., above 100 pCi/L), should a follow-up measurement be taken?
Yes, follow-up measurements, even if the initial ones are high, are recommended before making any further decisions.
11. Should a room be retested if there is evidence the test has been moved or tampered with in any way?
Yes.
12. How do you place radon test kits in large, open spaces such as cafeterias, gymnasiums or auditoriums?
Test kits may be hung from the ceiling and or wall using string and masking/duct tape. Be sure to hang them per the "Test Kit Placement Guide" in Appendix A of the "Testing for Elevated Radon in Oregon Schools" protocol and plan.
13. How do we test partitioned classrooms?
Classrooms with movable partitions should be individually tested.
14. Can you test during unusual weather conditions (heavy rain, snow or wind)?
Avoid testing during these conditions.
15. Should we take quality assurance duplicates and blanks during the follow-up tests?
Yes, per the "Quality assurance" section, starting on page 29 of the "Testing for Elevated Radon in Oregon Schools" protocol and plan. However, there are generally fewer samples taken for follow-up testing.
16. When two devices (duplicates) are placed in a room during initial testing, which measurement result is taken as the test result?
Both tests are recorded, but the average is taken as the test result.
17. What should be done if a device is picked up late or handled incorrectly?
Handle all test kits in accord with manufacturer's instructions. If there is any discrepancy or problem, the device's serial number should be recorded and noted to the laboratory doing the analysis. Include in the log the actual time device was picked up and a brief description of how the device was mishandled.