 Indoor Radon Testing Protocol

**SCOPE:** The purpose of this Radon Testing Plan is to describe the procedures to be taken to test District owned and/or occupied buildings.

Note: This document has been prepared to help Rowan-Salisbury School System to conduct radon measurements in schools. This is aimed at helping determine where to test, how many test are required, where to place Detectors 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 Maintenance Department.

**INSTRUCTION:**

**Initial Testing:**

Initial and follow-up testing will be conducted by RSS Maintenance Department as needed, will use short term (2-5 day) Active devices. Testing will occur between November 1 and March 31 in any given school year. If there is a high level of radon detected Rowan-Salisbury School System will contact a qualified measurement contractor to conduct a follow-up test.

Testing will occur in randomly picked **frequently occupied spaces** in contact with the soil or located above a basement or a crawlspace and will occur simultaneously per school site. EPA 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 building. Areas such as restrooms, hallways, stairwells, elevator shafts, utility closets and storage closets do not need to be tested.

**Testing Protocols:**

1. A Detector Placement Log and a Detector Location Floor Plan will be prepared for each building in which radon measurements are made. The District will use the building’s emergency/fire escape plan as a template (*Pick up copy of emergency/fire escape plan at main office of school being tested*). Detector location will be accurately recorded on both a Log and Floor Plan. Testing practices must be done following the directions on the Detector.

2. One detector is used for each room that is 2000 square feet or less.

 Indoor Radon Testing Protocol

3. Detector will be placed in rooms in contact with the soil or located above a basement or crawlspace that are frequently occupied by students and/or district staff.

4. Testing will occur during the time that students and teachers are normally present (during weekdays).

5. Detectors placed in the building, must be noted on the Device Placement Log and Floor Plan by their serial number.

6. Detectors 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 two detectors).

To prevent tampering, Detectors may be suspended from a wall or ceiling (using string and thumb-tack/tape.)

7. Detectors must **NOT** be placed:

a. Near drafts resulting from heating, ventilating vents, air conditioning vents, fans, doors 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

8. Testing with short-term Detector must be conducted 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. Buildings will only be tested for radon during periods when the HVAC system is operating as it does normally. No changes may be made to the HVAC operation during testing period.

b. All external doors should be closed except for normal use.

c. Closed conditions must be verified when placing and retrieving detector.

 Indoor Radon Testing Protocol

9. Short-term Detector will be placed during colder months (November 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 buildings found that short-term measurements may more accurately 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.

10. The District will 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 ¾ inch diameter hail and may produce tornadoes.

**Suggested testing timeline:**

**Monday morning** – Place detectors per Placement Log created for the building. Record data, as needed, on Log.

**Thursday morning** – Pick up detectors, record as needed.

11. 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. EPA 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, renovation of the building’s envelope or replacement of the HVAC system.

12. The District will receive results for all detectors analyzed in a week.

After receiving the results of the initial testing, the District will prepare the report, send it to the Building Administrator to share with staff and community. All radon reports will be posted on the District website.

 Indoor Radon Testing Protocol

**Follow-up Measurements:**

Follow-up testing (in rooms with initial short-term measurement of 4.0 pCi/L or higher) will start within one month after receiving the initial test results. Follow-up testing must be made in the same location in a room. Follow-up testing using short-term methods will be done in the same conditions as the initial measurement.

**Reporting Results**:

The District will make all testing results available: to the District’s School Board; the Rowan 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.

**Radon Mitigation**:

The District will take action to reduce the radon level in those rooms where the results are 4.0 pCi/L or more.

1. Ventilation for the areas with radon levels above 4.0 pCi/L will be evaluated. If deficiencies are identified in the ventilation, those will be remedied, and the spaces will be retested.

2. If the ventilation is functioning as designed, the District will consult with a radon mitigation specialist that has been certified by the National Radon Proficiency Program (NRPP) or the National Radon Safety Board (NRSB). That list is located at: http://1.usa.gov/1nSvisi

**Radon can be controlled through:**

• HVAC systems. Adjustments to the heating, ventilation and air conditioning systems serving a room may reduce radon levels to below EPA’s action level guideline of 4 pCi/L.

• Seal entry routes. Seals are installed at major entry routes to minimize radon entry.

• Soil depressurization. A suction fan is used to produce a low-pressure field in soil under the building slab. This low-pressure field prevents radon entry by ventilating the gas outside before it is drawn into the building.

• Building pressurization. Indoor/soil pressure relationships are controlled to prevent radon entry. More outdoor air is supplied than exhausted so the building has a slightly positive pressurize compared to both the exterior of the building and the sub-soil area.

• Zone-specific ventilation. A building’s crawlspaces, tunnels, conduits, vaults, etc. may be used to design a system that reduces its elevated radon.

 Indoor Radon Testing Protocol

**Retesting**:

1. Buildings with radon mitigation systems will be tested annually to ensure that the radon mitigation measures are working.

2. If major renovations to the structure of a school building or major alterations to a school's HVAC system are planned, the building will tested be before initiating the renovation. If elevated radon is present, radon-resistant techniques can be included as part of the renovation.

3. If major renovations to a building or to a building’s HVAC system take place, test the building after work is complete.

**GLOSSARY:**

**Action Level**: The designated measurements at or above which consumers should take action to reduce radon levels. EPA’s Action Level is set at 4.0 picoCuries/Liter (pCi/L).

**Carcinogen**: A dangerous substance that is directly involved in the contraction of cancer.

**Closed-building condition**: Keep all windows and doors closed except for normal entry and exit. Do not operate fans or other machines that bring in air from outside. Fans that are part of an existing radon-reduction system or small exhaust fans operating for only short periods of time may run during the test. HVAC systems run in normal operation.

**PicoCuries per liter (pCi/L)**: A unit of measurement. It specifies the decay in seconds within a volume of one liter of air.

**Radon**: **Radon** is a colorless, odorless, radioactive gas. It forms naturally from the decay (breaking down) of radioactive elements, such as uranium, which are found in different amounts in soil and rock throughout the world. **Radon** gas in the soil and rock can move into the air and into underground water and surface water. It is the second leading cause of lung cancer.

**Short-term test**: A radon Detector that is designed for a short testing period anywhere from a two- to 90-day period.

 Indoor Radon Testing Protocol

**State Radon Contacts**

North Carolina 919-571-4141

**EPA Regional Radiation (Radon) Program Managers**

**Region 4**

Radiation Program Manager

U.S. Environmental Protection Agency

345 Courtland Street, N.E.

Atlanta, GA 30365

(404) 347-3907