Radon Testing and Reporting Plan

North Clackamas School District
Portland, Oregon

Prepared for:

North Clackamas School District
12400 SE Freeman Way
Milwaukie, OR 97222

May 2016
12345.000

Radon Testing and Reporting Plan

For

NORTH CLACKAMAS SCHOOL DISTRICT

Prepared by

PBS Engineering and Environmental Inc.
4412 SW Corbett Avenue
Portland, Oregon 97239

North Clackamas School District
12400 SE Freeman Way
Milwaukie, OR 97222

Introduction:

In 2015, the Oregon Legislature passed Oregon Revised Statute (ORS) 332.166-167 which, in part, requires school districts to develop a plan for testing district-owned buildings for radon, test for radon, and provide test results to, school boards and the Oregon Health Authority (OHA) and make the results readily available to parents, guardians, school employees, school volunteers, administrators, and community representatives. This Radon Testing and Reporting Plan is designed to meet statute requirements for developing a radon testing plan for submittal to OHA by the deadline on or before September 1, 2016.

North Clackamas School District is committed to providing a safe environment for students and staff. As radon is the number one cause of lung cancer deaths in the United States among non-smokers, and schools are the second most commonly occupied buildings for children, testing for radon in schools is a priority for North Clackamas School District.

This Radon Testing and Reporting Plan meets the guidelines outlined in OHA's "Testing for Elevated Radon in Oregon Schools: A Protocol and Plan" Version 1.0 2016, and will be initiated after September 1, 2016 with initial testing completed before the Oregon Revised Statute deadline of on or before January 1, 2021.

Any questions about this document or results of radon testing should be directed to the North Clackamas School District Risk Management Office at 503-353-1909.

Robert S. Martinez, Facility Operations Supervisor

(Signature line of District Official submitting document)

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1. PLAN SUMMARY

1.1 Background

North Clackamas School District is located in Clackamas County, Oregon and has (40) schools and sites comprised of 69 buildings. North Clackamas School District is committed to completing initial radon testing, in accordance with ORS 332.166-167, in district-owned schools and sites prior to January 1, 2021. It is estimated that approximately 1594 rooms will need to be tested for radon based on the guidance outlined in the OHA "Testing for Elevated Radon in Oregon Schools: A Protocol and Plan" (A Protocol and Plan) Version 1.0 2016. Historic radon testing data for tests completed prior to January 1, 2006 is attached to this report for reference.

1.2 Regulatory Requirements

In 2015, the Oregon Legislature passed House Bill (HB) 2931 to bring awareness to elevated radon levels in Oregon schools. HB 2931 later became Oregon Revised Statute (ORS) 332.166-167.

This Radon Testing and Reporting Plan is designed to help school districts fulfill the requirements of (ORS) 332.166-167 of submitting a plan to Oregon Health Authority (OHA) on or before September 1, 2016.

Per ORS 332.166-167, actual testing of schools will be completed on or before January 1, 2021, and testing results will be provided to the OHA and the school district board and made 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

1.3 About Radon

Radon is a naturally occurring colorless, odorless, tasteless, and radioactive gas. Radon comes from natural deposits of uranium in the soil and is found everywhere in the world. Uranium naturally decays into radium, which further breaks down into radon gas. Because radon is a gas, it can move up through the soil and enter buildings that are in contact with the soil. Radon is typically at its highest concentration in the lower portion of a building. Once radon enters a building, it is easily dispersed through the air. It then begins a radioactive decay process that leads to the creation of radon decay products. If inhaled, these radioactive particles (decay products) can be trapped in the lungs. As these particles decay further, they release small bursts of radiation, which can damage lung tissue and lead to lung cancer over the course of a lifetime.

According to EPA estimates, radon is the number one cause of lung cancer among non-smokers. No amount of radon is safe, but steps can be taken to reduce its potential for harm.

For most school children and staff, the second largest contributor to radon exposure, next to their home is their school. As a result, both USEPA and the Oregon Health Authority (OHA) recommend that school buildings and homes be tested for radon. For schools in Oregon, this recommendation became law in the 2015 Legislature (ORS 332.166-167).

1.4 Action Level

In the US, radioactivity is measured in Curies. A Curie is the amount of radioactivity released from one gram of radium. A picocurie is a millionth of a millionth, or a trillionth, of a Curie. Radon is measured and reported in picocuries per liters of air (pCi/L).

USEPA recommends reducing the concentration of radon in indoor environments to below the Radon Action Level of 4.0 pCi/L. This "action level" is not health-based. No amount of radon is good for a person.

2. TESTING PLAN

2.1 Testing Locations

The North Clackamas School District will develop a detailed list of rooms for each site to be tested for radon in accordance with recommendations in the OHA Testing for Elevated Radon in Oregon Schools: Protocol and Plan document. The District will utilize each facility's floor plan to determine testing locations in frequently-occupied rooms that are in contact with the ground or located above a crawlspace or basement, as required per ORS 332.166-167. Locations to be tested will be identified on drawings to be included in final reports and future radon testing plans.

Once testing locations are identified for each site, the District will calculate the number of test kits needed per site. One test kit or device will be used per room less than 2,000 square feet. For rooms greater than 2,000 square feet, one kit or detector will be placed every 2,000 square feet. Duplicates, blanks and spike kits will also be used as quality control methods in accordance with OHA guidelines.

Initial Short-Term Testing:

All locations identified will be tested using short term activated charcoal adsorption test kits. Test kit, duplicate, and blank locations will be plotted on a building floor plan and tracked in a placement log or electronic database. Ideally, initial short-term testing will occur from September-December 2016. Testing will occur during normal school days or days when the HVAC system is functioning in the same manner as normal school days.

Specific details and guidance outlining best practices for placing test kits and when to deploy test kits is not included in the scope of this plan. See "APPENDIX A: RADON TEST PLACEMENT PROTOCOL CHECKLIST" in the attached OHA "Testing for Elevated Radon in Oregon Schools: A Protocol and Plan" for details and guidance.

Results of the initial short-term tests that are ≥4.0 pCi/L will be evaluated using the quality assurance calculations listed in the "INTERPRETATION OF RESULTS" section of the attached OHA "Testing for Elevated Radon in Oregon Schools: A Protocol and Plan."

North Clackamas School District will schedule long-term follow-up testing based on the initial short-term test results as indicated below:

- If the result is less than 2.0 pCi/L, the District will test again every 10 years (as required by Oregon Revised Statute 332.166-167).
- If the result is between 2.0 pCi/L and 4.0 pCi/L, the District will investigate and consider options for fixing (lowering) the radon in that room (e.g., adjustments to HVAC, Sealing Entry Routes, etc.).
- If the result is between 4.0 pCi/L to 8.0 pCi/L, the District will perform a follow-up measurement of that room using a long-term test. This will be conducted over as much of a nine-month school year as possible, when rooms are likely to be occupied. If that result is equal to or greater than 4.0 pCi/L, the District will investigate and implement options for lowering the radon in that room (e.g., adjustments to HVAC, soil depressurization, sealing entry routes, building pressurization, zone-specific ventilation, etc.).
- If the initial test result is equal to or greater than 8.0 pCi/L, the District will conduct a second short-term test within a month. The follow up result is then averaged with the result of the initial short-term test (see follow-up testing below).
- If the average result of the two short-term tests is equal to or greater than 4.0 pCi/L, the District will investigate and implement options for lowering the radon in that room (e.g., adjustments to HVAC, soil depressurization, sealing entry routes, building pressurization, zone-specific ventilation, etc.).

- If the follow-up test is long-term, and the result is 4.0 pCi/L or above, the District will investigate options for lowering the radon in that room (e.g., adjustments to HVAC, soil depressurization, sealing entry routes, building pressurization, zone-specific ventilation etc.).

NOTE: ALSO SEE CRM USE BELOW

Results of any follow-up tests that are ≥4.0 pCi/L will be evaluated using the same quality assurance calculations as the initial short-term tests listed in the "INTERPRETATION OF RESULTS" section of the attached OHA "Testing for Elevated Radon in Oregon Schools: A Protocol and Plan."

CRM Use

The District may use continuous radon monitors (CRM) for follow-up long term and short term testing. The use of CRMs can help determine radon levels in a room during times it's actually occupied, which may in turn determine if adjustments to the HVAC system are adequate for reducing radon levels.

Mitigation

Mitigation measures are not specifically addressed in this plan but the District is committed to doing everything it can to reduce radon levels and provide a safe environment in every district building.

The EPA, OHA Oregon Radon Awareness Program, and numerous non-governmental groups recommend that school districts 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. Although not required of school districts under ORS 332.166-167, it is recommended that school administration direct appropriate staff members to adjust building HVAC systems and retest. If this doesn't reduce the radon below 4.0 pCi/L, school districts have the option of hiring a radon mitigation professional to reduce elevated radon levels identified through testing.

Periodic Retesting

Following initial short-term radon testing, District sites will be retested every 10 years as required by ORS 332.166-167. Additional testing may be undertaken by the District, in addition to the 10 year retest cycle, should any of the conditions noted in the "When Should Periodic Retesting be Done?" section of the attached OHA "Testing for Elevated Radon in Oregon Schools: A Protocol and Plan" apply.

2.2 Reporting

All radon testing results will be provided to the District's school board and the Oregon Health Authority, and made 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 as required by ORS 332.166-167. Follow-up testing results, 10-year retest results, and mitigation implementation will also be provided and made readily available in accordance with ORS 332.166-167.

North Clackamas School District

MEMORANDUM

DATE November 9, 1989

TO Bill Dierdorff

FROM Dave Church

SUBJECT Radon Tests

Attached is the report on the radon testing done at District schools and facilities during mid-October, 1989.

The action level for concern greater than four picocuries per liter. The report indicates there are three schools with readings above this level. The schools are Bilquist, Clackamas Elementary, and Seth Lewelling.

The attached chart outlines E.P.A.'s recommendation for follow-up testing for sites in the action level. At these three sites, Physical Plant will perform additional testing once each season during the next year. Samples will also be taken at other areas in the school.

It should be noted that their initial samples were taken in "worst case scenario" areas such as unventilated storage rooms, basements, and crawl space tunnels. During the next round of tests, a sample will be taken in ventilated classrooms and/or offices as a comparison. Of the sample schools in the range of concern, only Bilquist had both samples in the action level.

Please transmit this information to CMT for review and comment prior to releasing the data to the schools and units. If you have any questions, give me a call.

jnw
encls.

cc: Roy Varney

Health Physics Northwest

REPORT OF RADON (Rn-222) LEVELS

The average Radon level measured for each charcoal canister you recently submitted to Health Physics Northwest, Inc. is given below.

To : North Clackamas School District #12
Physical Plant Department
12451 S.E. Price-Fuller Rd.
Milwaukie, OR 97222

TEST PERIOD	LOCATION	SERIAL #	AVERAGE RADON LEVEL PICOCURIES/LITER
10-13-89 to 10-16-89	Physical Plant Off. Bsmt. Stor.	7692	0.3 +/- 1.0
10-13-89 to 10-16-89	Physical Plant	8111	0.3 +/- 0.4
10-13-89 to 10-16-89	Ickes JHS	5024	0.3 +/- 0.4
10-13-89 to 10-16-89	Ickes JHS	6843	3.0 +/- 1.0
10-13-89 to 10-16-89	Mt. Scott Elem.	6678	0.0 +/- 0.4
10-13-89 to 10-16-89	Happy Valley Elem.	G900	1.0 +/- 1.0
10-13-89 to 10-16-89	Happy Valley Elem.	G721	0.0 +/- 1.0
10-13-89 to 10-16-89	Sunnyside Elem.	7101	1.2 +/- 1.0
10-13-89 to 10-16-89	Sunnyside Elem.	9198	1.0 +/- 0.4
10-13-89 to 10-16-89	O.S.C. (Land Lab)	6852	0.1 +/- 0.1

11535 S.W. 67th Tigard, Oregon 97223 (503) 620-6617

TEST PERIOD	LOCATION	SERIAL #	AVERAGE RADON LEVEL PICOCURIES/LITER
10-13-89 to 10-16-89	O.S.C. (Land Lab House)	G634	2.0 +/- 1.0
10-13-89 to 10-16-89	Clackamas Elem.	6927	3.0 +/- 1.0
10-13-89 to 10-16-89	Clackamas Elem.	7394	2.0 +/- 1.0
10-13-89 to 10-16-89	Clackamas Elem.	G1416	√7.0 +/- 1.0
10-13-89 to 10-16-89	McLoughlin JHS	6642	0.2 +/- 1.0
10-13-89 to 10-16-89	McLoughlin JHS	G348	1.1 +/- 0.4
10-13-89 to 101-6-89	O.S.C. (Sector A)	G42	1.0 +/- 0.4
10-13-89 to 10-16-89	O.S.C. (Sector C)	5958	1.0 +/- 0.4
10-13-89 to 10-16-89	O.S.C. (Sector D)	4662	0.3 +/- 1.0
10-13-89 to 10-16-89	Transportation (Mechanics Shop)	7491	1.0 +/- 1.0
10-13-89 to 10-16-89	CHS	9067	1.0 +/- 0.4
10-13-89 to 10-16-89	CHS	G1139	0.3 +/- 1.0
10-13-89 to 10-16-89	CHS	6259	3.3 +/- 1.0
10-13-89 to 10-16-89	Bilquist Elem.	6977	√4.4 +/- 0.4
10-13-89 to 10-16-89	Bilquist Elem.	9018	√10.0 +/- 1.0
10-13-89 to 10-16-89	View Acres Elem.	7013	1.3 +/- 1.0

TEST PERIOD	LOCATION	SERIAL #	AVERAGE RADON LEVEL PICOCURIES/LITER
10-13-89 to 10-16-89	View Acres Elem.	G722	1.4 +/- 1.0
10-13-89 to 10-16-89	RPHS	7020	1.0 +/- 0.4
10-13-89 to 10-16-89	RPHS	G319	0.1 +/- 0.4
10-13-89 to 10-16-89	RPHS	7520	0.1 +/- 0.4
10-13-89 to 10-16-89	Concord Elem.	8107	0.0 +/- 1.0
10-13-89 to 10-16-89	Concord Elem.	G2012	1.0 +/- 0.4
10-13-89 to 10-16-89	Riverside Elem.	5325	0.0 +/- 1.0
10-13-89 to 10-16-89	Riverside Elem.	G529	0.4 +/- 0.4
10-13-89 to 10-16-89	Oak Grove Elem.	6776	0.0 +/- 0.4
10-13-89 to 10-16-89	Oak Grove Elem.	7122	2.2 +/- 1.0
10-13-89 to 10-16-89	Oak Grove Elem.	7474	1.0 +/- 0.4
10-13-89 to 10-16-89	North Oak Grove Elem.	9139	1.0 +/- 0.4
10-13-89 to 10-16-89	North Oak Grove Elem.	6197	1.0 +/- 1.0
10-13-89 to 10-16-89	Milwaukie JHS	5608	1.0 +/- 0.4
10-13-89 to 10-16-89	Milwaukie JHS	6899	1.0 +/- 1.0
10-13-89 to 10-16-89	MHS	7424	0.4 +/- 0.4

TEST PERIOD	LOCATION	SERIAL #	AVERAGE RADON LEVEL PICOCURIES/LITER
10-13-89 to 10-16-89	MHS	5890	0.4 +/- 1.0
10-13-89 to 10-16-89	MHS	7671	1.0 +/- 1.0
10-13-89 to 10-16-89	MHS	6056	0.0 +/- 0.4
10-13-89 to 10-16-89	MHS	6150	1.0 +/- 0.4
10-13-89 to 10-16-89	MHS	7661	1.0 +/- 1.0
10-13-89 to 10-16-89	Milwaukie Elem.	8047	1.0 +/- 0.4
10-13-89 to 10-16-89	Milwaukie Elem.	7643	0.0 +/- 1.0
10-13-89 to 10-16-89	Rowe JHS	4450	3.0 +/- 1.0
10-13-89 to 10-16-89	Rowe JHS	5526	2.0 +/- 1.0
10-13-89 to 10-16-89	Administration Bldg.	REI34	1.2 +/- 0.4
10-13-89 to 10-16-89	Administration Bldg.	9176	1.0 +/- 4.0
10-13-89 to 10-16-89	Linwood Elem.	G2038	1.3 +/- 0.4
10-13-89 to 10-16-89	Linwood Elem.	7770	2.0 +/- 1.0
10-13-89 to 10-16-89	Campbell Elem.	5944	1.0 +/- 0.4
10-13-89 to 10-16-89	Campbell Elem.	7429	2.0 +/- 0.4
10-13-89 to 10-16-89	Ardenwald Elem.	9157	0.4 +/- 1.0

TEST PERIOD	LOCATION	SERIAL #	AVERAGE RADON LEVEL PICOCURIES/LITER
10-13-89 to 10-16-89	Ardenwald Elem.	4901	1.0 +/- 1.0
10-13-89 to 10-16-89	S. Lewelling Elem.	G770	1.0 +/- 0.4
10-13-89 to 10-16-89	S. Lewelling Elem.	9060	5.2 +/- 1.0
10-16-89 to 10-18-89	Wichita Elem.	6223	1.0 +/- 0.3
10-16-89 to 10-18-89	Wichita Elem.	7606	2.0 +/- 0.3
10-16-89 to 10-18-89	L. Whitcomb Elem.	6424	1.0 +/- 0.4
10-16-89 10-18-89	L. Whitcomb Elem.	4297	1.0 +/- 0.3

Charcoal (activated carbon) canisters are designed as a simple cost effective way to acquire quick "screening" samples of indoor Radon. Since indoor Radon levels can change from season to season and room to room, a single screening test is not a reliable measure of long term Radon levels. These test results only serve to identify potential Radon problems.

The U.S. Environmental Protection Agency (EPA) recommends follow-up measurements, or remedial actions for Radon levels above four (4) picocuries per liter of air (pCi/l) as shown in the attached chart. A chart on Radon risks is also included.

Ross L. Mercer
Laboratory Director

11-03-89
Date

AccuStar Labs

Radon in Air

NEHA NRPP 101193 AL
NRSB ARL0017

EPA Method #402-R-92-004
Charcoal Canister
NEHA Device Code 1017, 1159

Laboratory Report For

JSE Labs
3325 Southeast Harrison Street
Milwaukie OR 97222

Property Tested

Clackamas Heights

Log Number	Device Number	Exposure Period				Area Tested	Result (pCi/L)
1315527	448038	12/23/2011	2:06 pm	12/27/2011	11:20 am	M6	20.0
1315528	448037	12/23/2011	2:10 pm	12/27/2011	11:20 am	Basement Storage	27.0
1315529	448034	12/23/2011	2:20 pm	12/27/2011	11:10 am	M13 Crawl	27.0
1315530	448032	12/23/2011	2:00 pm	12/27/2011	11:14 am	Office	10.9
1315531	448033	12/23/2011	2:02 pm	12/27/2011	11:15 am	Office Hall	13.3
1315532	448036	12/23/2011	2:03 pm	12/27/2011	11:17 am	Gym Stage	13.1
1315533	448035	12/23/2011	2:14 pm	12/27/2011	11:07 am	M12	9.9

Comment: A copy of this report was emailed to jelab@comcast.net.

Distributed By: National Safety Products

Date Received: 12/29/2011 Date Analyzed: 12/29/2011 Date Reported: 12/30/2011

Report Reviewed By: _____ Report Approved By: Carolyn K. Allen

Carolyn K. Allen President, AccuStar Labs

Disclaimer:

The uncertainty of this radon measurement is ~+/- 10 %. Factors contributing to uncertainty include, statistical variations, daily and seasonal variations in radon concentrations, sample collection techniques, and operation of the dwelling. Interference with test conditions may influence the test results.

This report may only be transferred to a third party in its entirety. Analytical results relate to the samples AS RECEIVED BY THE LABORATORY. Results shown on this report represent levels of radon gas measured between the dates shown in the room or area of the site identified above as "Property Tested". Incorrect information will affect results. The results may not be construed as either predictive or supportive of measurements conducted in any area of this structure at any other time. AccuStar Labs, its employees and agents are not responsible for the consequences of any action taken or not taken based upon the results reported or any verbal or written interpretation of the results.

11 Awl Street Medway MA 02053 888-480-8812 FAX 508-533-8831