RADON INSPECTION

The Muddy Creek Charter School
30252 Bellfountain Road
Corvallis, Oregon
97333

Prepared For:

Dewayne Irvin, Facilities Director
1555 S. W. 35th Street
Corvallis, Oregon 97333

EIS Job No. 2020009. Muddy Creek Charter School Radon Report

Prepared By:

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Charles A. Spear, Environmental Professional

February 23, 2020

ENVIRONMENTAL INSPECTION SERVICES

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1.0 EXECUTIVE SUMMARY

February 23, 2020
EIS JOB No. 2020009. Muddy Creek Charter School radon report

Dewayne Irvin, Facilities Director
Corvallis School District
1555 S.W. 35th Street
Corvallis, Oregon 97333

RE: Short term radon testing of The Muddy Creek Charter School located at 30252 Bellfountain Road in Corvallis, Oregon 97333

Dear Mr. Dewayne Irvin,

This letter summarizes the finding of a short term (48-72 hour)radon sampling test episode conducted at the subject charter school known as the Muddy Creek Charter School located at 30252 Bellfountain Road in Corvallis, Oregon 97333 between Friday, February 7, 2020 and Monday, February 10, 2020. The twenty-two (22) radon samplers were received by PRO-LAB on Wednesday, February 12, 2020, and analyzed by PRO-LAB laboratory on Thursday, February 13, 2020. The radon test results were reported to EIS on Tuesday, February 18, 2020.

The radon sampling episode was conducted by Charles A. Spear, field representative of Environmental Inspection Services (EIS)with n0 custodian escort through the entire charter School building. **No elevated radon considerations were noted for the Charter School building based on the short term simultaneous test results of the twenty-two (22) measured detached samplers. A total of nine (9) radon test concentrations were considered high with radon concentrations varying between 3.0 pCi//L and 3.9 pCi/L. A total of three (3) radon test concentrations approached the EPA Action limit of 4.0 pCi/L with radon concentrations varying between 3.7 pCi/L and 3.9 pCi/L.**

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The five (5)highest radon concentrations between 3.6 pCi/L and 3.9 pCi/L approached the EPA action limit of 4.0 pCi/L and are listed as follows:

Serial No.	Location	Analytical Test Result
4888301	Gym	3.6 pCi/L
4888365	Gym	3.8 pCi/L
4897301	Room 6 - dup	3.7 Pci/L
4914055	Room 7	3.9 pCi/L
4888307	Room 7 dup	3.6 pCi/L

All radon concentration measurements are below the action limit of 4.0 pCi/L.

In the united States radioactivity is measured in Curies. A curie is the amount of radioactivity released from one gram of radium. A picocurie is a millionth of million, or a trillionth of a curie. Radon is measured and reported in picocuries per liters of air (pCi/L). The aforementioned five (5)radon sampler concentrations were listed as the highest concentration testers and these tester concentrations were slightly below the EPA radon concentration action limit of 4 pCi/L. EIS does not recommend additional short term radon testing at this school at this time based on these analytical test results. EIS does recommend enhanced ventilation in room No. 6, room No.7, and the gymnasium.

All radon concentration sampler test results are summarized in Appendix 1.0. The radon test results for the charter school building are based on these initial short term simultaneous test results. The average building radon concentration level for this charter school is 2.37 pCi/L. The EPA notes there is no safe level of radon. If there are questions concerning the radon testing at the district please initially contact the Corvallis Administrative office at 541-757-5811.

Charles Arthur Spear

Charles Arthur Spear
Environmental Professional

2.0 RADON ENVIRONMENTAL RISK

The U.S Environmental Protection Agency (EPA) and other major national and international scientific organizations have concluded that radon is a human carcinogen and poses a serious environmental health problem. The EPA recommends that schools take action to reduce the level of radon concentration if radon concentration levels are 4 pCi/L or higher.

The U.S Surgeon General has warned about the health risk from the exposure to radon in indoor air. The surgeon general has urged Americans to test their homes because radon is the leading cause of lung cancer for non-smokers in the United States and breathing in radon over prolonged periods can present a significant health risk. The USEPA has estimated that approximately 21,000 lung cancer-related deaths occur annually with am estimated 275 lung cancer deaths annually in Oregon.

The US EPA has states that "Any exposure has some risk of causing lung cancer. The lower the radon risk level in your home, the lower your family's risk of lung cancer." The EPA has noted that depending on your geographic location the radon levels of air you breathe outside the home may be as High as 0.74 pCi./L. The national average of outside radon levels are 0.4 pCi/L and it has been estimated by The National Academy of Sciences that outdoor radon levels cause approximately 800 of the 21,000 radon induced lung cancer deaths in the US each year.

Radon Act 51 passed by Congress set the national outdoor level of radon gas (0.4pCi/L) as the target radon level for indoor radon levels. Unfortunately, two-thirds of all homes exceeded this level. The USEPA was tasked with setting practical guidelines and recommendations for the nation. The USEPA thereby set a practical level of 4pCi/L as an action level for radon.

3.0 RADON HEALTH EFFECTS

Radon is a known human carcinogen. The prolonged exposure to elevated radon concentrations does cause an increased risk of lung cancer. The precise magnitude of radon health risks are uncertain and research continues regarding these health risks. The EPA has estimated that radon may cause nearly 14,000 lung cancer deaths in the United States each year. However,, this number could range from nearly 7,000 to 30,000 deaths per year.

The U.S. Surgeon general has warned that radon is the second-leading cause of lung cancer deaths. The individual risks from radon exposure have been attributed to three factors; the level of radon, the duration of radon exposure, and the individual smoking habits. The risk of death from lung cancer has been determined to be much higher for smokers than non-smokers.

The EPA has noted that the home is to be the most likely significant source of radon exposure. Additionally, the EPA has also noted that the second largest potential contributor to radon exposure is likely to be schools. The EPA has recommended that school buildings be tested for radon. In 1989 and 1990, the EPA conducted the School Protocol Development Study as a nationwide effort to further examine how best to conduct radon measurements in schools.

4.0 RADON DESCRIPTION

Radon is a gas and the radon decay products are referred to as solid particles (progeny). The radon particles may become suspended in the air when they are formed. Some particles "plate-out" (attach) to surfaces as aerosols, dust, and/or smoke particle in air. The inhalation of the particles has attributed to lung tissue damage and may affect DNA.

Radon gas is an extremely toxic, chemically inert, odorless, colorless, and tasteless naturally-occurring radioactive element having the symbol Rn. Radon has the atomic number 86; an atomic weight of 222; a melting point of -71 degrees Celsius; a boiling point of -62 degrees; and 18 radioactive isotopes. It is derived from the radioactive decay of radium and is used in cancer treatment; as a tracer in leak detection; and in radiology.

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

5.0 RADON CHARACTERISTICS

The concentrations of radon in a building are dependent on factors to include the concentration of uranium and radium in the soil; the type of underlying geology; soil permeability; available migration pathways such as subsurface utilities; foundation openings; air temperature and pressure differentials and building ventilation.

Radon may migrate into a study area by either a pressure driven transport or no pressure differentials. The subject charter Building was built on concrete foundation and slab on slab foundations. Radon may migrate through foundations by the availability of expansion joints and cracks in the foundation. Radon may also migrate into a building through basements, utility trenches, pipe runs, HVAC systems, and other building ventilation systems. Radon contributions from building materials off-gassing are not often the source of measurable radon.

6.0 RADON TESTING ACTIVITY

The EPA has shown that radon concentration levels may vary from room to room in schools in the same building. It is also known that radon measurements for a particular room are not always precise indicators of radon measurements in adjacent rooms. ORS 332.166-167 has therefore required that radon measurement teams measure radon in schools with initial radon measurements conducted in all frequently occupied rooms in contact with the soil or above a basement crawlspace.

The OHA requires a simultaneous initial test of all frequently occupied rooms to include such rooms as offices, classrooms, conference rooms, resource room, gymnasium, a library, cafeteria, and break rooms. The OHA requires a minimum of one detector per every 2,000 square feet of open floor space or a portion of the room as required. All radon testers were placed away from windows and doors and in closed door conditions. The EPA has also noted that radon levels in upper floors are not likely to exceed the levels of lower rooms. The EPA has determined that testing the ground level floors is sufficient for initial radon concentration determinations.

EPA recommends that initial measurements be performed by the utilization of short term testers placed in the lowest section of the subject buildings and performed under closed door conditions. An initial short term test ensures that school students and workers may be informed quickly if radon measurements reveal elevated radon test levels. If the short term measurement is greater than 4 picoCuries per liter (pCi/L) or 0.02 working levels (WL), a followup measurement is recommended. The purpose of the follow up measurement is to determine whether or not radon mitigation is necessary for the measurement area.

All school locations were tested utilizing a short term activated charcoal adsorption test kit supplied by Pro Lab. Duplicates and blanks were placed two feet from the ground and away from windows and doors. The testers were placed according to the school floor plan with duplicates placed adjacent to the room testers in order to duplicate the total building envelope conditions. All testers were placed in closed building conditions and all windows and doors were closed except for normal entrance and exit from the rooms. Normal room ventilation and typical ambient air conditions were maintained throughout the radon testing sequence.

A total of twenty-two (22) short term radon test units were placed throughout the charter school building frequently occupied areas to include offices, classrooms, library, and gymnasium. All radon measurements varied between one (1)low radon concentration measurement of 0.2 pCi/L to one (1)higher radon concentration measurement of 3.9 pCi/L. The highest five (5) radon measurements were higher and varied between concentrations of 3.5 pCi/L and a single low radon concentration of 3.9 pCi/L. All radon concentration sampler test results are summarized in Appendix 1.0.

The radon samplers were opened on Friday, February 7, 2020 and capped on Monday, February 10, 2020. The capped radon samplers were packaged; logged on a chain of custody form; and shipped to ProLab Laboratories. Radon test results were reported to EIS on Tuesday, February 18, 2020. Radon concentration measurements varied between low concentrations of 0.2 pCi/L and a higher radon concentration of 3.9 Pci/L/L with an average radon concentration of the school of 2.37 pCi/L. No radon concentrations exceeded the EPA action limit and five (5) radon concentrations approached the EPA action limit of 4 pCi/L wuth radon concentrations varying between 3.6 pCi/L and 3.9 pCi/L. No additional short term radon re-testing is recommended at the charter school at this time. Enhanced ventilation is recommended in Room No.s , Room No. 7, and the gymnasium.

The EPA recommends that initial radon concentration measurements be short-term tests placed in the lowest frequently occupied areas of the school buildings and placed under closed door conditions. Open common rooms and multi-purpose rooms are often continuously open for student ingress and egress purposes and subsequently radon tests in the rooms are conducted under normal occupant conditions. The short term testing provides the school a snap shot of current radon concentration conditions throughout the school and provides data for the purposes of informing the occupants of radon concentrations at the time of the evaluation.

Radon concentrations greater than 4 pCi/L should be followed by a short term tester retest. The EPA recommends remedial action if the average of the initial and second short term test results are equal or greater than 4 pCi/L. Measurements were not conducted in bathrooms, kitchens, laundry rooms, or bathrooms. The effects of cooking and exhaust fan fluctuations do effect radon measurements.

Radon measurements are also not conducted in bathrooms because high humidity may affect the sensitivity of short term radon detectors and because exhaust fan operations may temporarily alter radon or decay product concentration levels. Radon measurements were also not conducted in stairwells and hallways due to the continuous variances in ventilation, air movements, and hallway barometric pressures.

7.0 RADON TEST RESULTS SUMMARY TABLE

The radon sampling episode was conducted by Charles A. Spear, field representative of Environmental Inspection Services (EIS)with custodian escort through the entire Charter school building. A total of twenty-two (22) short term radon test units were placed throughout the charter school building frequently occupied areas to include offices, classrooms, library, and gymnasium.

All radon measurements varied between one (1)low radon concentration measurement of 0.2 pCi/L to one (1)higher radon concentration measurement of 3.9 pCi/L. The highest five (5) radon measurements were higher and varied between concentrations of 3.5 pCi/L and a single low radon concentration of 3.9 pCi/L. All radon concentration sampler test results are summarized in Appendix 1.0.

A total of nine (9) radon test concentrations were considered high with radon concentrations varying between 3.0 pCi//L and 3.9 pCi/L. A total of three (3) radon test concentrations approached the EPA Action limit of 4.0 pCi/L with radon concentrations varying between 3.7 pCi/L and 3.9 pCi/L.

The five (5)highest radon concentrations between 3.6 pCi/L and 3.9 pCi/L approached the EPA action limit of 4.0 pCi/L and are listed as follows:

Serial No.	Location	Analytical Test Result
4888301	Gym	3.6 pCi/L
4888365	Gym	3.8 pCi/L
4897301	Room 6 - dup	3.7 Pci/L
4914055	Room 7	3.9 pCi/L
4888307	Room 7 dup	3.6 pCi/L

All radon concentration measurements are below the action limit of 4.0 pCi/L.

In the united States radioactivity is measured in Curies. A curie is the amount of radioactivity released from one gram of radium. A picocurie is a millionth of million, or a trillionth of a curie. Radon is measured and reported in picocuries per liters of air (pCi/L). The aforementioned five (5)radon sampler concentrations were listed as the highest concentration testers and all tester concentrations were below the EPA radon concentration action limit of 4 pCi/L. EIS does not recommend additional short term radon testing at this school based on these analytical test results. EIS does recommend enhanced ventilation at this school.

The following radon concentration table summarizes all the lower analytical test results and higher analytical test results;

radon concentration measurement	**Tester No.s**
0.2 pCi/L	1
1.2 pCi/L	2
1.3 pCi/L	1
1.4 pCi/L	1
1.6 pCi/L	2
1.7 pCi/L	1
1.8 pCi/L	1
2.1 pCi/L	3
2.4 pCi/L	1
3.0 pCi/L	1
3.1 pCi/L	1
3.4 pCi/L	1
3.5 pCi/L	1
3.6 pCi/L	2
3.7 pCi/L	1
3.8 pCi/L	1
3.9 pCi/L	1
Total	**22**

At or exceeding 4.0 pCi/L - None

Approaching 4.0 pCi/L (between 3.0 pCi/L and 3.9 pCi/L) nine (9)

Radon concentration levels have been noted to vary slightly from room to room. All frequently occupied rooms in contact with the ground were tested.

This radon sampling episode noted the following;

Total number of measured testers - twenty-two (22)
Elevated readings (at or greater than 4.0 pCi/l - none
Moderately high readings
(between 3.0 pCi/L and 3.9 pCi/L - nine (9)
Low readings (at or less than 1.0 pCi/L) - one (1)
Average reading - 2.37 pCi/L

8.0 RADON MEASUREMENT RISK ASSESSMENT

No elevated radon considerations above the EPA Action limit of 4 pCi/L were noted for the charter school building based on the short term simultaneous test results of the twenty-two (22)measured detached samplers.

The subject school improvement is referred to as the Muddy Creek Charter school Building located at 30252 Bellfountain Road in Corvallis, Oregon, 97333. The twenty-two (22) radon samplers for samplers placed in the Charter school were received by PRO-LAB on Wednesday, February 12, 2020, and analyzed by PRO-LAB laboratory on Thursday, February 13, 2020. The radon test results were reported to EIS on Tuesday, February 18, 2020. The radon sampling episode was conducted by Charles A. Spear, field representative of Environmental Inspection Services (EIS)with custodian escort through the entire charter school building.

The U.S surgeon general has warned about the health risk from the exposure to radon in indoor air. The surgeon general has urged Americans to test their homes because radon is the leading cause of lung cancer for non-smokers in the United States and breathing in radon over prolonged periods can present a significant health risk. The USEPA has estimated that approximately 21,000 lung cancer-related deaths occur annually with an estimated 275 lung cancer deaths annually in Oregon.

9.0 RADON LABORATORY ANALYSIS

The radon in test samplers was measured at the Pro-Lab Laboratory located at 1675 North Commerce Parkway in Weston, Florida using the liquid scintillation Method (EPA 402-R-92-004). The selected radon sampler devices utilized at the charter school building are described as passive activated charcoal adsorption devices (AC).

The short term testers utilize activated carbon to absorb the radon gas in the air. The test unit has activated carbon with a perforation screen to filter out radon decay products. The absorber is resealed by EIS and shipped to Pro-Lab for processing and evaluation. The selected passive radon tester devices do not uniformly adsorb radon during the testing episode and are not described as integrating devices.

The total of twenty-two (22) radon test units supplied by a certified laboratory known as Pro-Lab were utilized at the Charter school building. The testers were placed within functional frequently occupied charter school building areas such as classrooms, offices, and gymnasium rooms between Friday, February 7, 2020 and Monday, February 10, 2020. The total of twenty-two (22) short term samplers were capped and submitted to Pro-lab laboratories for radon analysis and analyzed by the Pro-Lab laboratories on Thursday, February 13, 2020. Radon test results were reported to EIS on Tuesday, February 18, 2020. No elevated radon concentrations were detected in all the samplers.

A total of nine (9) radon test concentrations were considered high with radon concentrations varying between 3.0 pCi//L and 3.9 pCi/L. A total of three (3) radon test concentrations approached the EPA Action limit of 4.0 pCi/L with radon concentrations varying between 3.7 pCi/L and 3.9 pCi/L.

The five (5)highest radon concentrations between 3.6 pCi/L and 3.9 pCi/L approached the EPA action limit of 4.0 pCi/L and are listed as follows:

Serial No.	Location	Analytical Test Result
4888301	Gym	3.6 pCi/L
4888365	Gym	3.8 pCi/L
4897301	Room 6 - dup	3.7 Pci/L
4914055	Room 7	3.9 pCi/L
4888307	Room 7 dup	3.6 pCi/L

All radon concentration measurements are below the action limit of 4.0 pCi/L.

10.0 QUALITY ASSURANCE / QUALITY CONTROL

Radon and all working measurements often do not produce identical test results. There are also variances between co-located measurements such as duplicate samplers. It is therefore essential to place and document duplicates in order to monitor measurement variability and precision. The primary objective of simultaneous or duplicate measurements is to assess the precision error of the measurement method and to examine variances in duplicate samplers. This precision error is the "random" component of error as opposed to calibration error which is considered systematic. The variance between duplicate test results may be caused by the random nature of counting radioactive decay; slight differences in the adsorptive material of the samplers; or handling differences.

Quality Assurance measurements were conduced during the initial testing episode. Minimum acceptable standards of precision and accuracy were maintained during the entire course of the radon testing period. The Quality Assurance protocol included the inclusion of side by side detectors (duplicates) and unexposed control detectors (Blanks).

BLANKS - The "blanks" are defined as tester measurements by analyzing unexposed (closed) radon detectors that accompany exposed detectors to the field. The school district may utilize blanks in order to assess any change in analysis caused by anything outside the immediate room conditions. Background levels may be due to leakage of radon into the tester, detector response to gamma radiation or other causes.

DUPLICATE - The duplicate samplers are placed in order to provide a check on the quality of the measurement results. The duplicate test results provide data for the purpose of testing the relative precision of the sampler tests. Large precision errors may be caused by detector manufacture, and/or improper data transcription or handling by suppliers, laboratories, or technicians performing the placements. The duplicate samplers are "side by side measurements at least ten percent of the total measurement locations. The sampler locations are distributed systematically throughout the entire population of samplers.

The duplicates were placed as pairs of detectors deployed in the same location side by side during the identical testing periods. Duplicate placements were at least ten percent of the measurement locations. The duplicates were placed, shipped, and manifested with chains of custody to Pro-lab for analysis in the same manner as the other devices so that processing at the laboratory could not distinguish the testers. Duplicate and blank samplers are listed as follows;

Sample serial No.	Sample location	Sample test result
4882083	Library - dup	1.7 pCi/L
4888389	Gym - blank	0.2 pCi/L
4876301	Gym - dup	2.1 pCi/L
4897301	Room 6 - dup	3.7 pCi/L
4888307	Room 7 - dup	3.6 pCi/L
4893156	Office - dup	3.4 pCi/L

SPIKES- Spike samples are described as detectors that have been exposed to known radon concentrations in a radon test calibration chamber. These "spiked" samples are labeled and submitted to the laboratory in the same manner as ordinary samples to preclude special processing. The results of the spiked samples analysis are used to monitor the overall accuracy of the entire measurement system.

The spike samples are handled and spiked by the PRO-LAB laboratory and results remain as internal tests and confidential per regulation. Spike samples are routinely conducted per the laboratory proficiency requirements. An independent company, Bowser Morner located at 4514 Taylorsville Road (phone No. 937-236-8805)conducts routine controls for proLab.

Bowser Morner participated in spike testing using liquid scintillation charcoal devices (NRPP device Code # 7084). None of the values of absolute individual Relative Error of the reported measurements was greater than 25%; therefore, the lab passed the performance test. The letter was signed by Rebecca J. Turek Manager of the Radon Reference laboratory of Bowser-Morner, Inc. A copy of the results of the performance test are attached as Appendix 1.0.

11.0 RECOMMENDATIONS & CONCLUSIONS

Initial radon measurements were all below the EPA action limit of 4 pCi/L and immediate followup radon measurements are not required at this time. There is a relatively low probability that radon mitigation is warranted with these favorable test results as cited in EPA document EPA 400-R-92-011; U.S. EPA 1992g. (Building alterations, structural foundation changes and/or other surface or sub-slab disturbances may effect radon concentrations).

The total of twenty-two (22) radon test units supplied by a certified laboratory known as Pro-Lab were utilized at the Charter school building. The testers were placed within functional frequently occupied charter school building areas such as classrooms, offices, and gymnasium rooms between Friday, February 7, 2020 and Monday, February 10, 2020. The total of twenty-two (22) short term samplers were capped and submitted to Pro-lab laboratories for radon analysis and analyzed by the Pro-Lab laboratories on Thursday, February 13, 2020. Radon test results were reported to EIS on Tuesday, February 18, 2020. No elevated radon concentrations were detected in all the samplers.

A total of nine (9) radon test concentrations were considered high with radon concentrations varying between 3.0 pCi//L and 3.9 pCi/L. A total of three (3) radon test concentrations approached the EPA Action limit of 4.0 pCi/L with radon concentrations varying between 3.7 pCi/L and 3.9 pCi/L.

The average radon concentration for the Muddy Creek Charter school is 2.37 pCi/L. Twenty-one (21) radon measurements exceeded 1.0 pCi/L. All radon concentration sampler test results are summarized in Appendix 1.0. The radon test results for the Muddy Creek Charter school building are based on these initial short term simultaneous test results.

The five (5)highest radon concentrations between 3.6 pCi/L and 3.9 pCi/L approached the EPA action limit of 4.0 pCi/L and are listed as follows:

Serial No.	Location	Analytical Test Result
4888301	Gym	3.6 pCi/L
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All radon concentration measurements are below the action limit of 4.0 pCi/L.

In the united States radioactivity is measured in Curies. A curie is the amount of radioactivity released from one gram of radium. A picocurie is a millionth of million, or a trillionth of a curie. Radon is measured and reported in picocuries per liters of air (pCi/L). The aforementioned five (5)radon sampler concentrations were listed as the highest concentration testers and these tester concentrations were slightly below the EPA radon concentration action limit of 4 pCi/L.

In the opinion of EIS, no additional radon testing is recommended at the Muddy Creek Charter school at this time based on this data. EIS does not recommend additional short term radon testing at this school at this time based on these analytical test results. EIS does recommend enhanced ventilation in room No. 6, room No.7, and the gymnasium. If there are questions concerning the radon testing at the district please initially contact the Corvallis school at (541)-757-5811.

Respectfully,

Charles A Spear

Charles A. Spear
Environmental Professional

12.0 PUBLIC AWARENESS

ORS 332.166-167 requires that school districts make all test results available: to the Muddy Creek Charter school board; the Oregon Health Authority with a post to the website and to parents, guardians, students, school employees, school volunteers, administrators, and community representatives at the school or district school or website.

The 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 test kit results or the results of the long-term test kit used in the followup is 4.0 pCi/L or higher.

Although not required of school districts under ORS 332.166-167 , it is recommended that school administration direct appropriate staff to adjust the building's HVAC system and then re-test if elevated radon concentration measurements are submitted for a target school. If the HVAC adjustment doesn't reduce the radon concentration measurement levels below 4 pCi/l then radon mitigation performed by a radon mitigation professional is recommended.

The percentage of health evaluations at the National Institute for Occupational Safety and Health at the Centers for Disease Control and Prevention (CDC) conducted related to indoor air quality has increased from 0.5 percent of all evaluations in 1978 to 52 percent of all evaluations since 1990. Evaluations related to air quality have increased from one of every 200 evaluations to now one of every two evaluations.

12.1 - Radon related questions and concerns should be forwarded to your state radon school. The following web sites, hotlines, and publications are submitted for reference:

12.2 - world wide web sites:

http://www.epa.gov/radon - EPA's primary radon web site

http://www.epa.gov/iaq/whereyoulive.html. - information for state web sites

http: //www.epa.gov/iag/radon/pubs/index.html - Full text versions of the most popular radon publications

http.//www.epa.gov/iaq - EPA air quality risk documents

http://www.epa.gov/safewater/radon.html

12.3 - Toll free radon information hotlines :

1-800-SOS-RADON (767-7236) - Radon test kit services
1-800-55RADON (557-2366) - Radon questions & answers
1-800-644-6999 - Radon reduction information for homes
1-866-528-3187 - Linea Directa de Inforamacion sobre Radon en Espanol.
1-800-426-4791 - Safe Drinking Water Hotline

12.4 - Printed documents:

- Home Buyers and Sellers Guide to Radon (EPA 402/K-09/002, January 2009)

-State radon schools;
see http://www.epa.gov/iaq/whereyoulive.html

- National Service center for Environmental Publications (NSCEP) at 1-800-490-9198, http://www.epa.gov/nscep/ or via email at nscep@bps-lmit.com

13.0 LIMITATIONS

This report was prepared in accordance with generally accepted ASTM standards of environmental practice at the time this investigation was performed. Evaluations of the conditions at the site for the purpose of this investigation are made from a limited number of observation and sample points and may be subjective in some cases. The client is solely responsible for providing any notices or disclosures to concerned public agencies or to the public.

Environmental Inspection Services has prepared this report based on information collected from available analytical test results. The scope of this investigation is limited and did include a limited number of radon testers and no subsurface or sub-slab radon screening of soil and groundwater. No radon mitigation or long term radon testing was performed on the subject property.

This report is not a substitution for a formal radon mitigation and/or radon mitigation effort. The findings and conclusions are not to be regarded as scientific certainties. Findings are based on professional judgement concerning independent laboratory data significance. This report is an expression of professional opinion and is not a warranty expressed or implied.

APPENDIX 1.0

RADON ANALYTICAL TEST RESULTS

ENVIROMENTAL INSPECTION SERVICES

charles_a_spear@yahoo.com

11981 FARGO RD NE
AURORA, OR 97002
503.680.6398

Pro Lab
1675 N. Commerce Parkway
Westin, FL 33326

MUDDY CREEK CHARTER SCHOOL
30252 BELLFOUNTAIN ROAD, CORVALLIS, OR, 97333

Vial #	Location	Start Date	Start Time	End Date	End Time	LEVEL
4888602	OFF-RECEPT	2/7/2020	4:53 PM	2/10/2020	7:35 AM	3.1
4882179	CONFER	2/7/2020	4:55 PM	2/10/2020	7:35 AM	3.0
4876227	PRINCIPAL	2/7/2020	4:58 PM	2/10/2020	7:35 AM	1.2
4897202	LIBRARY	2/7/2020	5:00 PM	2/10/2020	7:36 AM	1.8
4882083	LIBRARY (DUP)	2/7/2020	5:00 PM	2/10/2020	7:36 AM	1.7
4888647	LRC	2/7/2020	5:02 PM	2/10/2020	7:37 AM	1.3
4888718	ROOM 1	2/7/2020	5:05 PM	2/10/2020	7:37 AM	1.6
4888310	ROOM 2	2/7/2020	5:05 PM	2/10/2020	7:37 AM	1.4
4902386	ROOM 3	2/7/2020	5:05 PM	2/10/2020	7:38 AM	2.1
4914181	ROOM 4	2/7/2020	5:06 PM	2/10/2020	7:39 AM	2.4
4888655	ROOM 5	2/7/2020	5:06 PM	2/10/2020	7:39 AM	2.1
4882504	BOOKKER	2/7/2020	5:13 PM	2/10/2020	7:40 AM	3.5
4888301	GYM	2/7/2020	5:16 PM	2/10/2020	7:41 AM	3.6
4888365	GYM	2/7/2020	5:16 PM	2/10/2020	7:41 AM	3.8
4888389	GYM (BLANK)	2/7/2020	5:17 PM	2/10/2020	7:42 AM	0.2
4876301	GYM (DUP)	2/7/2020	5:17 PM	2/10/2020	7:42 AM	2.1
4902201	ROOM 6	2/7/2020	5:22 PM	2/10/2020	7:43 AM	1.2
4897301	ROOM 6 (DUP)	2/7/2020	5:22 PM	2/10/2020	7:43 AM	3.7
4914055	ROOM 7	2/7/2020	5:25 PM	2/10/2020	7:44 AM	3.9
4888307	ROOM 7 (DUP)	2/7/2020	5:25 PM	2/10/2020	7:44 AM	3.6
4893156	OFFICE (DUP)	2/7/2020	5:28 PM	2/10/2020	7:36 AM	3.4
4885952	LAB	2/7/2020	5:30 PM	2/10/2020	7:48 AM	1.6

BOWSER MORNER

4514 Taylorsville Road
Dayton, Ohio 45424

(937) 236-8805
(937) 233-2024

April 18, 2019

Mr. Jose Figueroa
Pro-Lab, Inc.
P.O. Box 267730
Weston, Florida 33326

Dear Mr. Figueroa:

Enclosed is a table of results for the radon performance test in which you recently participated using liquid scintillation charcoal devices (NRPP Device Code #7084). None of the values of Absolute Individual Relative Error of the reported measurements was greater than 25%; therefore, you passed the performance test. Please send a copy of this report to the NRPP when you apply for renewal of your certification, or whenever NRPP personnel request proof of passing a performance test.

If you have any questions, or require any further information, please call me at (937) 236-8805, ext. 249 or send e-mail to rturek@bowser-morner.com.

Very truly yours,

Rebecca J. Turek

Rebecca J. Turek
Manager, Radon Reference Laboratory

RESULTS OF PERFORMANCE TEST
FOR PRO-LAB, INC.

Exposure in Bowser-Morner's Radon Chamber:

From: 04/06/19
07:07 EST

To: 04/08/19
07:07 EST

Reported and Target Values are expressed in the unit of pCi/liter.

Participant	Device ID Code	Reported Value	Target Value	Absolute Value of Individual Relative Error
J FIGUEROA	4637487	22.3	26.5	0.158 (or 15.8%)
J FIGUEROA	4637586	24.1	26.5	0.091 (or 9.1%)
J FIGUEROA	4637603	23.0	26.5	0.132 (or 13.2%)
J FIGUEROA	4637222	20.6	26.5	0.223 (or 22.3%)
J FIGUEROA	4637611	24.4	26.5	0.079 (or 7.9%)

4.18.19
Date

Rebecca J. Turek
Manager, Radon Reference Laboratory
Bowser-Morner, Inc.

APPENDIX 2.0

CHAIN'S OF CUSTODY (COC'S)

RADON TEST CHAIN OF CUSTODY

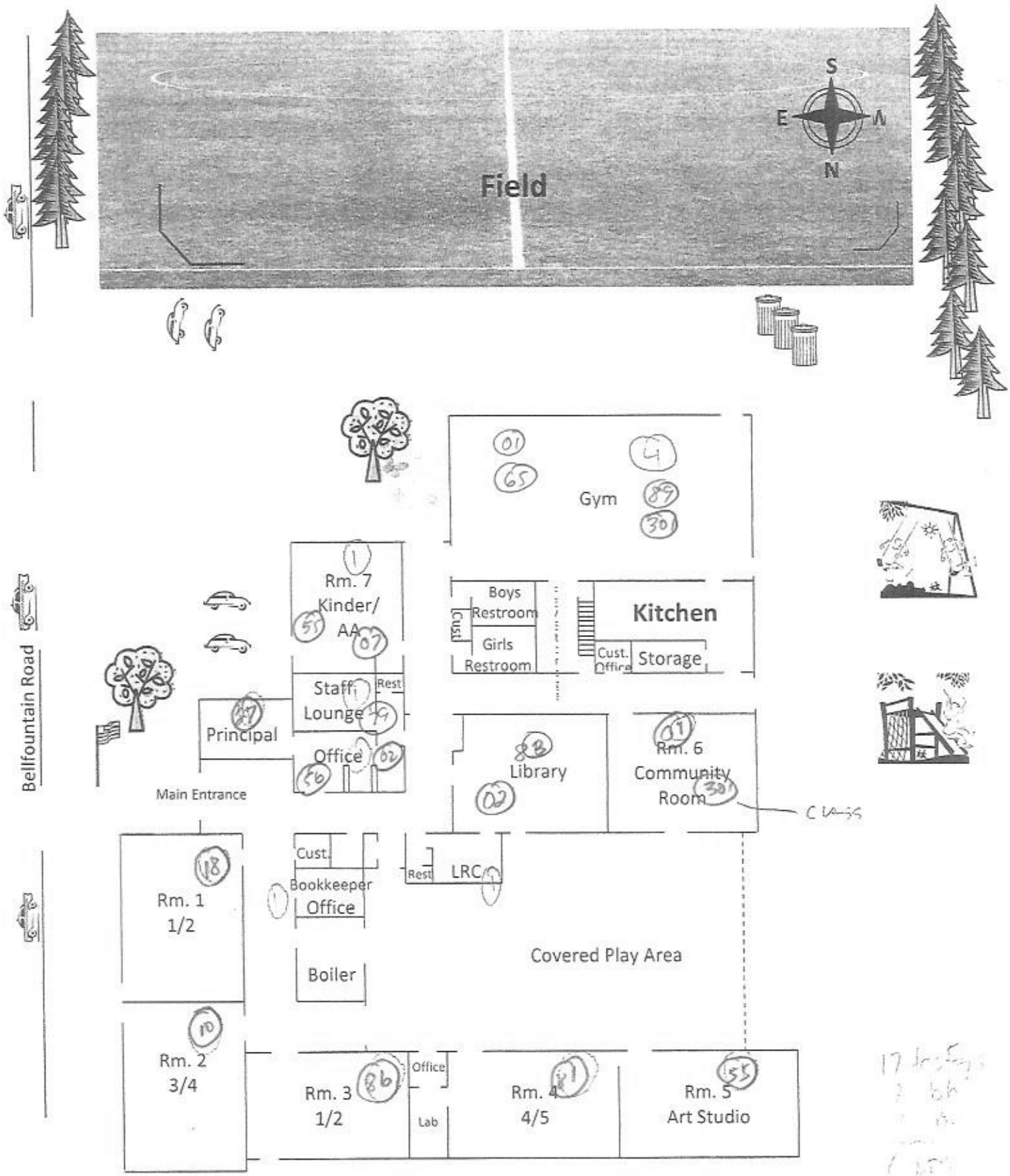
CLIENT (ADDRESS) Environmental Inspection Services
11981 Fargo Road
Aurora, Oregon 97002

TEST ADDRESS Muddy Creek Charter School
30252 Bellfountain Road
Corvallis, Oregon 97333

Serial No.	Location	Cap off time	Date	Cap on time	Date	Results
4888602	off-recept	4:53	2/7/20	7:35	2/10/20	
4882179	confer.	4:55		7:35		
4876227	Principal	4:58		7:35		
4897202	Library	5:00		7:36		
4882083	Library-dup	5:00		7:36		
4888647	LEC	5:02		7:37		
4888718	RM 1	5:05		7:37		
4888310	RM 2	5:05		7:37		
4902386	RM 3	5:05		7:38		
4914181	RM 4	5:06		7:39		
4888655	RM 5	5:06		7:39		
4882504	Boiler	5:13		7:40		
4888301	gym	5:16		7:41		
4888365	Gym	5:16		7:41		
4888389	Gym (Back)	5:17		7:42		
4876301	Gym-dup	5:17		7:42		
4902201	RM 6	5:22		7:43		
4897301	RM 6-dup	5:22		7:43		
4914055	RM 7	5:25		7:44		
4888307	RM 7-dup	5:25		7:44		
4893156	office dup	5:28		7:36		
4885952	LAB	5:30		7:45		

APPENDIX 3.0

SCHOOL SAMPLING FLOOR PLAN



Muddy Creek Charter School Supervision Map

APPENDIX 4.0

RADON REGULATION

News Release

FOR IMMEDIATE RELEASE
Thursday, January 13, 2005

Contact: HHS Press Office
(202) 690-6343

Surgeon General Releases National Health Advisory On Radon

U.S. Surgeon General Richard H. Carmona warned the American public about the risks of breathing indoor radon by issuing a national health advisory today. The advisory is meant to urge Americans to prevent this silent radioactive gas from seeping into their homes and building up to dangerous levels. Dr. Carmona issued the advisory during a two-day Surgeon General's Workshop on Healthy Indoor Environment.

"Indoor radon is the second-leading cause of lung cancer in the United States and breathing it over prolonged periods can present a significant health risk to families all over the county," Dr. Carmona said. "It's important to know that this threat is completely preventable. Radon can be detected with a simple test and fixed through well-established venting techniques."

Radon is an invisible, odorless and tasteless gas, with no immediate health symptoms, that comes from the breakdown of uranium inside the earth. Simple test kits can reveal the amount of radon in any building. Those with high levels can be fixed with simple and affordable venting techniques. According to U.S. Environmental Protection Agency (EPA) estimates, one in every 15 homes nationwide have a high radon level at or above the recommended radon action level of 4 picoCuries (pCi/L) per liter of air.

National Health Advisory on Radon

Radon gas in the indoor air of America's homes poses a serious health risk. More than 20,000 Americans die of radon-related lung cancer every year. Millions of homes have an elevated radon level. If you also smoke, your risk of lung cancer is much higher. Test your home for radon every two years, and retest any time you move, make structural changes to your home, or occupy a previously unused level of a house. If you have a radon level of 4 pCi/L or more, take steps to remedy the problem as soon as possible.

"Americans need to know about the risks of indoor radon and have the information and tools they need to take action. That's why EPA is actively promoting the Surgeon General's advice urging all Americans to get their homes tested for radon. If families do find elevated levels in their homes, they can take inexpensive steps that will reduce exposure to this risk," said Jeffrey R. Holmstead, Assistant Administrator, Office of Air and Radiation, U.S. Environmental Protection Agency (EPA).

"Based on national averages, we can expect that many of the homes owned or financed by federal government programs would have potentially elevated radon levels. The federal government has an opportunity to lead by example on this public health risk. We can accomplish this by using the outreach and awareness avenues we have, such as EPA's Web site, to share information and encourage action on radon to reduce risks," said Edwin Piñero, Federal Environmental Executive, Office of the Federal Environmental Executive (OFEE).

A national Public Service Announcement (PSA) that was released to television stations across America in January, National Radon Action Month, is reinforcing this recently updated health advisory. In the television spot, the camera scans a neighborhood with rooftop banners that remind the occupants of the importance to test their homes for radon. The television PSA can be viewed at: http://www.epa.gov/radon/rnpsa.html.

For more information about radon go to EPA's Web site www.epa.gov/radon; or call your state radon office; or call a national toll-free hotline at 1-800-SOS-RADON (1-800-767-7236).

The Surgeon General's Workshop on Healthy Indoor Environment is bringing together the best scientific minds in the nation to discuss the continuing problem of unhealthful buildings. Indoor environments are structures including workplaces, schools, offices, houses and apartment buildings, and vehicles. According to a recent study, Americans spend between 85 and 95 percent of their time indoors.

In just the past 25 years, the percentage of health evaluations that the National Institute for Occupational Safety and Health at the Centers for Disease Control and Prevention (CDC) has conducted related to indoor-air quality has increased from 0.5 percent of all evaluations in 1978, to 52 percent of all evaluations since 1990. This means that in those years, the evaluations related to air quality concerns have increased from one of every 200 evaluations to one of every two.

The problem is also adversely affecting our children's health as millions of homes and apartments and one in five schools in America have indoor air quality problems. This can trigger various allergies and asthma. Asthma alone accounts for 14 million missed school days each year. The rate of asthma in young children has risen by 160 percent in the past 15 years, and today one out of every 13 school-age children has asthma. Dr. Carmona is especially focusing on how unhealthy indoor environment affects children, as he promotes 2005 as The Year of the Healthy Child.

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Note: All HHS press releases, fact sheets and other press materials are available at http://www.hhs.gov/news.

Last Revised: January 12, 2005

2017 ORS 332.345[1]
Tests of schools for elevated levels of radon

- **plan**
- **results**

(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. [Formerly 332.167]

Note: Section 3, chapter 729, Oregon Laws 2015, provides:

Sec. 3. (1) A school district shall submit the plan developed under section 2 of this 2015 Act [332.345 (Tests of schools for elevated levels of radon)] 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) c.729 §3]

Note: See note under 332.341 (Provision of information to school districts about elevated levels of radon).

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[1] Legislative Counsel Committee, *CHAPTER 332—Local Administration of Education*, https://www.oregonlegislature.gov/bills_laws/ors/ors332.html (2017) (last accessed Mar. 30, 2018).

APPENDIX 5.0

CONSULTANT RESUME

RESUME

CHARLES ARTHUR SPEAR

CENTER FOR ENVIRONMENTAL RESEARCH & TECHNOLOGY RADON TRAINING

CERTIFIED ENVIRONMENTAL CONSULTANT (CEC) ENVIRONMENTAL ASSESSMENT ASSOCIATION

REGISTERED ENVIRONMENTAL ASSESSOR (Former) REA - 01241

AHERA INSPECTOR (EPA CERTIFICATION NO. IR-19-2439A

CERTIFIED ENVIRONMENTAL INSPECTOR CEI - 10364

Professional Background

Charles A. Spear, President and founder of Environmental Inspection Services has over 30 years technical experience ranging from facility and school district radon testing to site remediation. Technical employment included food technologist to hazardous waste site remediation at Federal SUPERFUND sites from California to Maryland. Mr. Spear has successfully performed over 3,000 Phase One, Phase Two, and Phase Three Environmental Site Assessment inspections and multiple radon inspections and surveys on properties from California to Alaska and east to Maryland.

Mr. Spear has managed such projects as spilled mustard gas and organophosphate demilitarization and remediation as a decontamination sergeant of the U.S.Army Chemical Corps Technical Escort Unit Drill & Transfer Unit at Umatilla Army Depot and removal of leaking solvent underground storage tanks in California and Oregon. Additional experience included supervision as a USARMY NBC Specialist of focused remediation at the Federal Superfund site known as Aberdeen Proving Grounds, Maryland (Michaelsville Landfill). EIS does not conduct or perform geological work. Geologic work is referred to a state registered geologist.

Specifically, Mr. Spear has worked with clients such as: numerous school districts, Housing & Urban Development, the International Fabric Care Industry (IFI), the U.S. Environmental Protection Agency, The U.S. Department of Defense, The Oregon Department of Environmental Quality (ODEQ), The Oregon Department of Forestry, INTEL, Sun Microsystems, IBM, Rohm & Haas, General Electric, AT&T, Texaco, Unocal, BP, Lockheed Missile and Space Center, FMC Corporation, Oregon Department of Fish & Wildlife, Washington Department of Fish & Wildlife, City of Beaverton, City of Hillsboro, City of Corvallis, Housing Authority of Portland, Northwest Oregon Housing Authority, Washington County Department of Housing, Housing & Urban Development, numerous lenders and mortgage companies, many private development and site remedial site projects, and many attorneys and investors.

Mr. Spear managed complex solvent tank farm removals at Xidex Corporation in Sunnyvale, California and was the site cleanup manager at the Rose City Plating Site currently developed as the Oregon Convention Center. Mr. Spear is a certified hazardous waste professional who has coupled military experience as a Nuclear, Biological and Chemical Specialist (U,S. Army MOS 54E20) with experience as a professional industrial and process research engineer in both the corrugated paper and petroleum industries.

Mr. Spear has managed food industry quality control as an inplant food technologist and prepared cost reduction programs as a corrugated boxboard industrial engineer in Dallas, Texas. He is currently registered with the states of California, Washington, and Oregon and is an active member of the national respected Environmental Assessment Association. Due diligence projects have been performed throughout the United States from Fairbanks, Alaska to San Diego, California.

Professional experience includes the following:

Professional Experience

* Dry Cleaner Inspections
* Environmental Consultation
* Waste Reduction Audits
* Regulatory Compliance Audits
* Drum Yard Clearances
* Tank Farm Removals/Replacements
* Lab Packaging & Supervision
* Environmental Site Assessments
* Superfund Site Remediation
* Hazardous Waste site Project Design & Management
* Habitat/Wetlands Restoration
* AHERA asbestos inspections for school districts
* Landfill Remediation
* Agricultural assessments
* Indoor air quality inspections

Professional Employment/Consultation

* C.F.S. Continental Coffee, Inc., Food technologist, Chicago, Illinois
* Holiday Industries, Research Engineer, Grand Prairie, Texas
* Alton Packaging Corporation, Industrial Engineer, Dallas, Texas
* U,S. Army Chemical Corps., Nuclear, Biological, Chemical Specialist - Special assignment - Umatilla Army Depot (DATS)
  Oregon and permanent assignment U.S. Army Chemical Corps. Technical Escort Unit in Edgewood, Maryland
* Rollins Environmental Services, Remedial Project Manager
* Crown Environmental Services, Technical Director, Redmond, California
* Dames & Moore, Remedial design Engineer, Portland, Oregon
* Pegasus Environmental Management Services, Director of Technical Services
* Pacific Tank & Construction, Manager of Estimation, Portland, Oregon
* Enviro-Logic Inc., Director of Environmental Site Assessment Division
* Environmental Inspection Services Founder / President

Professional Education

* Environmental Research & Technology radon training
* American Standard for Testing & Materials ASTM E1527-13 Training
* Bachelor of Science, Chemistry, Northeastern Illinois University, 1978
* U.S. Army Chemical School, Ft. McClellan, Alabama, 1983
* U.S. Army Technical Escort Unit, Accident / Incident Response Training Center 1983
* Registered Environmental Assessor REA - 01241 (Former classification)
* Certified environmental Inspector CEI - 10364
* AHERA Certified Asbestos Inspector IR-19-2439A
* ODEQ Soil Matrix Assessor & UST Decommission Supervisor ID No. 10305
* Washington DOE Registered Environmental Assessor
* Wetland Specialist - Training Wetlands Institute 1997
* EPA / HUD Lead-Based Paint (LBP) Certified Inspector & Risk Assessor

Additional Education

* Joint Military Material Packaging & Transportation
* Asbestos Abatement Seminar attendance 1987
* Thin Layer Chromatography, 1989
* Oregon Registered Underground storage Tank Supervisor, 1998
* Oregon Registered Soil Matrix Assessor, 1998
* Washington Registered Assessor, 1991
* Washington Registered Underground Storage Tank Supervisor, 1991
* Wetland Training Institute Delineation Course Study University of Portland 1997
* 40-Hour HAZMAT Certified
* AHERA-Certified Inspector

Special Skills

* School District radon surveys and radon control planning
* Facility Environmental Compliance Audits
* ASTM standard Environmental Site Assessments
* Computer Programming
* Organic surfactant chemical synthesis and analysis
* Hazardous Waste Site remediation/ estimating/ standards development
* Design of filtration systems, batch and continuous process optimization studies
* QA/QC Procedures
* SUPERFUND Site Management
* Industrial/ Research Engineering
* Hazardous Waste Site Remediation/ Consultation
* Wetlands Delineation and Habitat Restoration

Certification

* U.S. Army MOS 54E20 - U.S. Army Chemical Corps.
* International Fire Code Institute (IFCI) Certified UST Supervisor
* International Fire Code Institute (IFCI) Certified Soil Matrix Assessor
* Certified Hazardous Waste Manager
* 40-hour OSHA Training
* 40-hour OSHA Supervisor Training
* Registered Environmental Assessor (DOE)
* DEQ Registered UST Supervisor
* DEQ Registered Soil Matrix Assessor
* Resolution Trust Corporation (RTC) approved Environmental Assessor
* California Registered Environmental Assessor (REA-01241)- program discontinued
* Department of Ecology (DOE) Registered Environmental Assessor
* Environmental Assessment Association, Certified Environmental Inspector & Transaction Specialist (CEI-10364)
* Environmental Assessment Association, Certified Environmental Consultant (CEC)
* AHERA Certified Asbestos Inspector
* Wetland Delineator Graduate Wetland Training Institute, University of Portland 1997
* EPA / HUD LBP Inspector & Risk Assessor
* ASTM Training class, May, 2004