



December 18, 2016

Joe Crelier
Director of Risk Management
Portland Public Schools
501 N Dixon Street
Portland, Oregon 97227

Via email: jcrelier@pps.net

Regarding: Continuous Radon Monitor Measurement Report
Seven Locations at Lent, Marysville, and Whitman
Portland, Oregon
PBS Project No. 06500.618, Phase 0002

Dear Mr. Crelier:

From November 28 to December 2, 2016, PBS Engineering and Environmental Inc. (PBS) conducted continuous radon monitor (CRM) measurements at three Portland Public Schools (PPS) sites in seven unique locations. These measurements were performed in response to elevated radon levels identified during previous short term radon monitoring. Locations tested are identified in the following table:

Site	Building	Room
Lent	Portables	P2 (old Industrial Arts)
Marysville	Main	108 (Library)
Whitman	Main	14
Whitman	Main	23
Whitman	Main	Cafeteria
Whitman	Main	Kitchen
Whitman	Main	Gym

This testing was performed with Sun Nuclear Model 1027 continuous radon monitors, EPA and Industry approved testing devices. CRM monitors were placed on desk or table tops in rooms identified for testing. Devices were placed on the morning of November 28, 2016, and collected the morning of December 2, 2016. The devices recorded radon levels and tilts (an anti-tampering indication) data for 90 hours. Closed building conditions were not verified during the course of this testing.

The following table summarizes radon data collected:

Test Location	Start Time	Stop Time	Total Time*	Average Radon Concentration (pCi/L = picocuries per liter)
Lent – P2	11/28/2016 9:27:00 AM	12/2/2016 9:29:00 AM	71 Hours	11.7 pCi/l
Marysville - 108	11/28/2016 9:47:00 AM	12/2/2016 9:19:00 AM	90 Hours	2.8 pCi/l
Whitman - 14	11/28/2016 8:38:00 AM	12/2/2016 9:04:00 AM	90 Hours	2.7 pCi/l
Whitman - 23	11/28/2016 8:28:00 AM	12/2/2016 8:58:00 AM	90 Hours	1.3 pCi/l
Whitman - Cafeteria	11/28/2016 8:53:00 AM	12/2/2016 8:49:00 AM	90 Hours	0.4 pCi/l
Whitman - Kitchen	11/28/2016 8:50:00 AM	12/2/2016 8:57:00 AM	90 Hours	1.4 pCi/l
Whitman - Gym	11/28/2016 8:57:00 AM	12/2/2016 8:54:00 AM	90 Hours	0.1 pCi/l

* Units log data once per hour for a maximum of the first 90 hours. Data for all hours between start and stop times may not be logged.

The unit deployed at Lent in portable P2 indicated multiple tilts and power disruptions. At the time the unit was collected it was also noted that the HVAC system servicing the portable was not operational. Mitigation in this location is recommended prior to additional testing.

For more detail, please see the Report Graph With Detailed Hourly Data for each test location.

Please feel free to contact me at 503.417.7694 or chris.boyce@pbsenv.com with any questions or comments.

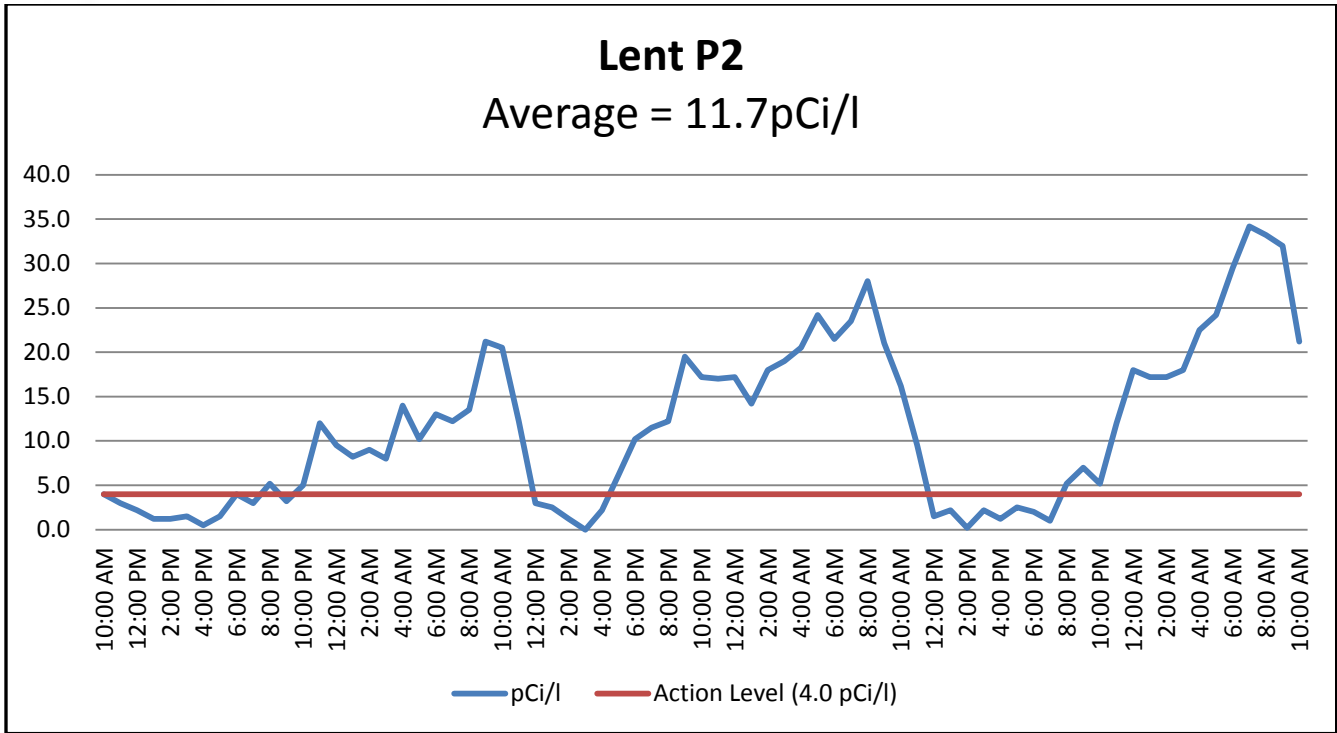
Sincerely,
 PBS Engineering and Environmental Inc.



Chris Boyce
 Project Manager

Attachments: Report Graph With Detailed Hourly Data (x7)
 CRM Statement of Calibration (x7)
 (Serial No.:1407134, 1407171, 1407175, 1407176, 1407179, 1407185, 1407187)

CB::bmp



Unit Type: Sun Nuclear Model 1027
 Serial Number: 1407175

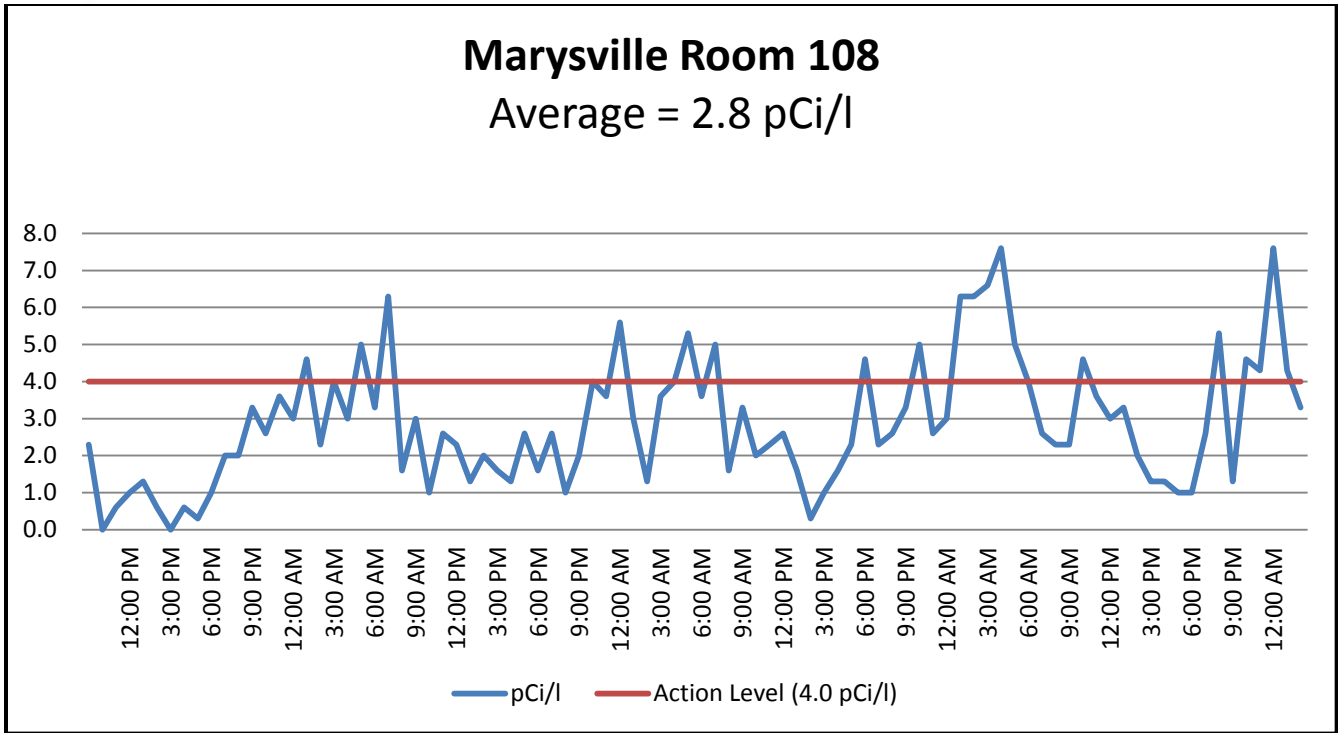
Date:	Time:	Radon (pCi/l)
November 28, 2016	10:00 AM	4.0
November 28, 2016	11:00 AM	3.0
November 28, 2016	12:00 PM	2.2
November 28, 2016	1:00 PM	1.2
November 28, 2016	2:00 PM	1.2
November 28, 2016	3:00 PM	1.5
November 28, 2016	4:00 PM	0.5
November 28, 2016	5:00 PM	1.5
November 28, 2016	6:00 PM	4.0
November 28, 2016	7:00 PM	3.0
November 28, 2016	8:00 PM	5.2
November 28, 2016	9:00 PM	3.2
November 28, 2016	10:00 PM	5.0
November 28, 2016	11:00 PM	12.0

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November 28, 2016	12:00 AM	9.5
November 29, 2016	1:00 AM	8.2
November 29, 2016	2:00 AM	9.0
November 29, 2016	3:00 AM	8.0
November 29, 2016	4:00 AM	14.0
November 29, 2016	5:00 AM	10.2
November 29, 2016	6:00 AM	13.0
November 29, 2016	7:00 AM	12.2
November 29, 2016	8:00 AM	13.5
November 29, 2016	9:00 AM	21.2
November 29, 2016	10:00 AM	20.5
November 29, 2016	11:00 AM	12.2
November 29, 2016	12:00 PM	3.0
November 29, 2016	1:00 PM	2.5
November 29, 2016	2:00 PM	1.2
November 29, 2016	3:00 PM	0.0
November 29, 2016	4:00 PM	2.2
November 29, 2016	5:00 PM	6.2
November 29, 2016	6:00 PM	10.2
November 29, 2016	7:00 PM	11.5
November 29, 2016	8:00 PM	12.2
November 29, 2016	9:00 PM	19.5
November 29, 2016	10:00 PM	17.2
November 29, 2016	11:00 PM	17.0
November 29, 2016	12:00 AM	17.2
November 30, 2016	1:00 AM	14.2
November 30, 2016	2:00 AM	18.0
November 30, 2016	3:00 AM	19.0
November 30, 2016	4:00 AM	20.5
November 30, 2016	5:00 AM	24.2
November 30, 2016	6:00 AM	21.5
November 30, 2016	7:00 AM	23.5
November 30, 2016	8:00 AM	28.0
November 30, 2016	9:00 AM	21.0
November 30, 2016	10:00 AM	16.2
November 30, 2016	11:00 AM	9.5
November 30, 2016	12:00 PM	1.5
November 30, 2016	1:00 PM	2.2
November 30, 2016	2:00 PM	0.2
November 30, 2016	3:00 PM	2.2
November 30, 2016	4:00 PM	1.2

Continuous Radon Monitor Measurement Hourly Data: Lent Room P2

November 30, 2016	5:00 PM	2.5
November 30, 2016	6:00 PM	2.0
November 30, 2016	7:00 PM	1.0
November 30, 2016	8:00 PM	5.2
November 30, 2016	9:00 PM	7.0
November 30, 2016	10:00 PM	5.2
November 30, 2016	11:00 PM	12.0
November 30, 2016	12:00 AM	18.0
December 1, 2016	1:00 AM	17.2
December 1, 2016	2:00 AM	17.2
December 1, 2016	3:00 AM	18.0
December 1, 2016	4:00 AM	22.5
December 1, 2016	5:00 AM	24.2
December 1, 2016	6:00 AM	29.5
December 1, 2016	7:00 AM	34.2
December 1, 2016	8:00 AM	33.2
December 1, 2016	9:00 AM	32.0
December 1, 2016	10:00 AM	21.2



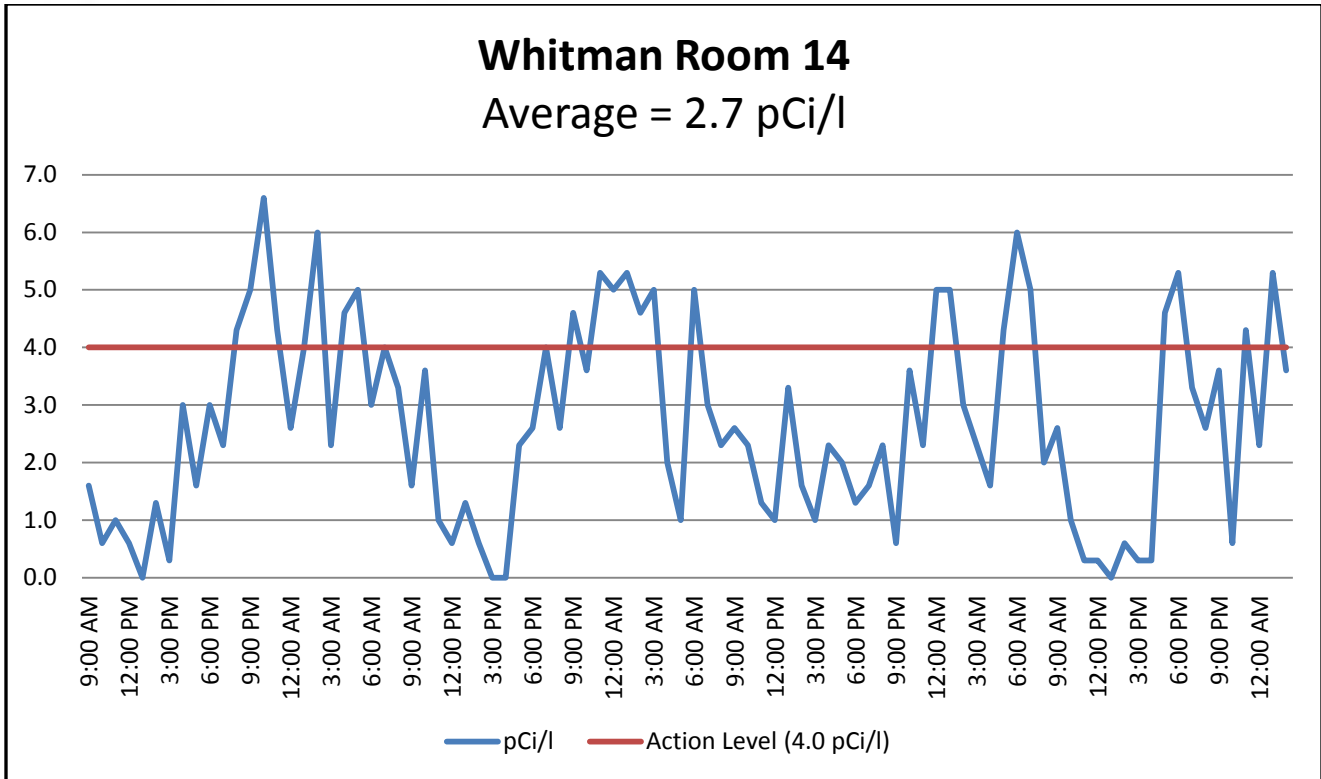
Unit Type: Sun Nuclear Model 1027
 Serial Number: 1407175

Date:	Time:	Radon (pCi/l)
November 28, 2016	10:00 AM	2.3
November 28, 2016	11:00 AM	0.0
November 28, 2016	12:00 PM	0.6
November 28, 2016	1:00 PM	1.0
November 28, 2016	2:00 PM	1.3
November 28, 2016	3:00 PM	0.6
November 28, 2016	4:00 PM	0.0
November 28, 2016	5:00 PM	0.6
November 28, 2016	6:00 PM	0.3
November 28, 2016	7:00 PM	1.0
November 28, 2016	8:00 PM	2.0
November 28, 2016	9:00 PM	2.0
November 28, 2016	10:00 PM	3.3
November 28, 2016	11:00 PM	2.6

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November 28, 2016	12:00 AM	3.6
November 29, 2016	1:00 AM	3.0
November 29, 2016	2:00 AM	4.6
November 29, 2016	3:00 AM	2.3
November 29, 2016	4:00 AM	4.0
November 29, 2016	5:00 AM	3.0
November 29, 2016	6:00 AM	5.0
November 29, 2016	7:00 AM	3.3
November 29, 2016	8:00 AM	6.3
November 29, 2016	9:00 AM	1.6
November 29, 2016	10:00 AM	3.0
November 29, 2016	11:00 AM	1.0
November 29, 2016	12:00 PM	2.6
November 29, 2016	1:00 PM	2.3
November 29, 2016	2:00 PM	1.3
November 29, 2016	3:00 PM	2.0
November 29, 2016	4:00 PM	1.6
November 29, 2016	5:00 PM	1.3
November 29, 2016	6:00 PM	2.6
November 29, 2016	7:00 PM	1.6
November 29, 2016	8:00 PM	2.6
November 29, 2016	9:00 PM	1.0
November 29, 2016	10:00 PM	2.0
November 29, 2016	11:00 PM	4.0
November 29, 2016	12:00 AM	3.6
November 30, 2016	1:00 AM	5.6
November 30, 2016	2:00 AM	3.0
November 30, 2016	3:00 AM	1.3
November 30, 2016	4:00 AM	3.6
November 30, 2016	5:00 AM	4.0
November 30, 2016	6:00 AM	5.3
November 30, 2016	7:00 AM	3.6
November 30, 2016	8:00 AM	5.0
November 30, 2016	9:00 AM	1.6
November 30, 2016	10:00 AM	3.3
November 30, 2016	11:00 AM	2.0
November 30, 2016	12:00 PM	2.3
November 30, 2016	1:00 PM	2.6
November 30, 2016	2:00 PM	1.6
November 30, 2016	3:00 PM	0.3
November 30, 2016	4:00 PM	1.0

November 30, 2016	5:00 PM	1.6
November 30, 2016	6:00 PM	2.3
November 30, 2016	7:00 PM	4.6
November 30, 2016	8:00 PM	2.3
November 30, 2016	9:00 PM	2.6
November 30, 2016	10:00 PM	3.3
November 30, 2016	11:00 PM	5.0
November 30, 2016	12:00 AM	2.6
December 1, 2016	1:00 AM	3.0
December 1, 2016	2:00 AM	6.3
December 1, 2016	3:00 AM	6.3
December 1, 2016	4:00 AM	6.6
December 1, 2016	5:00 AM	7.6
December 1, 2016	6:00 AM	5.0
December 1, 2016	7:00 AM	4.0
December 1, 2016	8:00 AM	2.6
December 1, 2016	9:00 AM	2.3
December 1, 2016	10:00 AM	2.3
December 1, 2016	11:00 AM	4.6
December 1, 2016	12:00 PM	3.6
December 1, 2016	1:00 PM	3.0
December 1, 2016	2:00 PM	3.3
December 1, 2016	3:00 PM	2.0
December 1, 2016	4:00 PM	1.3
December 1, 2016	5:00 PM	1.3
December 1, 2016	6:00 PM	1.0
December 1, 2016	7:00 PM	1.0
December 1, 2016	8:00 PM	2.6
December 1, 2016	9:00 PM	5.3
December 1, 2016	10:00 PM	1.3
December 1, 2016	11:00 PM	4.6
December 1, 2016	12:00 AM	4.3
December 2, 2016	1:00 AM	7.6
December 2, 2016	2:00 AM	4.3
December 2, 2016	3:00 AM	3.3



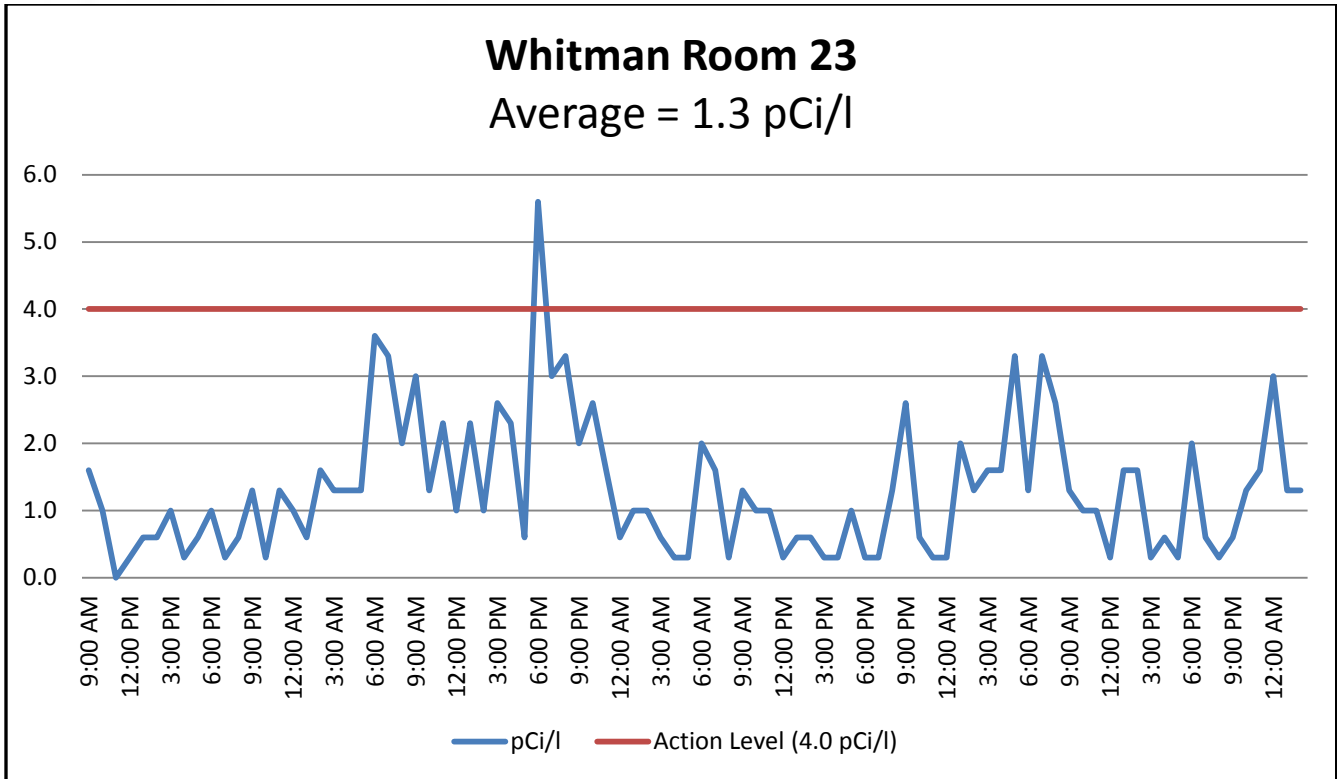
Unit Type: Sun Nuclear Model 1027
Serial Number: 1407171

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November 28, 2016	11:00 AM	1.0
November 28, 2016	12:00 PM	0.6
November 28, 2016	1:00 PM	0.0
November 28, 2016	2:00 PM	1.3
November 28, 2016	3:00 PM	0.3
November 28, 2016	4:00 PM	3.0
November 28, 2016	5:00 PM	1.6
November 28, 2016	6:00 PM	3.0
November 28, 2016	7:00 PM	2.3
November 28, 2016	8:00 PM	4.3
November 28, 2016	9:00 PM	5.0

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November 28, 2016	10:00 PM	6.6
November 28, 2016	11:00 PM	4.3
November 29, 2016	12:00 AM	2.6
November 29, 2016	1:00 AM	4.0
November 29, 2016	2:00 AM	6.0
November 29, 2016	3:00 AM	2.3
November 29, 2016	4:00 AM	4.6
November 29, 2016	5:00 AM	5.0
November 29, 2016	6:00 AM	3.0
November 29, 2016	7:00 AM	4.0
November 29, 2016	8:00 AM	3.3
November 29, 2016	9:00 AM	1.6
November 29, 2016	10:00 AM	3.6
November 29, 2016	11:00 AM	1.0
November 29, 2016	12:00 PM	0.6
November 29, 2016	1:00 PM	1.3
November 29, 2016	2:00 PM	0.6
November 29, 2016	3:00 PM	0.0
November 29, 2016	4:00 PM	0.0
November 29, 2016	5:00 PM	2.3
November 29, 2016	6:00 PM	2.6
November 29, 2016	7:00 PM	4.0
November 29, 2016	8:00 PM	2.6
November 29, 2016	9:00 PM	4.6
November 29, 2016	10:00 PM	3.6
November 29, 2016	11:00 PM	5.3
November 30, 2016	12:00 AM	5.0
November 30, 2016	1:00 AM	5.3
November 30, 2016	2:00 AM	4.6
November 30, 2016	3:00 AM	5.0
November 30, 2016	4:00 AM	2.0
November 30, 2016	5:00 AM	1.0
November 30, 2016	6:00 AM	5.0
November 30, 2016	7:00 AM	3.0
November 30, 2016	8:00 AM	2.3
November 30, 2016	9:00 AM	2.6
November 30, 2016	10:00 AM	2.3
November 30, 2016	11:00 AM	1.3
November 30, 2016	12:00 PM	1.0
November 30, 2016	1:00 PM	3.3
November 30, 2016	2:00 PM	1.6

November 30, 2016	3:00 PM	1.0
November 30, 2016	4:00 PM	2.3
November 30, 2016	5:00 PM	2.0
November 30, 2016	6:00 PM	1.3
November 30, 2016	7:00 PM	1.6
November 30, 2016	8:00 PM	2.3
November 30, 2016	9:00 PM	0.6
November 30, 2016	10:00 PM	3.6
November 30, 2016	11:00 PM	2.3
December 1, 2016	12:00 AM	5.0
December 1, 2016	1:00 AM	5.0
December 1, 2016	2:00 AM	3.0
December 1, 2016	3:00 AM	2.3
December 1, 2016	4:00 AM	1.6
December 1, 2016	5:00 AM	4.3
December 1, 2016	6:00 AM	6.0
December 1, 2016	7:00 AM	5.0
December 1, 2016	8:00 AM	2.0
December 1, 2016	9:00 AM	2.6
December 1, 2016	10:00 AM	1.0
December 1, 2016	11:00 AM	0.3
December 1, 2016	12:00 PM	0.3
December 1, 2016	1:00 PM	0.0
December 1, 2016	2:00 PM	0.6
December 1, 2016	3:00 PM	0.3
December 1, 2016	4:00 PM	0.3
December 1, 2016	5:00 PM	4.6
December 1, 2016	6:00 PM	5.3
December 1, 2016	7:00 PM	3.3
December 1, 2016	8:00 PM	2.6
December 1, 2016	9:00 PM	3.6
December 1, 2016	10:00 PM	0.6
December 1, 2016	11:00 PM	4.3
December 2, 2016	12:00 AM	2.3
December 2, 2016	1:00 AM	5.3
December 2, 2016	2:00 AM	3.6



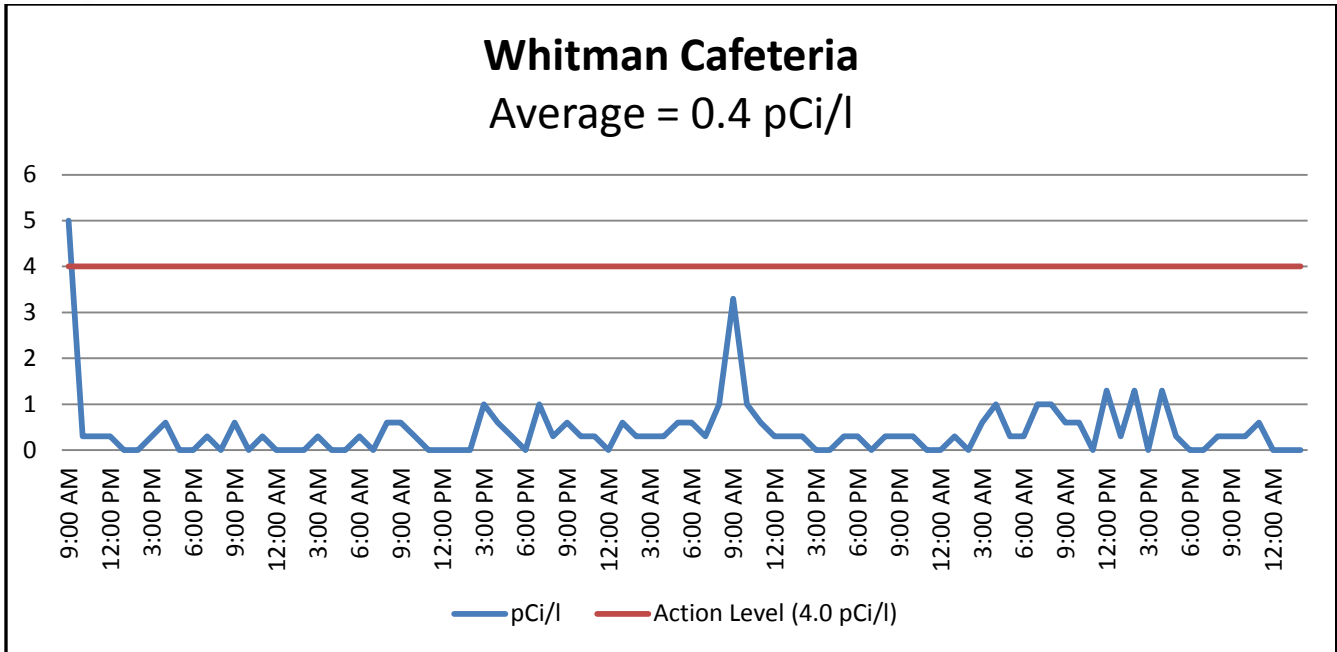
Unit Type: Sun Nuclear Model 1027
Serial Number: 1407185

Date:	Time:	Radon (pCi/l)
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November 28, 2016	12:00 PM	0.3
November 28, 2016	1:00 PM	0.6
November 28, 2016	2:00 PM	0.6
November 28, 2016	3:00 PM	1.0
November 28, 2016	4:00 PM	0.3
November 28, 2016	5:00 PM	0.6
November 28, 2016	6:00 PM	1.0
November 28, 2016	7:00 PM	0.3
November 28, 2016	8:00 PM	0.6
November 28, 2016	9:00 PM	1.3

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November 28, 2016	10:00 PM	0.3
November 28, 2016	11:00 PM	1.3
November 29, 2016	12:00 AM	1.0
November 29, 2016	1:00 AM	0.6
November 29, 2016	2:00 AM	1.6
November 29, 2016	3:00 AM	1.3
November 29, 2016	4:00 AM	1.3
November 29, 2016	5:00 AM	1.3
November 29, 2016	6:00 AM	3.6
November 29, 2016	7:00 AM	3.3
November 29, 2016	8:00 AM	2.0
November 29, 2016	9:00 AM	3.0
November 29, 2016	10:00 AM	1.3
November 29, 2016	11:00 AM	2.3
November 29, 2016	12:00 PM	1.0
November 29, 2016	1:00 PM	2.3
November 29, 2016	2:00 PM	1.0
November 29, 2016	3:00 PM	2.6
November 29, 2016	4:00 PM	2.3
November 29, 2016	5:00 PM	0.6
November 29, 2016	6:00 PM	5.6
November 29, 2016	7:00 PM	3.0
November 29, 2016	8:00 PM	3.3
November 29, 2016	9:00 PM	2.0
November 29, 2016	10:00 PM	2.6
November 29, 2016	11:00 PM	1.6
November 30, 2016	12:00 AM	0.6
November 30, 2016	1:00 AM	1.0
November 30, 2016	2:00 AM	1.0
November 30, 2016	3:00 AM	0.6
November 30, 2016	4:00 AM	0.3
November 30, 2016	5:00 AM	0.3
November 30, 2016	6:00 AM	2.0
November 30, 2016	7:00 AM	1.6
November 30, 2016	8:00 AM	0.3
November 30, 2016	9:00 AM	1.3
November 30, 2016	10:00 AM	1.0
November 30, 2016	11:00 AM	1.0
November 30, 2016	12:00 PM	0.3
November 30, 2016	1:00 PM	0.6
November 30, 2016	2:00 PM	0.6

November 30, 2016	3:00 PM	0.3
November 30, 2016	4:00 PM	0.3
November 30, 2016	5:00 PM	1.0
November 30, 2016	6:00 PM	0.3
November 30, 2016	7:00 PM	0.3
November 30, 2016	8:00 PM	1.3
November 30, 2016	9:00 PM	2.6
November 30, 2016	10:00 PM	0.6
November 30, 2016	11:00 PM	0.3
December 1, 2016	12:00 AM	0.3
December 1, 2016	1:00 AM	2.0
December 1, 2016	2:00 AM	1.3
December 1, 2016	3:00 AM	1.6
December 1, 2016	4:00 AM	1.6
December 1, 2016	5:00 AM	3.3
December 1, 2016	6:00 AM	1.3
December 1, 2016	7:00 AM	3.3
December 1, 2016	8:00 AM	2.6
December 1, 2016	9:00 AM	1.3
December 1, 2016	10:00 AM	1.0
December 1, 2016	11:00 AM	1.0
December 1, 2016	12:00 PM	0.3
December 1, 2016	1:00 PM	1.6
December 1, 2016	2:00 PM	1.6
December 1, 2016	3:00 PM	0.3
December 1, 2016	4:00 PM	0.6
December 1, 2016	5:00 PM	0.3
December 1, 2016	6:00 PM	2.0
December 1, 2016	7:00 PM	0.6
December 1, 2016	8:00 PM	0.3
December 1, 2016	9:00 PM	0.6
December 1, 2016	10:00 PM	1.3
December 1, 2016	11:00 PM	1.6
December 2, 2016	12:00 AM	3.0
December 2, 2016	1:00 AM	1.3
December 2, 2016	2:00 AM	1.3



Unit Type: Sun Nuclear Model 1027
 Serial Number: 1407185

Date:	Time:	Radon (pCi/l)
November 28, 2016	9:00 AM	5
November 28, 2016	10:00 AM	0.3
November 28, 2016	11:00 AM	0.3
November 28, 2016	12:00 PM	0.3
November 28, 2016	1:00 PM	0
November 28, 2016	2:00 PM	0
November 28, 2016	3:00 PM	0.3
November 28, 2016	4:00 PM	0.6
November 28, 2016	5:00 PM	0
November 28, 2016	6:00 PM	0
November 28, 2016	7:00 PM	0.3
November 28, 2016	8:00 PM	0
November 28, 2016	9:00 PM	0.6
November 28, 2016	10:00 PM	0
November 28, 2016	11:00 PM	0.3
November 29, 2016	12:00 AM	0

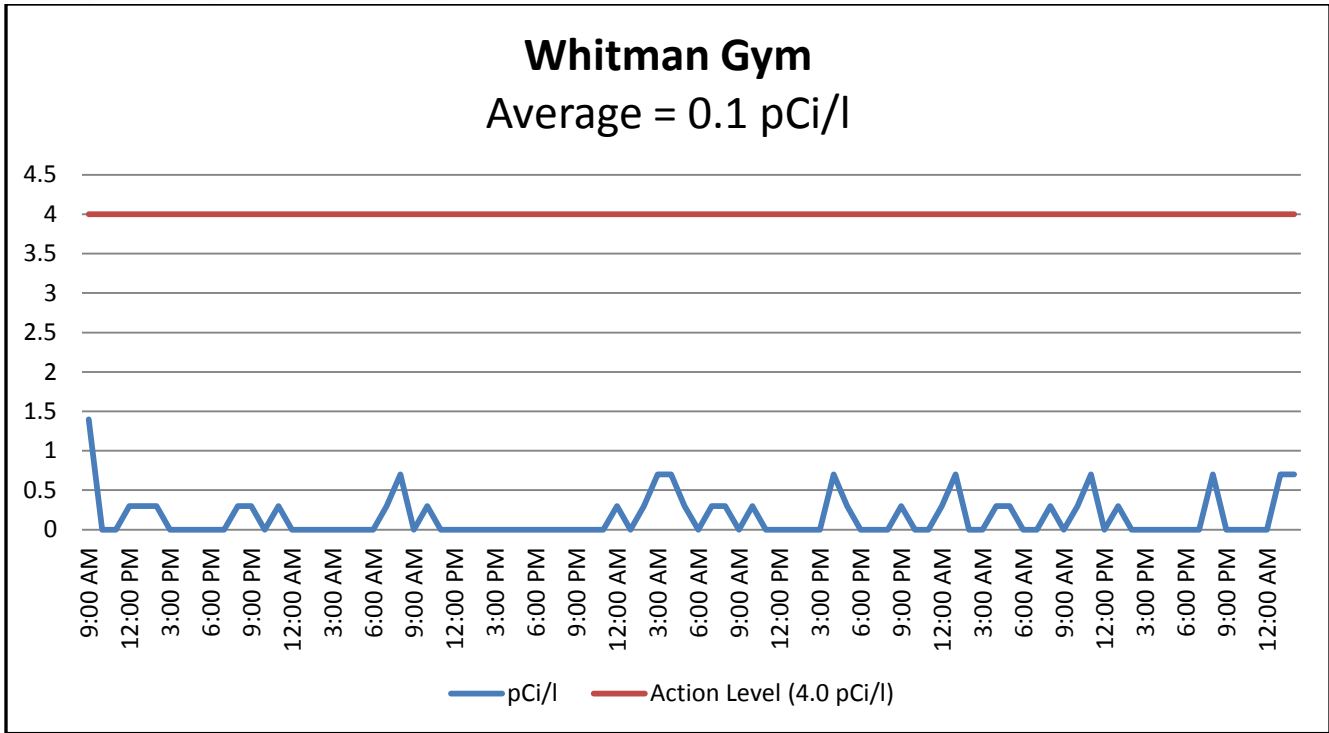
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Continuous Radon Monitor Measurement Hourly Data: Whitman Cafeteria

November 29, 2016	1:00 AM	0
November 29, 2016	2:00 AM	0
November 29, 2016	3:00 AM	0.3
November 29, 2016	4:00 AM	0
November 29, 2016	5:00 AM	0
November 29, 2016	6:00 AM	0.3
November 29, 2016	7:00 AM	0
November 29, 2016	8:00 AM	0.6
November 29, 2016	9:00 AM	0.6
November 29, 2016	10:00 AM	0.3
November 29, 2016	11:00 AM	0
November 29, 2016	12:00 PM	0
November 29, 2016	1:00 PM	0
November 29, 2016	2:00 PM	0
November 29, 2016	3:00 PM	1
November 29, 2016	4:00 PM	0.6
November 29, 2016	5:00 PM	0.3
November 29, 2016	6:00 PM	0
November 29, 2016	7:00 PM	1
November 29, 2016	8:00 PM	0.3
November 29, 2016	9:00 PM	0.6
November 29, 2016	10:00 PM	0.3
November 29, 2016	11:00 PM	0.3
November 30, 2016	12:00 AM	0
November 30, 2016	1:00 AM	0.6
November 30, 2016	2:00 AM	0.3
November 30, 2016	3:00 AM	0.3
November 30, 2016	4:00 AM	0.3
November 30, 2016	5:00 AM	0.6
November 30, 2016	6:00 AM	0.6
November 30, 2016	7:00 AM	0.3
November 30, 2016	8:00 AM	1
November 30, 2016	9:00 AM	3.3
November 30, 2016	10:00 AM	1
November 30, 2016	11:00 AM	0.6
November 30, 2016	12:00 PM	0.3
November 30, 2016	1:00 PM	0.3
November 30, 2016	2:00 PM	0.3
November 30, 2016	3:00 PM	0
November 30, 2016	4:00 PM	0
November 30, 2016	5:00 PM	0.3

Continuous Radon Monitor Measurement Hourly Data: Whitman Cafeteria

November 30, 2016	6:00 PM	0.3
November 30, 2016	7:00 PM	0
November 30, 2016	8:00 PM	0.3
November 30, 2016	9:00 PM	0.3
November 30, 2016	10:00 PM	0.3
November 30, 2016	11:00 PM	0
December 1, 2016	12:00 AM	0
December 1, 2016	1:00 AM	0.3
December 1, 2016	2:00 AM	0
December 1, 2016	3:00 AM	0.6
December 1, 2016	4:00 AM	1
December 1, 2016	5:00 AM	0.3
December 1, 2016	6:00 AM	0.3
December 1, 2016	7:00 AM	1
December 1, 2016	8:00 AM	1
December 1, 2016	9:00 AM	0.6
December 1, 2016	10:00 AM	0.6
December 1, 2016	11:00 AM	0
December 1, 2016	12:00 PM	1.3
December 1, 2016	1:00 PM	0.3
December 1, 2016	2:00 PM	1.3
December 1, 2016	3:00 PM	0
December 1, 2016	4:00 PM	1.3
December 1, 2016	5:00 PM	0.3
December 1, 2016	6:00 PM	0
December 1, 2016	7:00 PM	0
December 1, 2016	8:00 PM	0.3
December 1, 2016	9:00 PM	0.3
December 1, 2016	10:00 PM	0.3
December 1, 2016	11:00 PM	0.6
December 2, 2016	12:00 AM	0
December 2, 2016	1:00 AM	0
December 2, 2016	2:00 AM	0



Unit Type: Sun Nuclear Model 1027
 Serial Number: 1407179

Date:	Time:	Radon (pCi/l)
November 28, 2016	9:00 AM	1.4
November 28, 2016	10:00 AM	0
November 28, 2016	11:00 AM	0
November 28, 2016	12:00 PM	0.3
November 28, 2016	1:00 PM	0.3
November 28, 2016	2:00 PM	0.3
November 28, 2016	3:00 PM	0
November 28, 2016	4:00 PM	0
November 28, 2016	5:00 PM	0
November 28, 2016	6:00 PM	0
November 28, 2016	7:00 PM	0
November 28, 2016	8:00 PM	0.3
November 28, 2016	9:00 PM	0.3
November 28, 2016	10:00 PM	0

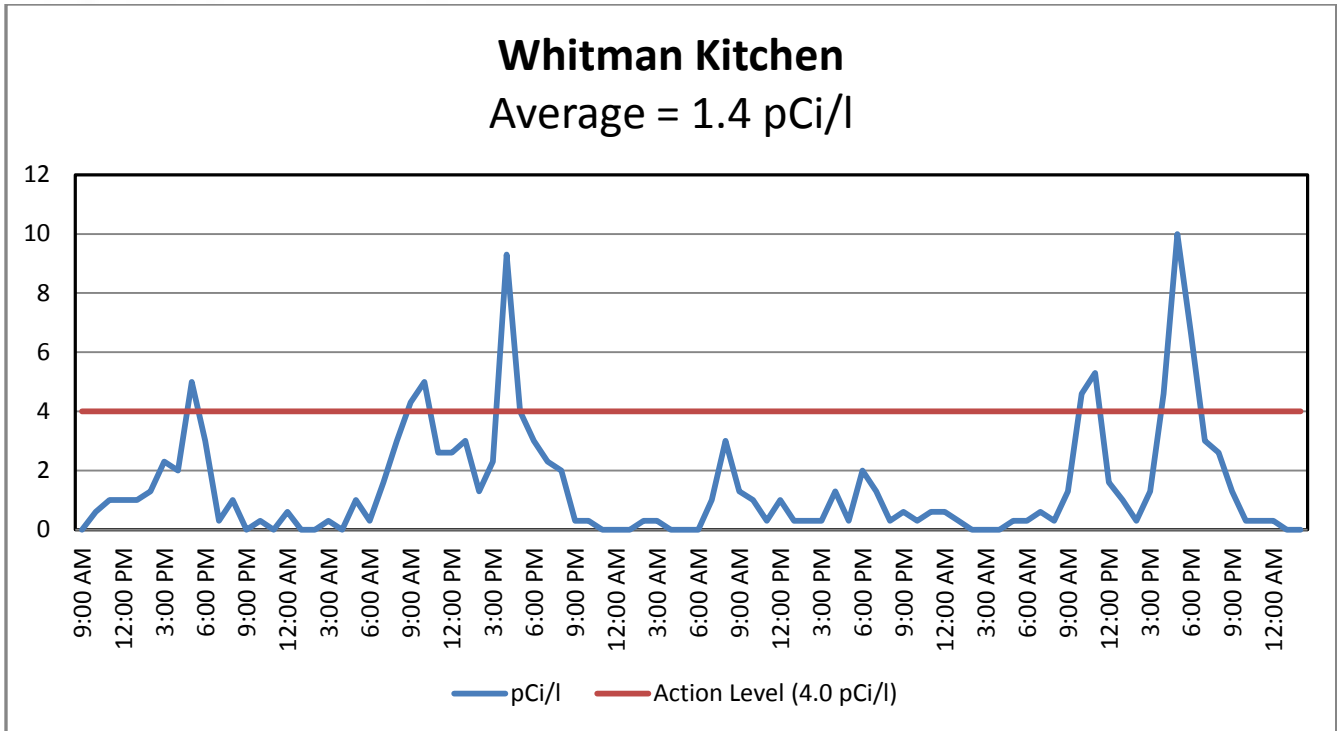
4412 SW Corbett Avenue, Portland, OR 97239
 503.248.1939 Main
 866.727.0140 Fax
 888.248.1939 Toll-Free
 www.pbsenv.com

Continuous Radon Monitor Measurement Hourly Data: Whitman Gym

November 28, 2016	11:00 PM	0.3
November 29, 2016	12:00 AM	0
November 29, 2016	1:00 AM	0
November 29, 2016	2:00 AM	0
November 29, 2016	3:00 AM	0
November 29, 2016	4:00 AM	0
November 29, 2016	5:00 AM	0
November 29, 2016	6:00 AM	0
November 29, 2016	7:00 AM	0.3
November 29, 2016	8:00 AM	0.7
November 29, 2016	9:00 AM	0
November 29, 2016	10:00 AM	0.3
November 29, 2016	11:00 AM	0
November 29, 2016	12:00 PM	0
November 29, 2016	1:00 PM	0
November 29, 2016	2:00 PM	0
November 29, 2016	3:00 PM	0
November 29, 2016	4:00 PM	0
November 29, 2016	5:00 PM	0
November 29, 2016	6:00 PM	0
November 29, 2016	7:00 PM	0
November 29, 2016	8:00 PM	0
November 29, 2016	9:00 PM	0
November 29, 2016	10:00 PM	0
November 29, 2016	11:00 PM	0
November 30, 2016	12:00 AM	0.3
November 30, 2016	1:00 AM	0
November 30, 2016	2:00 AM	0.3
November 30, 2016	3:00 AM	0.7
November 30, 2016	4:00 AM	0.7
November 30, 2016	5:00 AM	0.3
November 30, 2016	6:00 AM	0
November 30, 2016	7:00 AM	0.3
November 30, 2016	8:00 AM	0.3
November 30, 2016	9:00 AM	0
November 30, 2016	10:00 AM	0.3
November 30, 2016	11:00 AM	0
November 30, 2016	12:00 PM	0
November 30, 2016	1:00 PM	0
November 30, 2016	2:00 PM	0
November 30, 2016	3:00 PM	0

Continuous Radon Monitor Measurement Hourly Data: Whitman Gym

November 30, 2016	4:00 PM	0.7
November 30, 2016	5:00 PM	0.3
November 30, 2016	6:00 PM	0
November 30, 2016	7:00 PM	0
November 30, 2016	8:00 PM	0
November 30, 2016	9:00 PM	0.3
November 30, 2016	10:00 PM	0
November 30, 2016	11:00 PM	0
December 1, 2016	12:00 AM	0.3
December 1, 2016	1:00 AM	0.7
December 1, 2016	2:00 AM	0
December 1, 2016	3:00 AM	0
December 1, 2016	4:00 AM	0.3
December 1, 2016	5:00 AM	0.3
December 1, 2016	6:00 AM	0
December 1, 2016	7:00 AM	0
December 1, 2016	8:00 AM	0.3
December 1, 2016	9:00 AM	0
December 1, 2016	10:00 AM	0.3
December 1, 2016	11:00 AM	0.7
December 1, 2016	12:00 PM	0
December 1, 2016	1:00 PM	0.3
December 1, 2016	2:00 PM	0
December 1, 2016	3:00 PM	0
December 1, 2016	4:00 PM	0
December 1, 2016	5:00 PM	0
December 1, 2016	6:00 PM	0
December 1, 2016	7:00 PM	0
December 1, 2016	8:00 PM	0.7
December 1, 2016	9:00 PM	0
December 1, 2016	10:00 PM	0
December 1, 2016	11:00 PM	0
December 2, 2016	12:00 AM	0
December 2, 2016	1:00 AM	0.7
December 2, 2016	2:00 AM	0.7



Unit Type: Sun Nuclear Model 1027
 Serial Number: 1407187

Date:	Time:	Radon (pCi/l)
November 28, 2016	9:00 AM	0
November 28, 2016	10:00 AM	0.6
November 28, 2016	11:00 AM	1
November 28, 2016	12:00 PM	1
November 28, 2016	1:00 PM	1
November 28, 2016	2:00 PM	1.3
November 28, 2016	3:00 PM	2.3
November 28, 2016	4:00 PM	2
November 28, 2016	5:00 PM	5
November 28, 2016	6:00 PM	3
November 28, 2016	7:00 PM	0.3
November 28, 2016	8:00 PM	1
November 28, 2016	9:00 PM	0
November 28, 2016	10:00 PM	0.3

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 888.248.1939 Toll-Free
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Continuous Radon Monitor Measurement Hourly Data: Whitman Kitchen

November 28, 2016	11:00 PM	0
November 29, 2016	12:00 AM	0.6
November 29, 2016	1:00 AM	0
November 29, 2016	2:00 AM	0
November 29, 2016	3:00 AM	0.3
November 29, 2016	4:00 AM	0
November 29, 2016	5:00 AM	1
November 29, 2016	6:00 AM	0.3
November 29, 2016	7:00 AM	1.6
November 29, 2016	8:00 AM	3
November 29, 2016	9:00 AM	4.3
November 29, 2016	10:00 AM	5
November 29, 2016	11:00 AM	2.6
November 29, 2016	12:00 PM	2.6
November 29, 2016	1:00 PM	3
November 29, 2016	2:00 PM	1.3
November 29, 2016	3:00 PM	2.3
November 29, 2016	4:00 PM	9.3
November 29, 2016	5:00 PM	4
November 29, 2016	6:00 PM	3
November 29, 2016	7:00 PM	2.3
November 29, 2016	8:00 PM	2
November 29, 2016	9:00 PM	0.3
November 29, 2016	10:00 PM	0.3
November 29, 2016	11:00 PM	0
November 30, 2016	12:00 AM	0
November 30, 2016	1:00 AM	0
November 30, 2016	2:00 AM	0.3
November 30, 2016	3:00 AM	0.3
November 30, 2016	4:00 AM	0
November 30, 2016	5:00 AM	0
November 30, 2016	6:00 AM	0
November 30, 2016	7:00 AM	1
November 30, 2016	8:00 AM	3
November 30, 2016	9:00 AM	1.3
November 30, 2016	10:00 AM	1
November 30, 2016	11:00 AM	0.3
November 30, 2016	12:00 PM	1
November 30, 2016	1:00 PM	0.3
November 30, 2016	2:00 PM	0.3
November 30, 2016	3:00 PM	0.3

Continuous Radon Monitor Measurement Hourly Data: Whitman Kitchen

November 30, 2016	4:00 PM	1.3
November 30, 2016	5:00 PM	0.3
November 30, 2016	6:00 PM	2
November 30, 2016	7:00 PM	1.3
November 30, 2016	8:00 PM	0.3
November 30, 2016	9:00 PM	0.6
November 30, 2016	10:00 PM	0.3
November 30, 2016	11:00 PM	0.6
December 1, 2016	12:00 AM	0.6
December 1, 2016	1:00 AM	0.3
December 1, 2016	2:00 AM	0
December 1, 2016	3:00 AM	0
December 1, 2016	4:00 AM	0
December 1, 2016	5:00 AM	0.3
December 1, 2016	6:00 AM	0.3
December 1, 2016	7:00 AM	0.6
December 1, 2016	8:00 AM	0.3
December 1, 2016	9:00 AM	1.3
December 1, 2016	10:00 AM	4.6
December 1, 2016	11:00 AM	5.3
December 1, 2016	12:00 PM	1.6
December 1, 2016	1:00 PM	1
December 1, 2016	2:00 PM	0.3
December 1, 2016	3:00 PM	1.3
December 1, 2016	4:00 PM	4.6
December 1, 2016	5:00 PM	10
December 1, 2016	6:00 PM	6.6
December 1, 2016	7:00 PM	3
December 1, 2016	8:00 PM	2.6
December 1, 2016	9:00 PM	1.3
December 1, 2016	10:00 PM	0.3
December 1, 2016	11:00 PM	0.3
December 2, 2016	12:00 AM	0.3
December 2, 2016	1:00 AM	0
December 2, 2016	2:00 AM	0



425-A Pineda Court
Melbourne, FL 32940-7508 U.S.A.
Ph: 321 259 6862 Fax: 321 259 7979
<http://www.sunnuclear.com>

Radon Certificate of Calibration

The following radon monitor was placed in the calibration chamber:

SNC Serial No: 1407134

Model No: 1027

<u>Actual Reading</u>	<u>Error %</u>	<u>Correction Factor</u>	<u>Background</u>
197.0 pCi/l	-2.6%	1.03	0.2

The Rn-222 gas concentration in the chamber, over the measurement interval was:

202.3 pCi/l, $\pm 10\%$ as measured with 100ml scintillation cells

The correction factor is a multiplicative and can be applied to the displayed value on the monitor.

The accuracy of this radon monitor is $\pm 25\%$ or 1 pCi/l, which ever is greater, after a 24 hour period of deployment.

This instrument has been calibrated in accordance with the specifications set forth by the manufacturer. Radon gas calibrations are traceable to the NIST SRM 4973 Radon emanation standard.

The error of the chamber concentration is a best estimate based upon typical inter-comparison results with Bowser Morner Reference Laboratory. The most recent inter-comparison in which Sun Nuclear participated, March 2015, resulted in a 1.4% error in our reported measurement.

Frequency of re-calibration may vary depending upon local, state, or proficiency program requirements.

Sun Nuclear Corporation has successfully met the established and published requirements for Accreditation by the National Radon Safety Board as an accredited chamber. Certification No: NRSB TRC6001 expiring May 2017.

Calibration Date: 11/3/2016 Next Calibration Date: 11/3/2017

Technician: CG

Please retain this document for record keeping purposes.



STATEMENT OF CALIBRATION

**Client Information:**

PBS Engineering & Environmental Inc.
4412 Southwest Corbett Avenue
Portland, Oregon 97239
Attn: Chris Boyce

BMI Control Information:

Statement No.: 17581709
Issue Date: July 25, 2016
Calibrated on: July 25, 2016
Calibrated by: JPN
Calibration site: BMI Dayton

Description of Continuous Radon Monitor:

Manufacturer: Sun Nuclear **Model:** 1027 **Serial No.:** 1407171

The monitor was found to be in good physical condition. No power adapter was received with the monitor. The calibration was conducted using an adapter belonging to Bowser-Morner.

Initial Checks:

<u>Visual Inspection</u>	<u>Batteries</u>	<u>Power Adapter</u>	<u>High Voltage</u>	<u>Software Version</u>
Ok	Ok	See above	1199 VDC (Ok)	N5A

Result of Background Exposure (16 hr): 0.2 pCi/liter

Radon Chamber Conditions:

<u>Exposure Duration</u>	<u>Radon Concentration</u>	<u>Relative Humidity</u>	<u>Temperature</u>
48 hr	25.8 ± 0.5 pCi/liter	49.9 ± 0.5 %	70.0 ± 0.1 °F

The values listed above for the radon concentration, relative humidity and temperature are the means and standard deviations of the hourly average measurements of these parameters. The calibration of Bowser-Morner's Radon Monitoring System is maintained through comparisons with the USEPA radon laboratory in Las Vegas using a NIST traceable radium standard. The estimated total uncertainty of Bowser-Morner's average chamber concentration is ± 6.4% at the 95% confidence level.

Results of Calibration:

<u>Average Monitor Reading</u>	<u>Relative Error As Received</u>	<u>Relative Error After Change of Calibration Factor</u>
27.7 pCi/liter	6.6%	-3.1%

Based on the results of the calibration, the monitor's internal calibration factor was changed to the most accurate available setting. The background value listed above should be subtracted from the radon measurement and the result multiplied by the correction factor of 1.032.

The calibration was performed using BMI procedure number 42-001.

Authorized Signature *Jill P. Newton*, Manager Radon Reference Lab

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RADON REFERENCE LABORATORY

STATEMENT OF CALIBRATION

**BOWSER
MORNER**®

Client Information:

PBS Engineering & Environmental Inc.
4412 Southwest Corbett Avenue
Portland, Oregon 97239
Attn: Chris Boyce

BMI Control Information:

Statement No.: 17581704
Issue Date: July 25, 2016
Calibrated on: July 25, 2016
Calibrated by: JPN
Calibration site: BMI Dayton

Description of Continuous Radon Monitor:

Manufacturer: Sun Nuclear **Model:** 1027

Serial No.: 1407175

The monitor was found to be in good physical condition.

Initial Checks:

<u>Visual Inspection</u>	<u>Batteries</u>	<u>Power Adapter</u>	<u>High Voltage</u>	<u>Software Version</u>
Ok	Replaced	11.1 VDC (Ok)	1114 VDC (Ok)	N5A

Result of Background Exposure (16 hr): 0.2 pCi/liter

Radon Chamber Conditions:

<u>Exposure Duration</u>	<u>Radon Concentration</u>	<u>Relative Humidity</u>	<u>Temperature</u>
48 hr	25.8 ± 0.5 pCi/liter	49.9 ± 0.5 %	70.0 ± 0.1 °F

The values listed above for the radon concentration, relative humidity and temperature are the means and standard deviations of the hourly average measurements of these parameters. The calibration of Bowser-Morner's Radon Monitoring System is maintained through comparisons with the USEPA radon laboratory in Las Vegas using a NIST traceable radium standard. The estimated total uncertainty of Bowser-Morner's average chamber concentration is ± 6.4% at the 95% confidence level.

Results of Calibration:

<u>Average Monitor Reading</u>	<u>Relative Error As Received</u>	<u>Relative Error After Change of Calibration Factor</u>
29.0 pCi/liter	11.6%	1.5%

Based on the results of the calibration, the monitor's internal calibration factor was changed to the most accurate available setting. The background value listed above should be subtracted from the radon measurement and the result multiplied by the correction factor of 0.986.

The calibration was performed using BMI procedure number 42-001.

Authorized Signature *Jill P. Newton*, Manager Radon Reference Lab

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RADON REFERENCE LABORATORY

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Client Information:

PBS Engineering & Environmental Inc.
4412 Southwest Corbett Avenue
Portland, Oregon 97239
Attn: Chris Boyce

BMI Control Information:

Statement No.: 17581705
Issue Date: July 25, 2016
Calibrated on: July 25, 2016
Calibrated by: JPN
Calibration site: BMI Dayton

Description of Continuous Radon Monitor:

Manufacturer: Sun Nuclear **Model:** 1027 **Serial No.:** 1407176

The monitor was found to be in good physical condition.

Initial Checks:

<u>Visual Inspection</u>	<u>Batteries</u>	<u>Power Adapter</u>	<u>High Voltage</u>	<u>Software Version</u>
Ok	Replaced	11.0 VDC (Ok)	1144 VDC (Ok)	N5A

Result of Background Exposure (16 hr): 0.1 pCi/liter

Radon Chamber Conditions:

<u>Exposure Duration</u>	<u>Radon Concentration</u>	<u>Relative Humidity</u>	<u>Temperature</u>
48 hr	25.8 ± 0.5 pCi/liter	49.9 ± 0.5 %	70.0 ± 0.1 °F

The values listed above for the radon concentration, relative humidity and temperature are the means and standard deviations of the hourly average measurements of these parameters. The calibration of Bowser-Morner's Radon Monitoring System is maintained through comparisons with the USEPA radon laboratory in Las Vegas using a NIST traceable radium standard. The estimated total uncertainty of Bowser-Morner's average chamber concentration is ± 6.4% at the 95% confidence level.

Results of Calibration:

<u>Average Monitor Reading</u>	<u>Relative Error As Received</u>	<u>Relative Error After Change of Calibration Factor</u>
28.0 pCi/liter	8.1%	-1.7%

Based on the results of the calibration, the monitor's internal calibration factor was changed to the most accurate available setting. The background value listed above should be subtracted from the radon measurement and the result multiplied by the correction factor of 1.017.

The calibration was performed using BMI procedure number 42-001.

Authorized Signature *Jill P. Newton*, Manager Radon Reference Lab

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STATEMENT OF CALIBRATION



Client Information:

PBS Engineering & Environmental Inc.
4412 Southwest Corbett Avenue
Portland, Oregon 97239
Attn: Chris Boyce

BMI Control Information:

Statement No.: 17581706
Issue Date: July 25, 2016
Calibrated on: July 25, 2016
Calibrated by: JPN
Calibration site: BMI Dayton

Description of Continuous Radon Monitor:

Manufacturer: Sun Nuclear **Model:** 1027 **Serial No.:** 1407179

The monitor was found to be in good physical condition.

Initial Checks:

<u>Visual Inspection</u>	<u>Batteries</u>	<u>Power Adapter</u>	<u>High Voltage</u>	<u>Software Version</u>
Ok	Replaced	10.9 VDC (Ok)	1155 VDC (Ok)	N5A

Result of Background Exposure (16 hr): 0.2 pCi/liter

Radon Chamber Conditions:

<u>Exposure Duration</u>	<u>Radon Concentration</u>	<u>Relative Humidity</u>	<u>Temperature</u>
48 hr	26.0 ± 0.3 pCi/liter	48.9 ± 0.6 %	70.0 ± 0.1 °F

The values listed above for the radon concentration, relative humidity and temperature are the means and standard deviations of the hourly average measurements of these parameters. The calibration of Bowser-Morner's Radon Monitoring System is maintained through comparisons with the USEPA radon laboratory in Las Vegas using a NIST traceable radium standard. The estimated total uncertainty of Bowser-Morner's average chamber concentration is ± 6.4% at the 95% confidence level.

Results of Calibration:

<u>Average Monitor Reading</u>	<u>Relative Error As Received</u>	<u>Relative Error After Change of Calibration Factor</u>
27.0 pCi/liter	3.1%	N/A

Based on the results of the calibration, the monitor's internal calibration factor as received was the most accurate available setting. The background value listed above should be subtracted from the radon measurement and the result multiplied by the correction factor of 0.970.

The calibration was performed using BMI procedure number 42-001.

Authorized Signature , Manager Radon Reference Lab

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RADON REFERENCE LABORATORY

STATEMENT OF CALIBRATION

BOWSER MORNER®

Client Information:

PBS Engineering & Environmental Inc.
4412 Southwest Corbett Avenue
Portland, Oregon 97239
Attn: Chris Boyce

BMI Control Information:

Statement No.: 17581701
Issue Date: July 25, 2016
Calibrated on: July 25, 2016
Calibrated by: JPN
Calibration site: BMI Dayton

Description of Continuous Radon Monitor:

Manufacturer: Sun Nuclear **Model:** 1027 **Serial No.:** 1407185

The monitor was found to be in good physical condition. No power adapter was received with the monitor. The calibration was conducted using an adapter belonging to Bowser-Morner.

Initial Checks:

<u>Visual Inspection</u> Ok	<u>Batteries</u> Ok	<u>Power Adapter</u> See above	<u>High Voltage</u> 1118 VDC (Ok)	<u>Software Version</u> N5A
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Result of Background Exposure (18 hr): 0.1 pCi/liter

Radon Chamber Conditions:

<u>Exposure Duration</u> 48 hr	<u>Radon Concentration</u> 26.0 ± 0.3 pCi/liter	<u>Relative Humidity</u> 48.9 ± 0.6 %	<u>Temperature</u> 70.0 ± 0.1 °F
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The values listed above for the radon concentration, relative humidity and temperature are the means and standard deviations of the hourly average measurements of these parameters. The calibration of Bowser-Morner's Radon Monitoring System is maintained through comparisons with the USEPA radon laboratory in Las Vegas using a NIST traceable radium standard. The estimated total uncertainty of Bowser-Morner's average chamber concentration is ± 6.4% at the 95% confidence level.

Results of Calibration:

<u>Average Monitor Reading</u> 29.7 pCi/liter	<u>Relative Error As Received</u> 13.8%	<u>Relative Error After Change of Calibration Factor</u> 3.5%
--	--	--

Based on the results of the calibration, the monitor's internal calibration factor was changed to the most accurate available setting. The background value listed above should be subtracted from the radon measurement and the result multiplied by the correction factor of 0.966.

The calibration was performed using BMI procedure number 42-001.

Authorized Signature *Gill P. Newton*, Manager Radon Reference Lab

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STATEMENT OF CALIBRATION

**Client Information:**

PBS Engineering & Environmental Inc.
4412 Southwest Corbett Avenue
Portland, Oregon 97239
Attn: Chris Boyce

BMI Control Information:

Statement No.: 17581707
Issue Date: July 25, 2016
Calibrated on: July 25, 2016
Calibrated by: JPN
Calibration site: BMI Dayton

Description of Continuous Radon Monitor:

Manufacturer: Sun Nuclear **Model:** 1027 **Serial No.:** 1407187

The monitor was found to be in good physical condition.

Initial Checks:

<u>Visual Inspection</u>	<u>Batteries</u>	<u>Power Adapter</u>	<u>High Voltage</u>	<u>Software Version</u>
Ok	Replaced	11.1 VDC (Ok)	1130 VDC (Ok)	N5A

Result of Background Exposure (16 hr): 0.0 pCi/liter

Radon Chamber Conditions:

<u>Exposure Duration</u>	<u>Radon Concentration</u>	<u>Relative Humidity</u>	<u>Temperature</u>
48 hr	25.8 ± 0.5 pCi/liter	49.9 ± 0.5 %	70.0 ± 0.1 °F

The values listed above for the radon concentration, relative humidity and temperature are the means and standard deviations of the hourly average measurements of these parameters. The calibration of Bowser-Morner's Radon Monitoring System is maintained through comparisons with the USEPA radon laboratory in Las Vegas using a NIST traceable radium standard. The estimated total uncertainty of Bowser-Morner's average chamber concentration is ± 6.4% at the 95% confidence level.

Results of Calibration:

<u>Average Monitor Reading</u>	<u>Relative Error As Received</u>	<u>Relative Error After Change of Calibration Factor</u>
28.6 pCi/liter	10.9%	0.8%

Based on the results of the calibration, the monitor's internal calibration factor was changed to the most accurate available setting. The radon measurement should be multiplied by the correction factor of 0.992.

The calibration was performed using BMI procedure number 42-001.

Authorized Signature Gill P. Newton, Manager Radon Reference Lab

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