Use of Sniffers In Radon Mitigation

Testing three different Radon Sniffers

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What are Radon Sniffers good for?

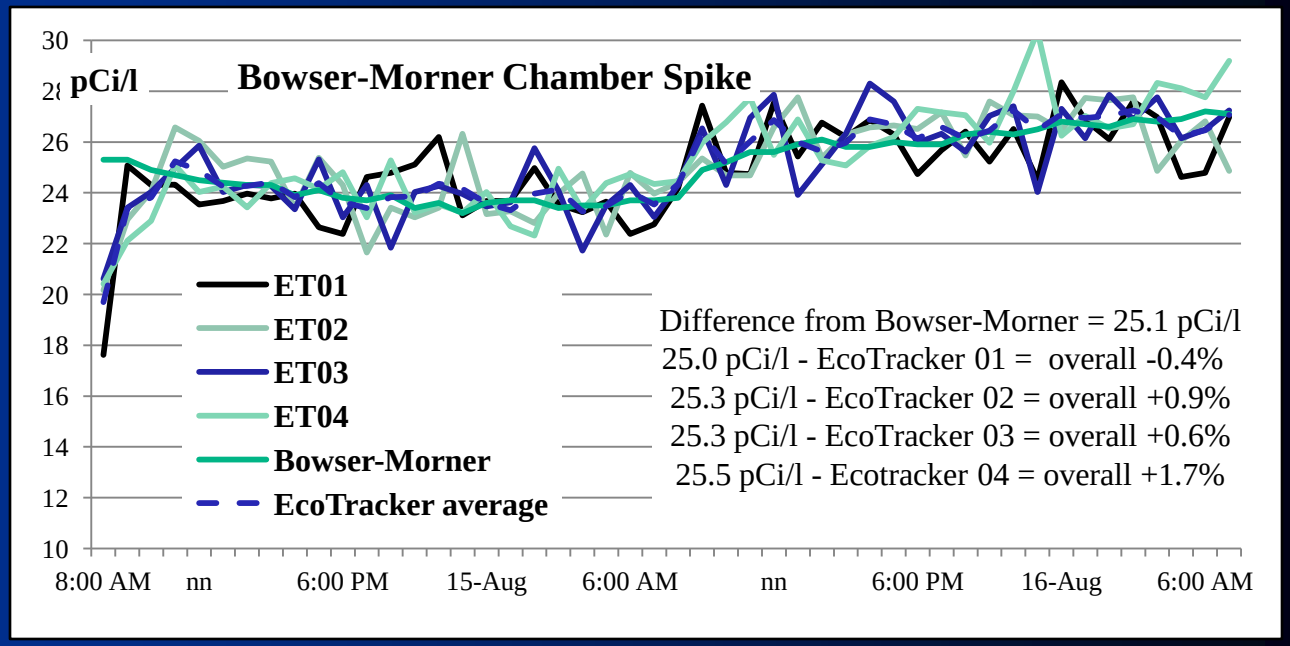
1) Testing obvious radon sources like Floor Drains or Utility pipes
2) Measuring differences between lower level rooms or areas
3) Trying to locate radon source along top of foundation wall
4) Measuring radon levels below the slab before or after mitigation
5) Measuring radon flux coming out of or through concrete
6) Measuring radon exposure after ventilation of a Lower Level
7) Measuring increased radon from water usage
8) Some sniffers can measure thoron contribution

Sniffer Source: Radon Chamber Field tests

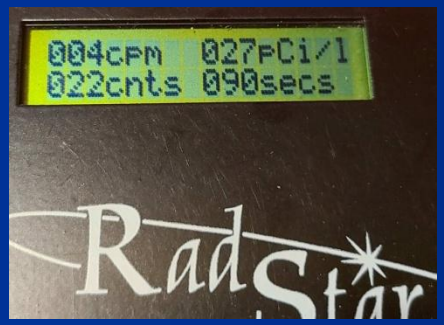
Three levels tested
9 pCi/l
19 pCi/l
87 pCil

GM1-2 & CT007-R would draw a sample

Ecotackers placed in a chamber or near a source



Ecotacker average tested within 2% of Bowser-Morner average

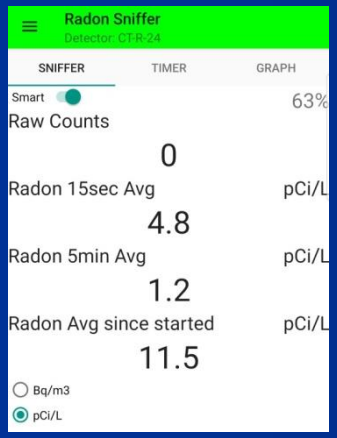


RadonAway
GM1-2

Displays results

$1515

1) Measures up to 999 pCi/l
2) Provides average every 6 minutes
3) Recorded about 70 to 80% of radon level in chamber in 6 to 12 minutes.
4) 12 minute sampling in low radon area reduced display to about 10% to 25% of original sampling level
5) Erases previous data when new results are displayed requiring separate recording
6) Has no graph of continuous results
7) Cannot download data
8) Sensitivity 0.17 cpm / pCi/l

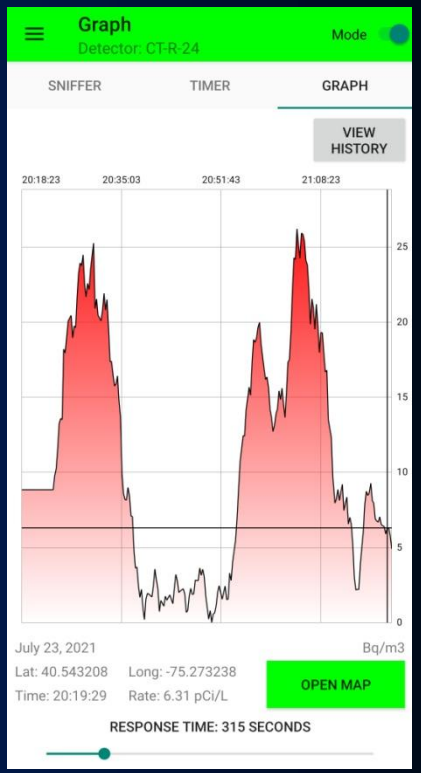


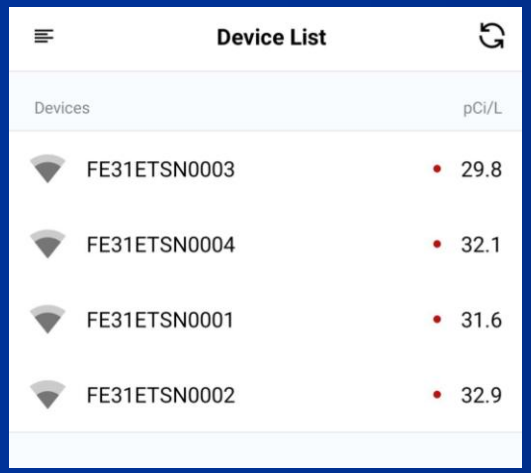
Environmental Instruments Canada CT007-R

Bluetooth to cellphone

$1750

1) Measures up to 25,000 pCi/l
2) Displays current 15 second & 5 minute avg
3) Recorded about 90 to 120% of radon level in chamber in 5 minutes.
4) 12 minute sampling in low radon area reduced display to about 10 to 20% of original sampling level
5) Varying the Graph averages improves interpretation of results
6) Can download the data – Can do screen shots
7) Sensitivity 0.78 cpm / pCi/l
8) Can measure thoron contribution





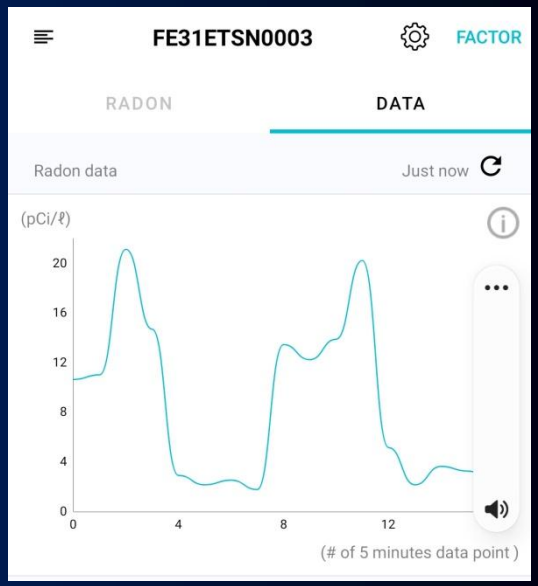
Ecosense
Ecotracker

Bluetooth to cellphone

4 averages displayed at the same time

1) Measures up to 255 pCi/l
2) Provides 5 or 10 minute or hourly avg
3) Recorded about 60% to 70% of radon level in chamber in 5 minutes.
4) 10 minute sampling in low radon area reduced display to about 10 to 14% of original sampling level
5) Displays Graph of sampling average
6) Can download data to spreadsheet
7) Sensitivity 0.50 cpm / pCi/l
8) A cell phone booster battery can be used for non-plug test locations

$999 includes 4 units

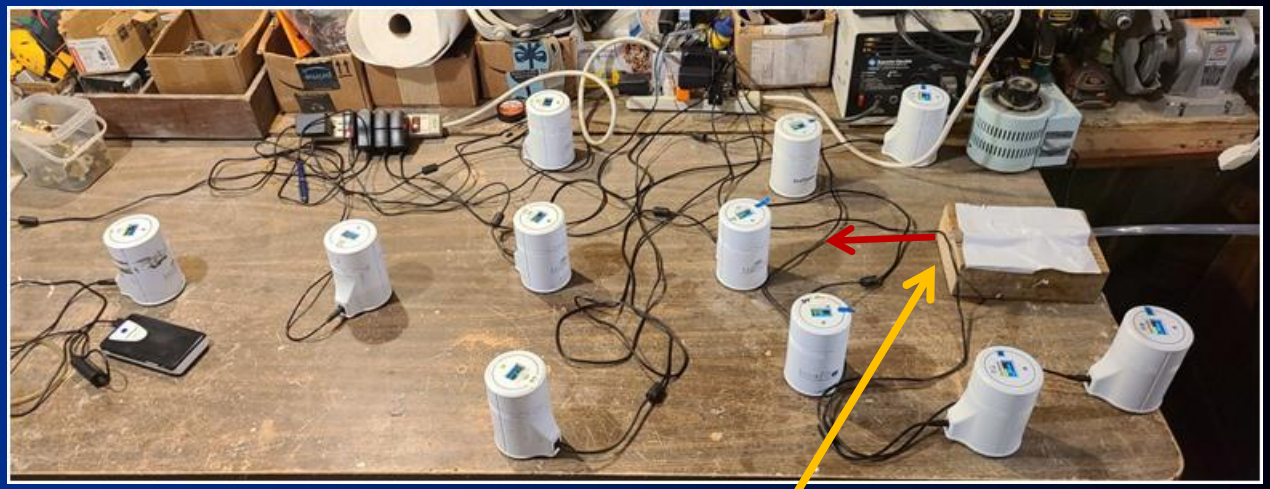


Graph of 5 minute averages

Radon diffusion from point source is difficult to track

Basement radon levels increased from 2.7 pCi/l to 4.5 pCi/l

12 Radon Eye monitors were exposed for 12 hours

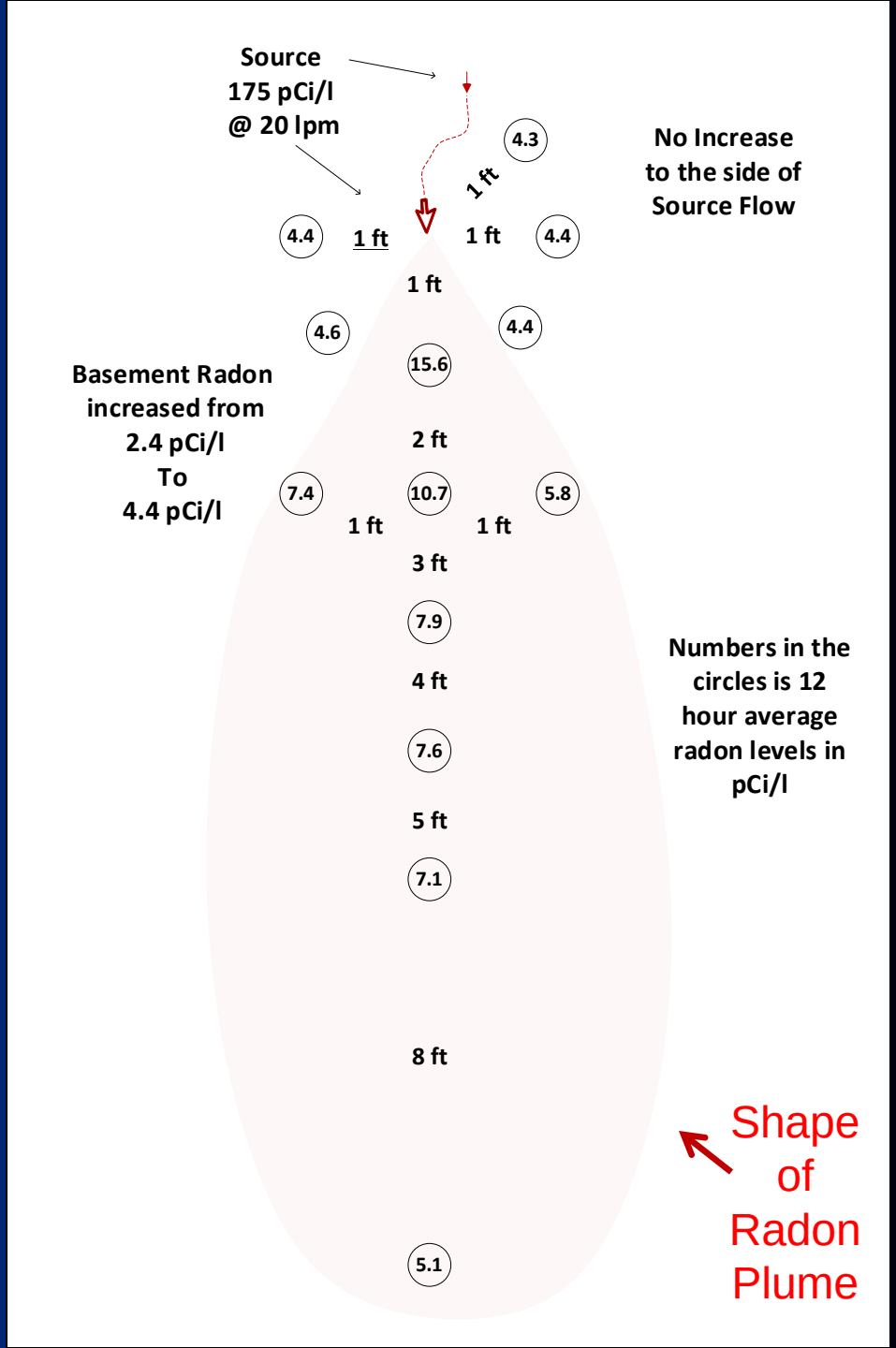


175 pCi/l at flow rate of 20 lpm / 0.7 CFM

Radon levels from 175 pCi/l @ 20 LPM

Distance	pCi/l
1 ft out	15.6
2 ft out	10.7
3 ft out	7.9
4 ft out	7.6
5 ft out	7.1
8 ft out	5.1
1 ft left side	4.4
1 ft right side	4.4
1 ft right 45	4.4
1 ft left 45	4.6
1 ft rear 45	4.3
2 ft out 1 ft right	5.8
2 ft out 1 ft right	7.4

Basement level 4.4 pCi/l



Case Study 1 Diagnostics Measurements

Pre-Mitigation 17.0 pCi/l

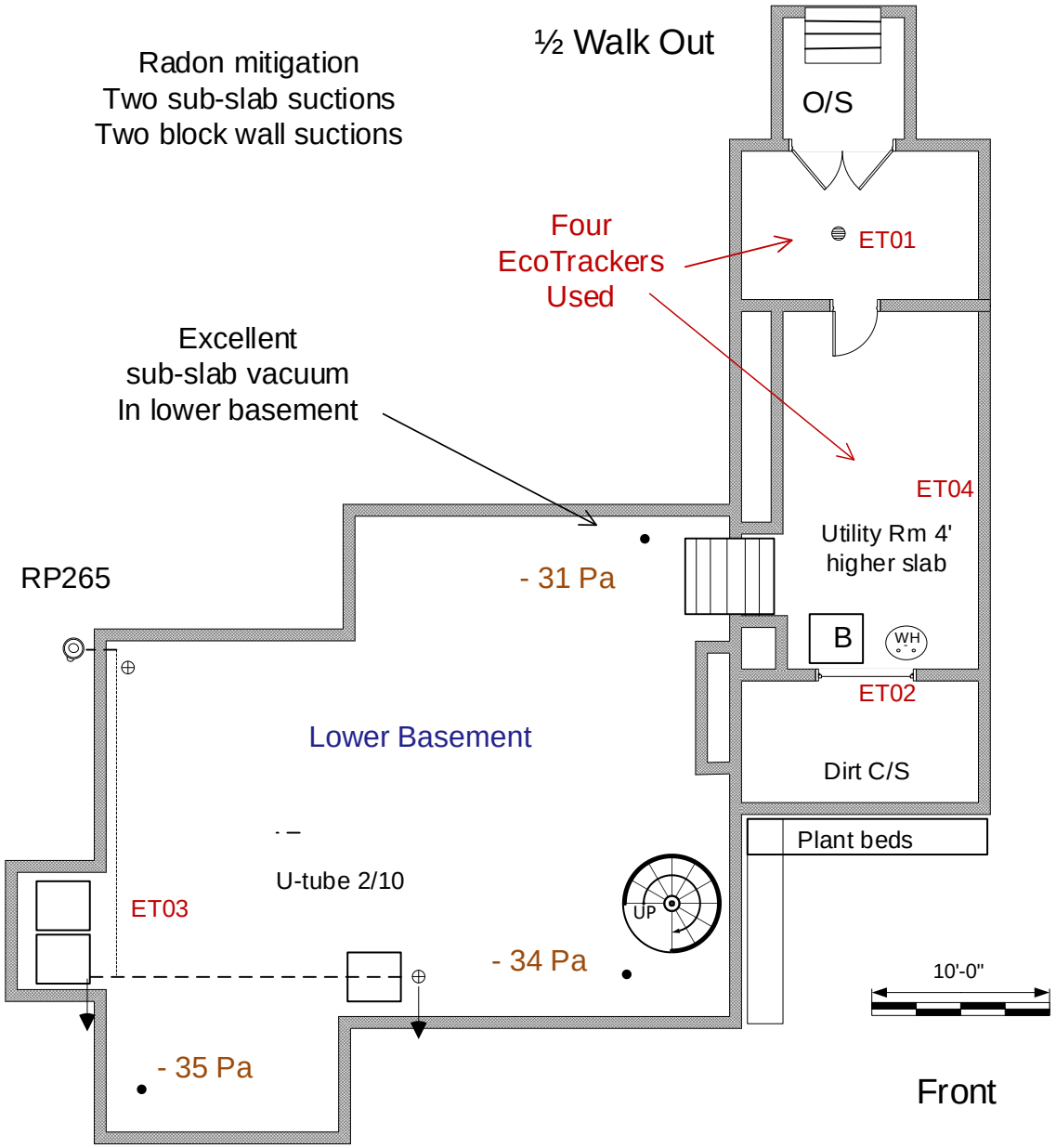
Post-Mitigation 5.5 pCi/l

Lower level sub-slab
- 31 pascals

Upper level slab
and
crawlspace
Never treated

HVAC neutral pressure

Four
Ecotrackers
set up
ET01 to ET04

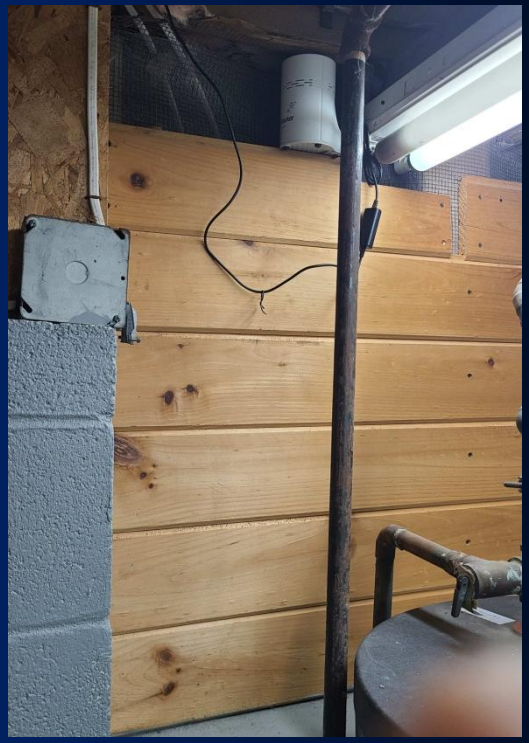


Diagnostic Testing Measurements

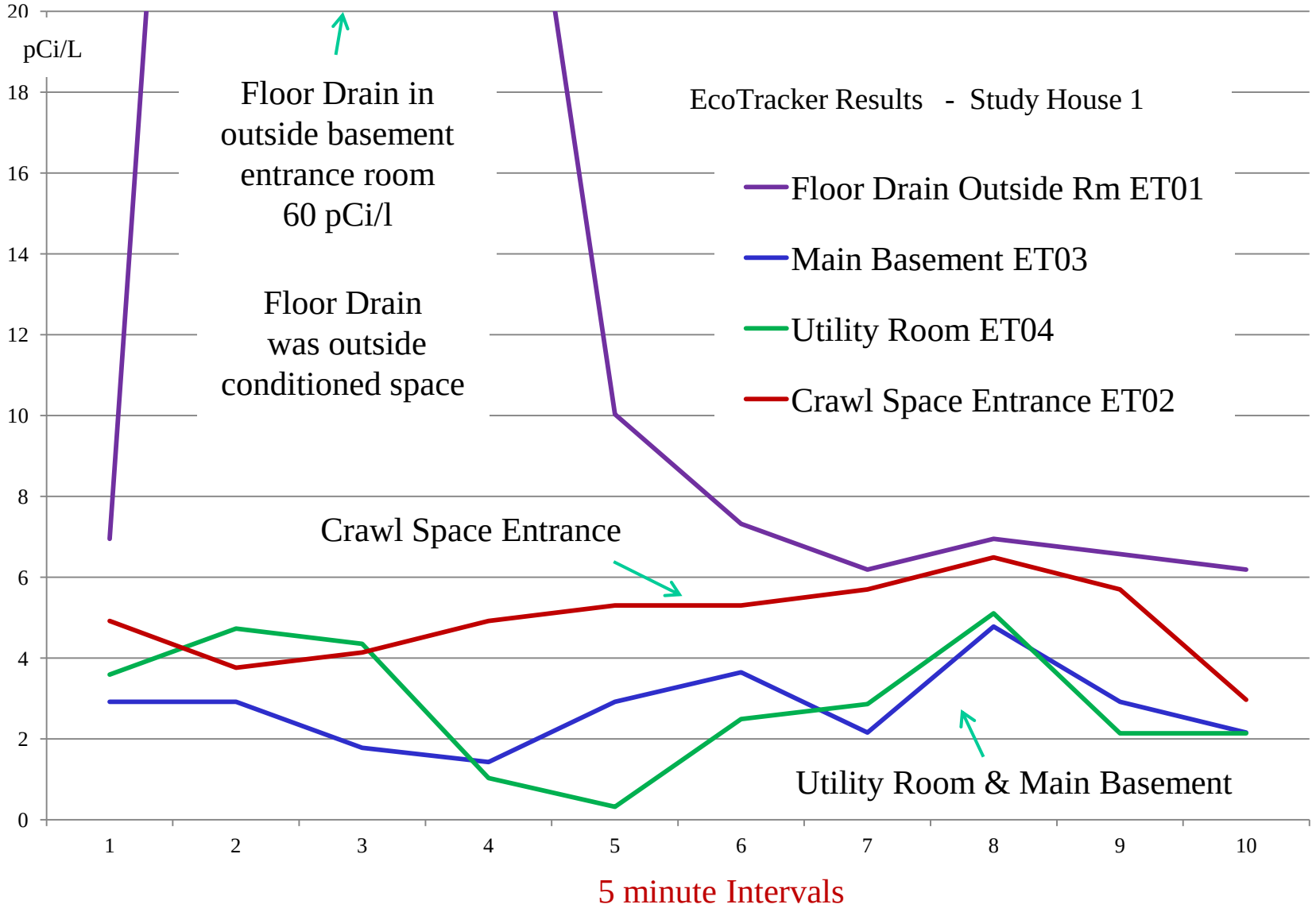
Always measure Sub-slab Vacuum 1st

Measure likely Radon Sources

Measure HVAC Depressurization



Make comparative radon measurements



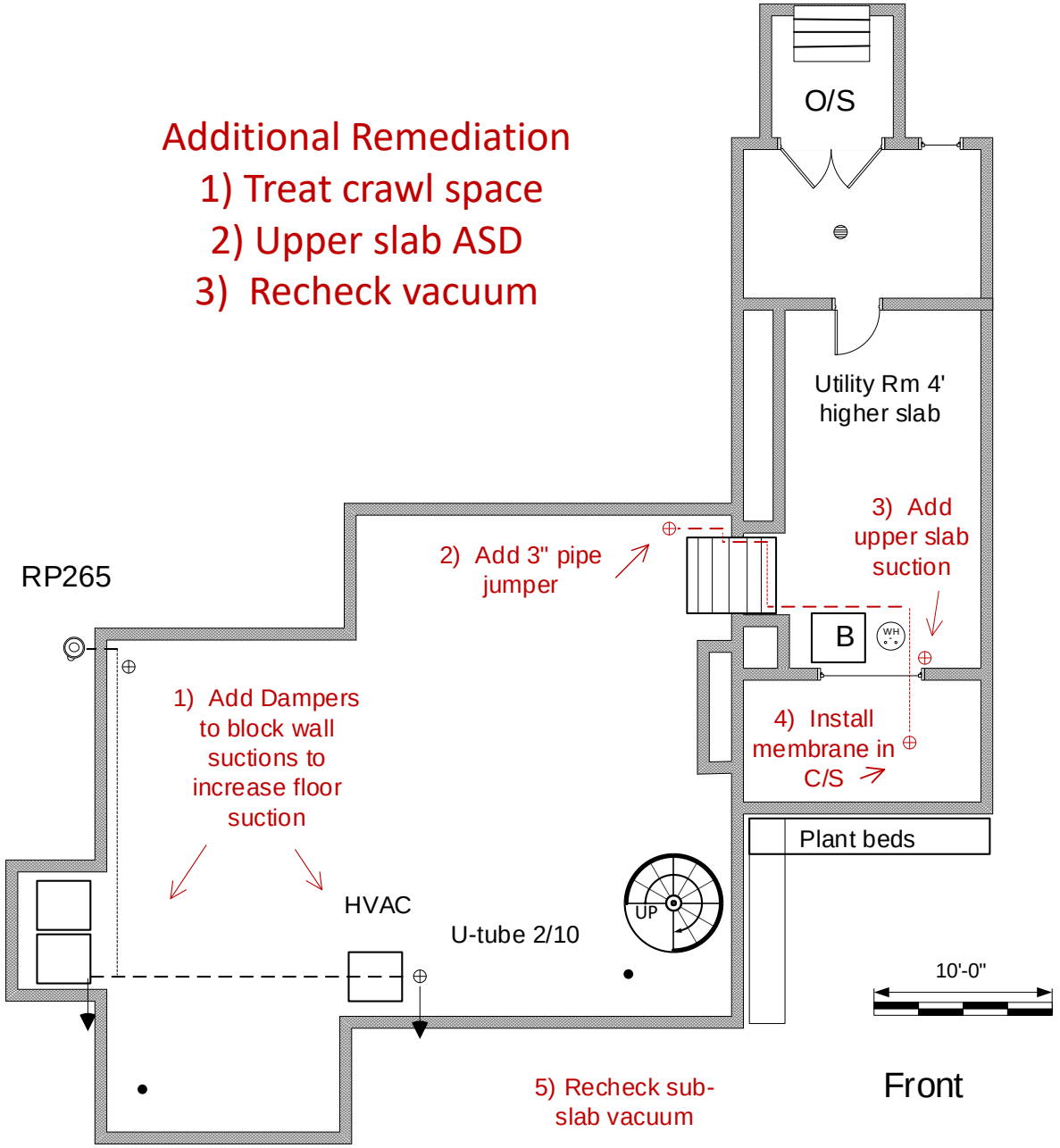
At 20 minutes crawl space entrance measures about 2 pCi/l higher

Case Study 1 Diagnostics based Mitigation Plan

Block wall suctions dampered

Jumper suction pipe added to upper slab

Crawl space membrane depressurization installed



Case Study 2 Diagnostics Measurements

Pre-Mitigation >1000 pCi/l

Post-Mitigation 5.0 pCi/l

HVAC neutral pressure

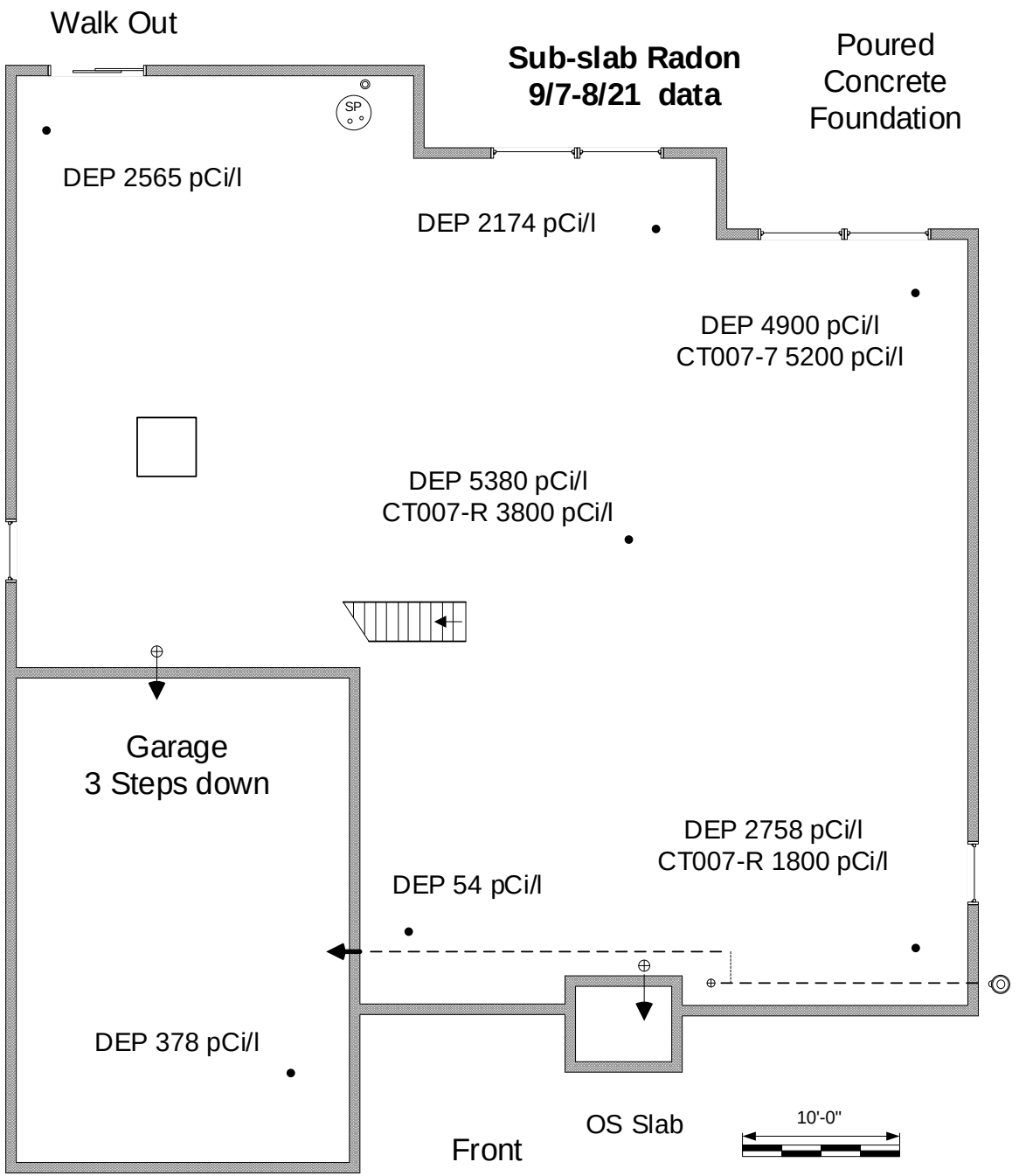
Basement sub-slab
-40 pascals
-Garage sub-slab
- 9 pascals

Sub-slab
54 to 2100 to 5300 pCi/l

Options

Reduce Slab Diffusion

Install HRV / ERV

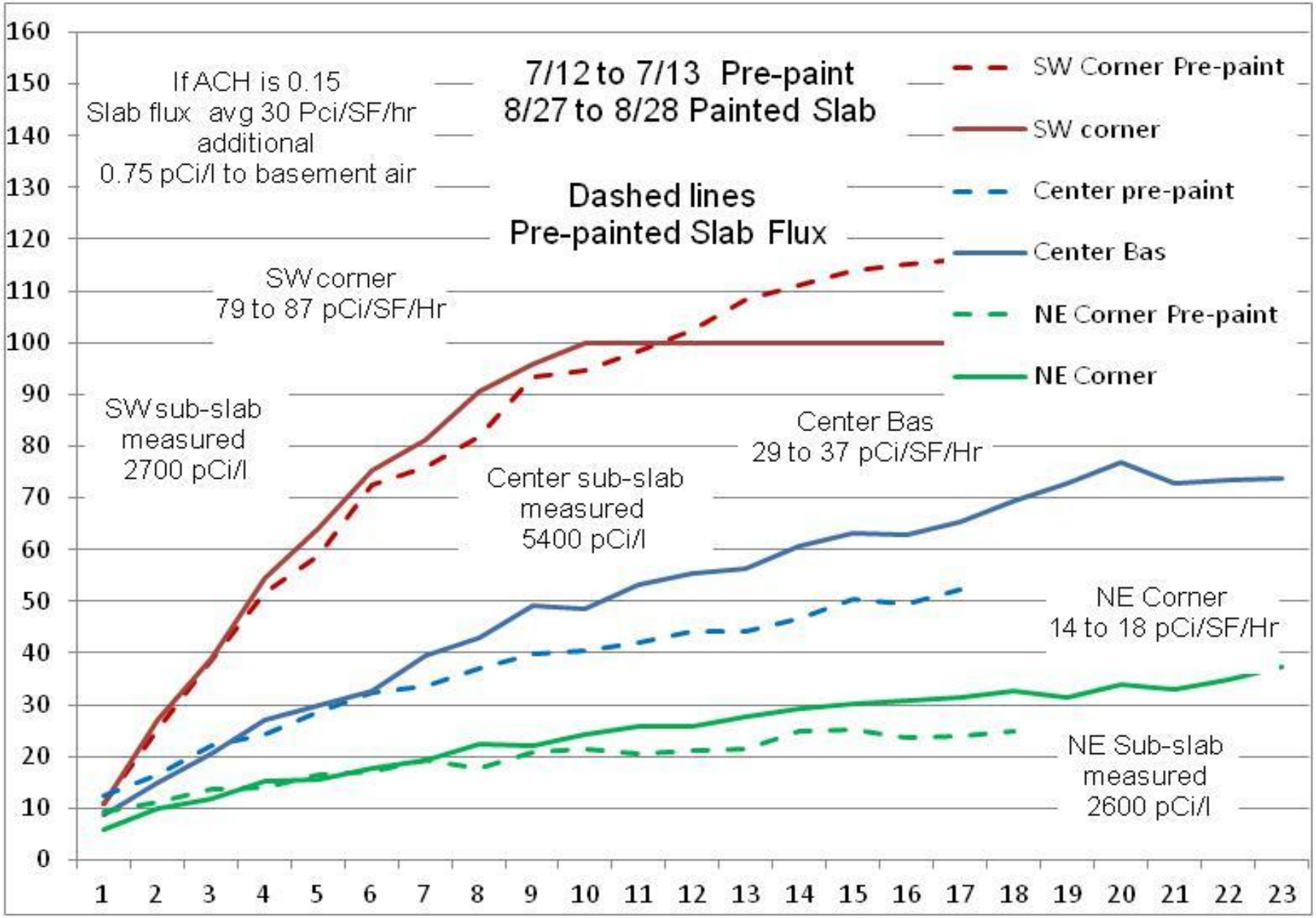


Case Study 2: Measure Sub-Slab Radon - Slab Diffusion – Outdoor Radon

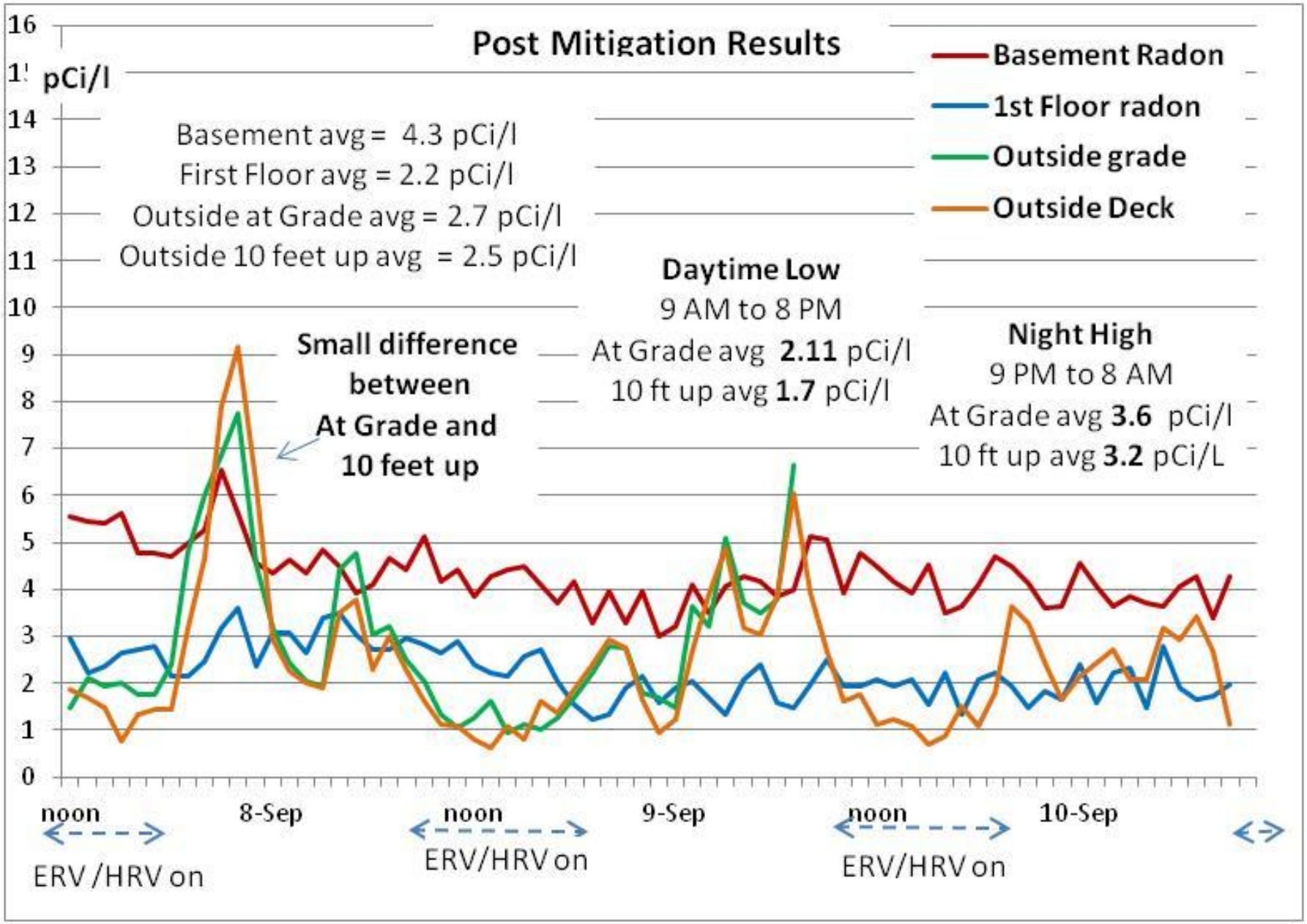
1) Use CT007-R to measure sub-slab radon and thoron

2) Use Ecotracker under metal bowl to measure slab flux

3) Measure outdoor radon at grade and upper deck area for HRV / ERV



Sealing Slab provided no apparent Radon reduction



Radon at deck 1.7 pCi/l during day time & 3.2 pCi/l during night time

Sniffer Conclusions:

1) Sniffers measured actual radon levels in a range of 60% to 120%
2) Sniffers displayed 10% to 30% of previous measurements after 15 minutes in outdoor air. Must measure low levels first!
3) Sniffers measure thoron as radon. Soil source however is likely to have radon if thoron is measured.
4) Plume of Radon is elongated in direction of the source airflow.
5) Multiple area testing can require ability to detect as little as 2 pCi/l differences which was more suited for Ecotrackers
6) Sub-slab radon testing requires CT007-R thoron function
7) CT007-R & Ecotracker graph function assists evaluation
8) All the sniffers can measure radon from pipe, drain or crack.
9) GM1-2 & CT007-R can measuring block walls.
10) CT007-R can measure levels above 1000 pCi/l with 15 second avg