Case Study: Difficult to Mitigate Home

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AVIP 2025 Conference

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What Makes a Structure Difficult to Mitigate?

- Area work can be done is limited
  - Construction details
  - Limited or no access to areas
  - Finishes
- Poor communication/pressure field extension (PFE)
- Work done – you think you have PFE – levels are still high
  - It doesn't make sense
  - It always makes sense; you need to figure out why
- Source not easily identifiable
  - Water
  - Building materials
  - Soil
  - You missed something

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Case Study House

- Mid-Century Modern House in Gerogia
  - Three foundation types: slab on grade, basement, and crawlspace
  - Radon levels 10 pCi/L+/-

7.5 pCi/L
Master (first floor)

11.8 pCi/L
Crawlspace
(under master)

8.5 pCi/L
Basement

10.8 pCi/L
Main living area

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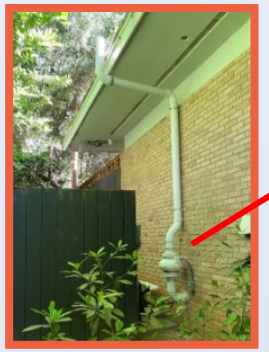
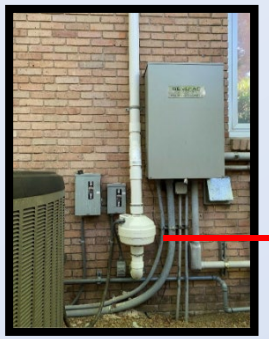
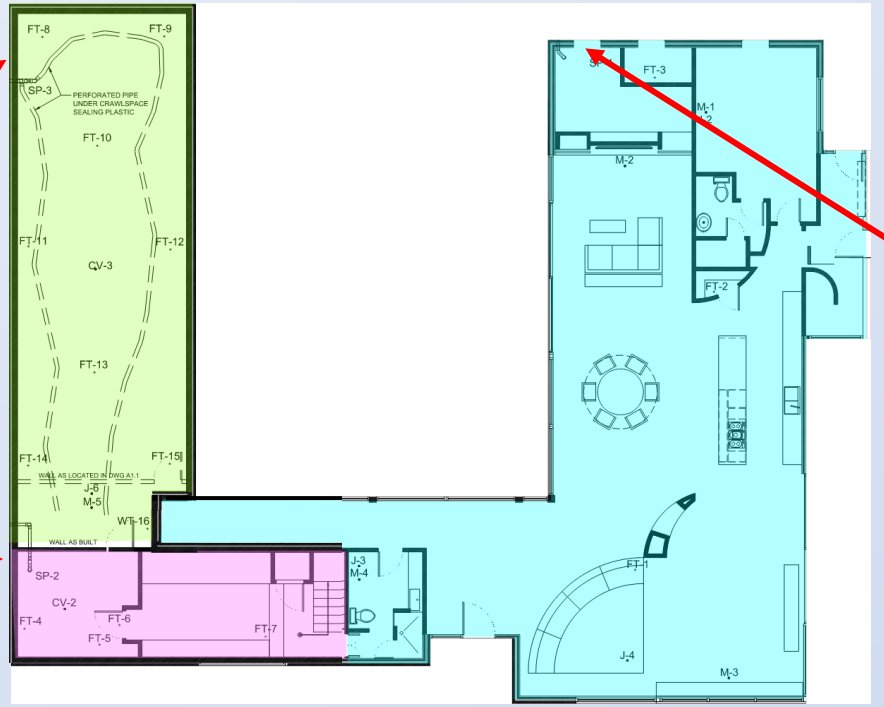
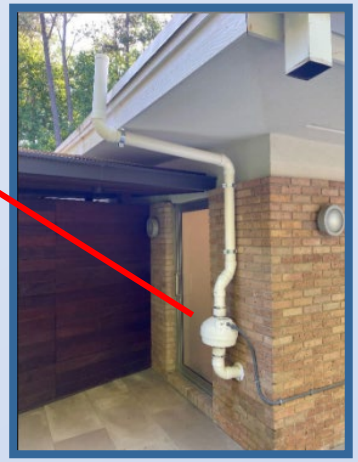
Case Study House

- Mid-Century Modern House in Georgia
  - Person living in the house has lung cancer
  - There are three active mitigation systems in the home!
  - What was missed?









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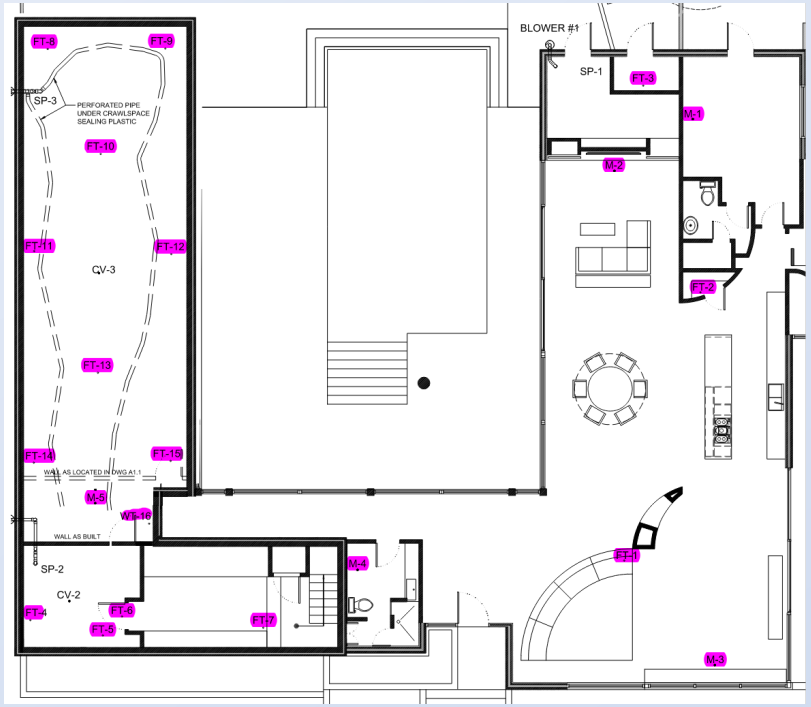
Why Do the High Radon Levels Make Sense?

- Clean Vapor called in to investigate
- Diagnostic testing performed



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Why Do the High Radon Levels Make Sense?

- Performance of each system measured
  - Air flow in exhaust vent
  - Air pressure across fan
  - Sub-slab PFE
  - Sub-membrane PFE

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Why Do the High Radon Levels Make Sense?

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Existing Blower	Vacuum ("w.c.)	Airflow (CFM)
SP-1 - AMG Eagle	-1.16	207
SP-2 - AMG Eagle Supreme	-3.94	16
SP-3 - AMG Fury	-1.17	155

Test Hole	Distance (ft.)	Baseline
FT-1	57	-0.0015
FT-2	31	-0.0285
FT-3	11	-0.0870

Test Hole SP-2	Distance (ft.)	Baseline
FT-4	6	-0.1575
FT-5	11	-0.0040
FT-6	11	N/A
FT-7	27	-0.0015

Test Hole SP-3	Distance (ft.)	Baseline
FT-8	5	-0.0094
FT-9	15	-0.0034
FT-10	10	N/A
FT-11	18	-0.0080
FT-12	24	-0.0017
FT-13	32	N/A
FT-14	42	-0.0048
FT-15	44	-0.0004
WT-16	51	-0.0004

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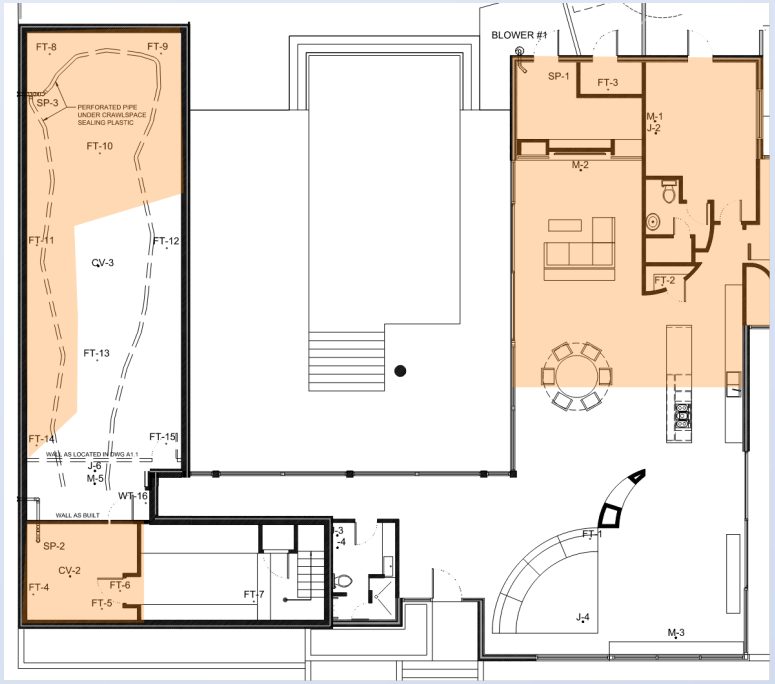
What Do We Do to Fix This?

- Information evaluated
- Where are we not getting sufficient PFE?
- Plan for further work developed



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What is the Plan?

- System 1: Slab on grade
  - Replace fan with high flow fan
  - Replace 3” pipe with 4” pipe
- System 2: Basement
  - Additional suction point
  - Higher pressure fan
- System 3: Crawlspace
  - Modify configuration to get better air flow across the space
- System 4: Crawlspace
  - Add another system at other end of crawlspace to get better PFE

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Mobilization

System 1

- Intrusive evaluation of system
  - Cut pipe – inspect pipe
  - Good pit
  - 4” gravel

  - Replace high pressure fan with high flow fan
  - Replace 3” pipe with 4” pipe
  - Air flow increases 25%

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Mobilization

System 2

- Intrusive evaluation of system
  - Cut pipe – inspect pit
  - No pit dug
  - Hard Clay

  - Dig larger pit
  - Core hole in new concrete where trench for plumbing work was created to connect pit with loose soil under new concrete
  - Replace fan with high pressure/high flow fan

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Mobilization

System 3

- Intrusive evaluation of system
  - Cut vapor barrier – inspect vapor collection system
  - Tarps installed over soil
  - Perforated pipe installed ON TOP of tarps
  - Previously installed pipes to other side of crawlspace were abandoned
  - Area in center of crawlspace with block wall with exposed soil in center

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Mobilization

System 3

- Cut tarp, install vapor barrier over top of vent pipe and seal to tarp on both sides
- Reinstall vapor barrier
- Tie into abandoned radon system pipes to provide suction points around perimeter of crawlspace
- Install vapor barrier in area with exposed soil and add depressurization point underneath

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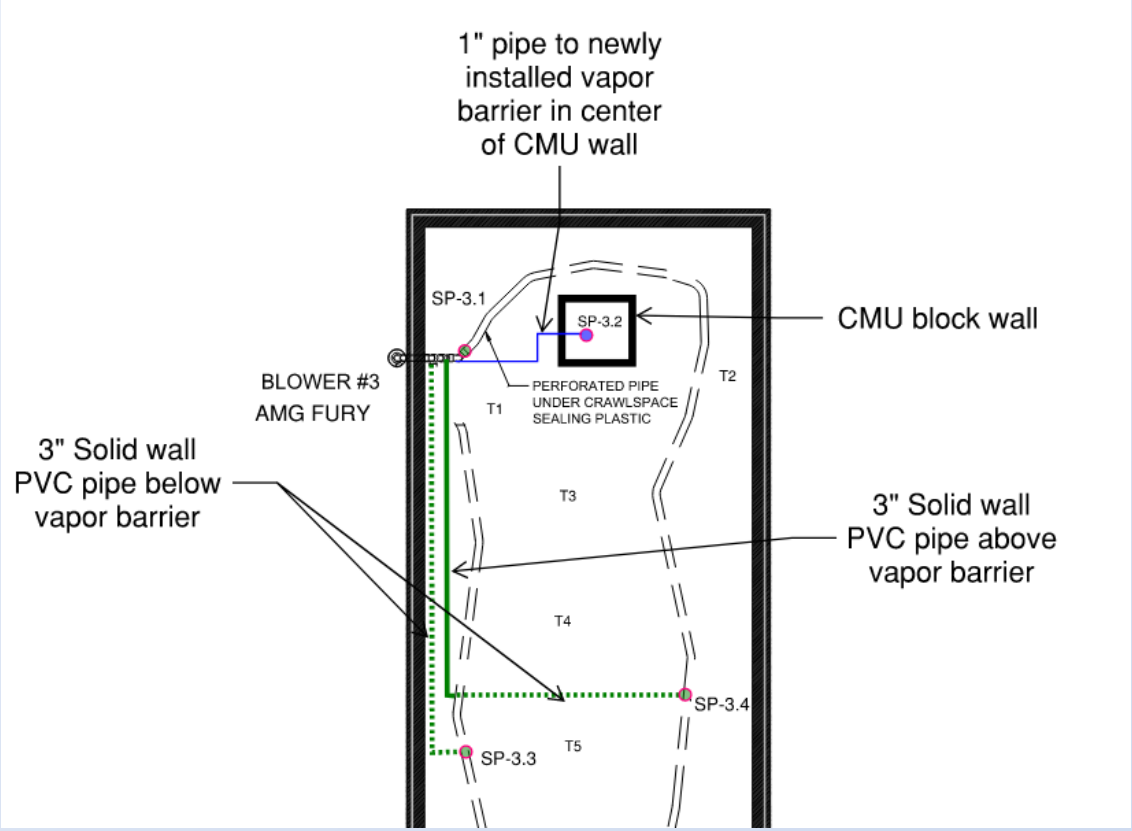
Mobilization

System 3



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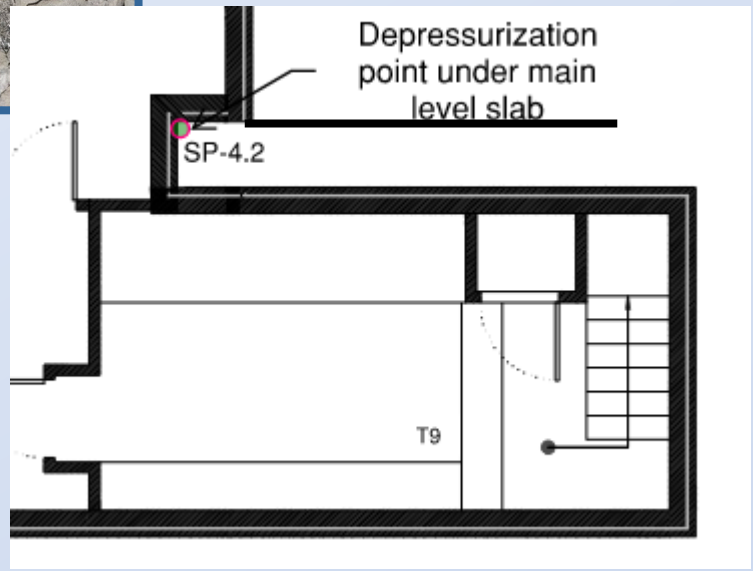
Work Performed

System 4

- New system installed at end of crawlspace
- Hole cored through block wall at end of hallway to provide suction point under slab
- 3” subsidence under slab
- Tie into pipe loop at end of crawlspace closest to basement area



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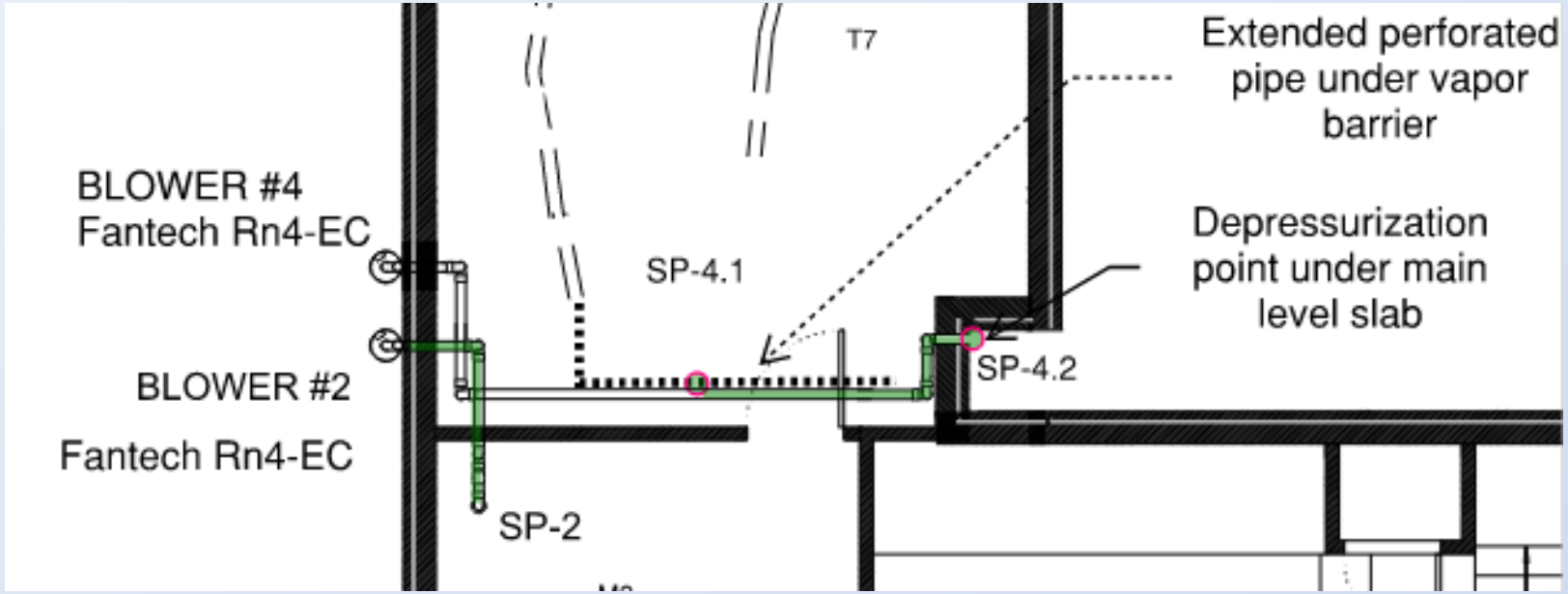
Work Performed

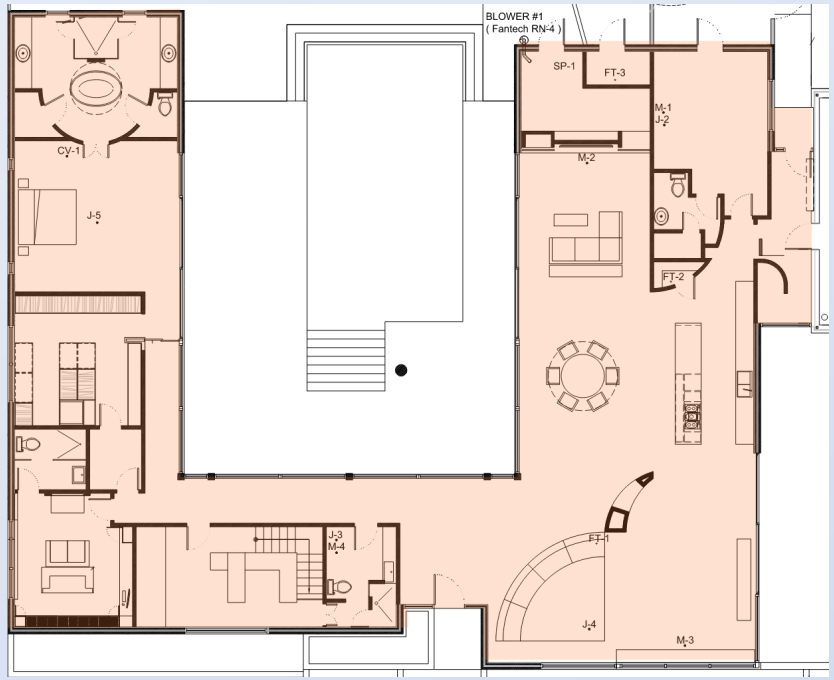
System 4



Work Performed

- Where are we getting PFE now?
  - What are the radon levels?

1.0 pCi/L
Master (first floor)
86% Reduction



0.6 pCi/L
Main living area
94% Reduction

0.9 pCi/L
Basement
84% Reduction

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Takeaway

- Every structure can be mitigated
- If you do work and the radon levels do not go down, there is a source that has not been identified
- Mitigation is not just installing a pipe and fan, turn it on…. presto – low radon levels
- It is all about PFE

- IF YOU DO NOT KNOW YOUR PFE, YOU DON'T KNOW JACK!

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Any Questions?

To discuss these findings, please contact Matt Koch, at mkoch@cleanvapor.com

Thank you!

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