



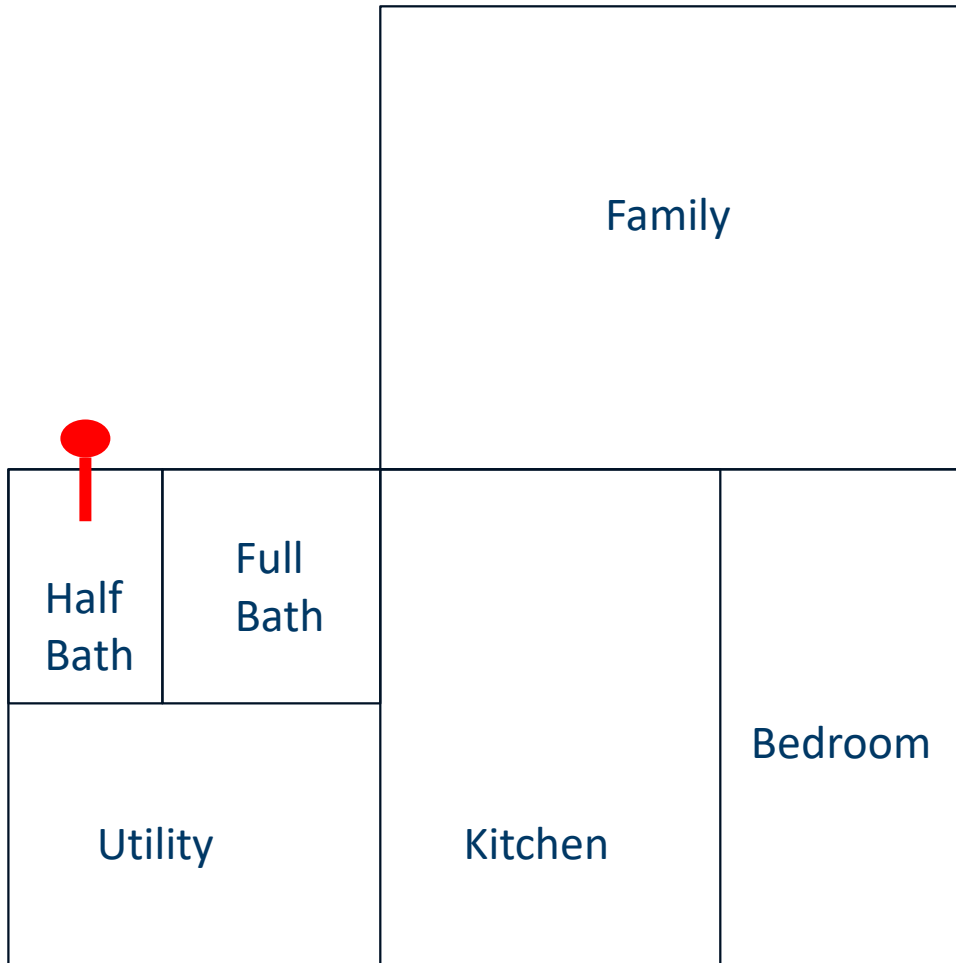
Why are My Utility Bills so Much Higher After Mitigation?

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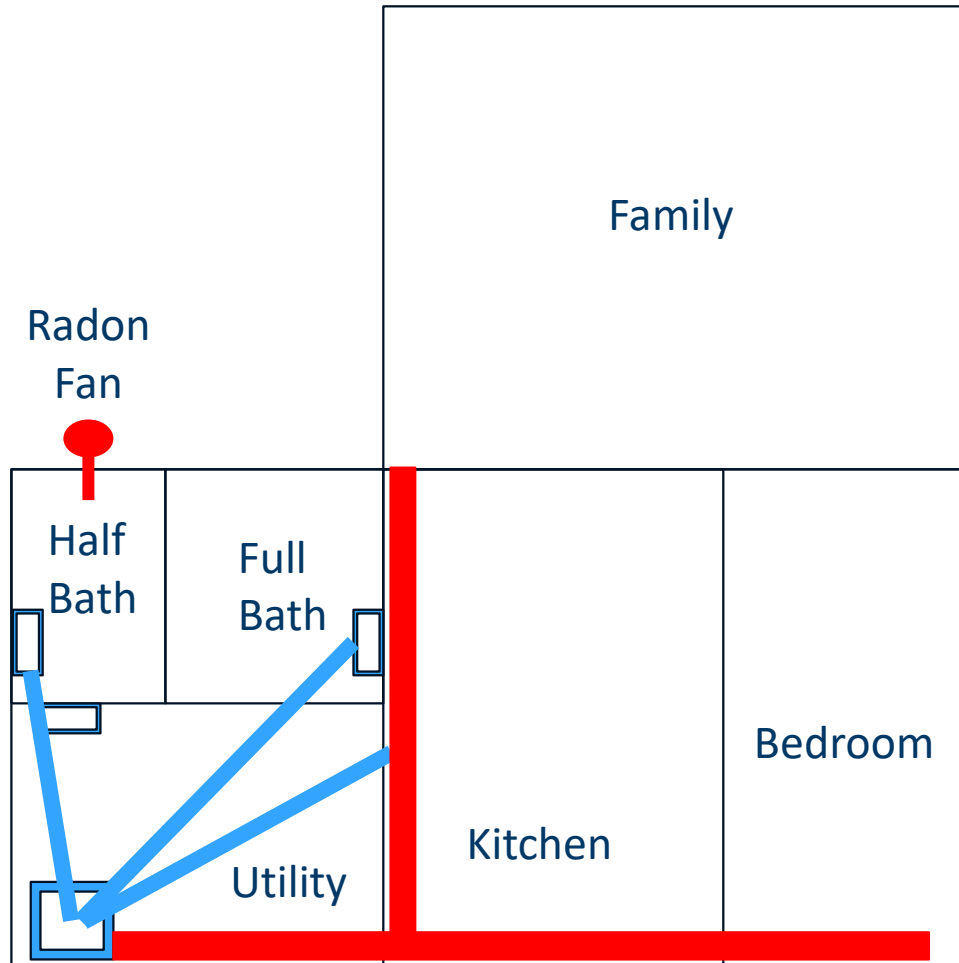
9/16/2024 – Indoor Environments 2024 International Radon and Vapor Intrusion Symposium

Radon System Info and House Background



- Small Slab on Grade
 - 800 sq. ft.
- Radon started at 8 pCi/L (300 Bq/m³)
- SSD installed in bathroom
 - Some tweaks made over the years
- 3-inch pipe
- High airflow fan – exterior system
- Super loud, even with muffler

Sub-Slab Ductwork



- Sub-slab returns (blue)
 - Poor condition
 - Bathrooms and utility room
- Overhead supplies (red)
- Radon reduced to 5 pCi/L

Homeowner and System Concerns

- Energy conservation leader
- Environmentally minded
- PFE never conducted
- Large fan moving over 100 cfm
- Fan consuming 130 watts

What is the Fan Doing?

- What is the fan's job?

10.2.1 *Information package*

The information package shall include content that complies with a), b), c), d) and e) of this Section 10.2.1.

b) System descriptions

A description of the *mitigation* system(s) as installed shall be provided to include:

1. System components labeled on a floor plan sketch or portrayed in narrative that describes system components and locations.

Documentation—All Systems and Methods

2. Basic operating principles;
3. An estimation of annual operating costs; and

- Include both electrical consumption, and
- Loss of conditioned air into the system
- Which is more significant?

- Temporarily sealed the returns
 - But airflow went up. WHAT??
- Double checked seals
 - All good, so what is happening?



Total System Operating Costs – Minneapolis, MN

Air Flow	110	CFM
Average Annual Heating Degree Days	7500	Minneapolis, MN
Average Annual Cooling Degree Days	825	Minneapolis, MN
Furnace Efficiency (Gas)	92	
Furnace Efficiency (Electric)		HSPF
Air Conditioner Efficiency	13	SEER
Cost of gas	14.87	\$/1000ft ³
Cost of Electricity	0.1569	\$/KWH
Cost of added Ventilation	\$416	\$/Year
Fan Wattage	130	Watts
Cost of Electricity to run Radon Fan	\$179	\$/Year
Total Annual Operating Cost of Radon System	\$594	\$/Year

Total System Operating Costs – Columbus, OH

Air Flow	110	CFM
Average Annual Heating Degree Days	5200	Columbus, OH
Average Annual Cooling Degree Days	1100	Columbus, OH
Furnace Efficiency (Gas)	92	
Furnace Efficiency (Electric)		HSPF
Air Conditioner Efficiency	13	SEER
Cost of gas	13.75	\$/1000ft ³
Cost of Electricity	0.1665	\$/KWH
Cost of added Ventilation	\$291	\$/Year
Fan Wattage	130	Watts
Cost of Electricity to run Radon Fan	\$190	\$/Year
Total Annual Operating Cost of Radon System	\$480	\$/Year

Total System Operating Costs – Lincoln, NE

Air Flow	110	CFM
Average Annual Heating Degree Days	5900	Lincoln, NE
Average Annual Cooling Degree Days	1300	Lincoln, NE
Furnace Efficiency (Gas)	92	
Furnace Efficiency (Electric)		HSPF
Air Conditioner Efficiency	15	SEER
Cost of gas	13.89	\$/1000ft ³
Cost of Electricity	0.1222	\$/KWH
Cost of added Ventilation	\$316	\$/Year
Fan Wattage	130	Watts
Cost of Electricity to run Radon Fan	\$139	\$/Year
Total Annual Operating Cost of Radon System	\$455	\$/Year

Total System Operating Costs – Clemson, SC

Air Flow	110	CFM
Average Annual Heating Degree Days	3000	Greenville, SC
Average Annual Cooling Degree Days	1720	Greenville, SC
Furnace Efficiency (Gas)	92	
Furnace Efficiency (Electric)		HSPF
Air Conditioner Efficiency	17	SEER
Cost of gas	23.51	\$/1000ft ³
Cost of Electricity	0.1407	\$/KWH
Cost of added Ventilation	\$288	\$/Year
Fan Wattage	130	Watts
Cost of Electricity to run Radon Fan	\$160	\$/Year
Total Annual Operating Cost of Radon System	\$448	\$/Year

Total System Operating Costs – Orlando, FL

Air Flow	110	CFM
Average Annual Heating Degree Days	525	Orlando, FL
Average Annual Cooling Degree Days	3450	Orlando, FL
Furnace Efficiency (Gas)	92	
Furnace Efficiency (Electric)		HSPF
Air Conditioner Efficiency	17	SEER
Cost of gas	26.13	\$/1000ft ³
Cost of Electricity	0.1363	\$/KWH
Cost of added Ventilation	\$135	\$/Year
Fan Wattage	130	Watts
Cost of Electricity to run Radon Fan	\$155	\$/Year
Total Annual Operating Cost of Radon System	\$290	\$/Year

- To keep conditioned air in the house!



Finished System

- Radon <0.5 pCi/L
- Far less energy and airflow
- Quiet
- Significant reduction in operating costs



Total Operating Cost While Optimized – Minneapolis, MN

Air Flow	15	CFM
Average Annual Heating Degree Days	7500	
Average Annual Cooling Degree Days	825	
Furnace Efficiency (Gas)	92	
Furnace Efficiency (Electric)		HSPF
Air Conditioner Efficiency	13	SEER
Cost of gas	14.87	\$/1000ft ³
Cost of Electricity	0.1569	\$/KWH
Cost of added Ventilation	\$57	\$/Year
Fan Wattage	16	Watts
Cost of Electricity to run Radon Fan	\$22	\$/Year
Total Annual Operating Cost of Radon System	\$79	\$/Year

Total System Operating Costs Comparison

Location	As Found	Optimized
Minneapolis, MN	\$594	\$79
Columbus, OH	\$480	\$63
Lincoln, NE	\$455	\$60
Greenville, SC	\$448	\$59
Orlando, FL	\$290	\$37

Thank you.

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