

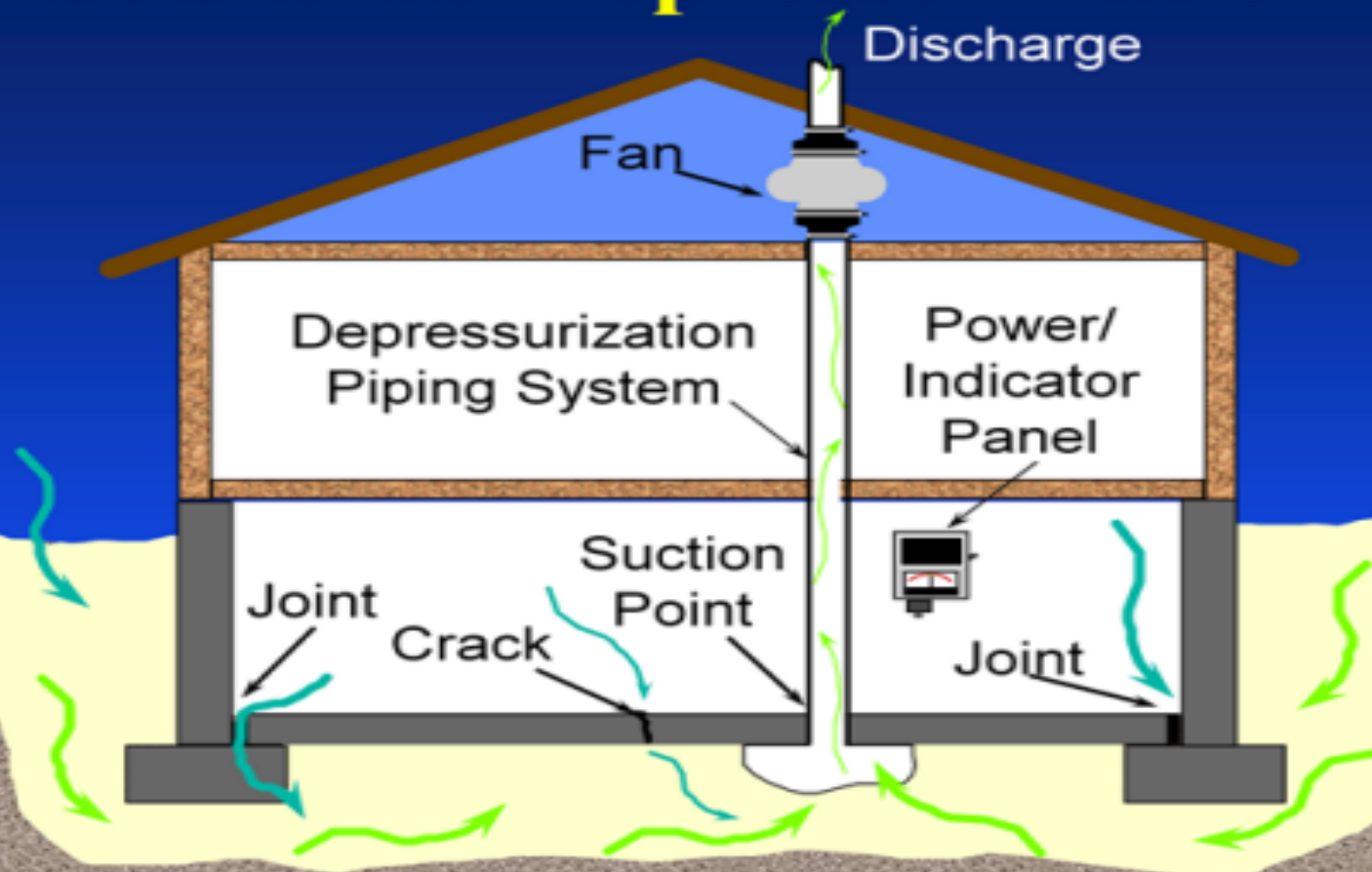
# *Inspecting Radon Mitigation Systems*



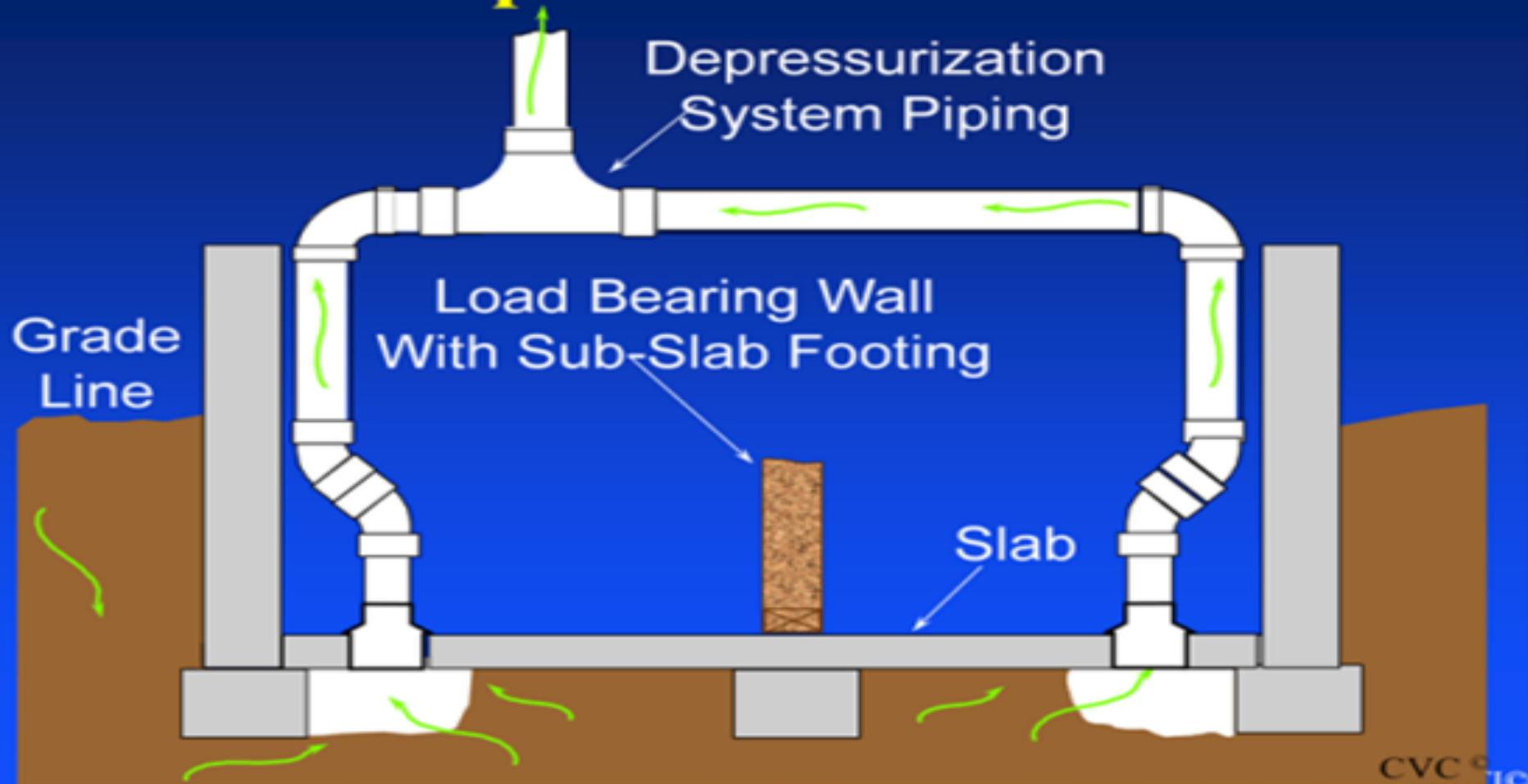
# Active Soil Depressurization: ASD

- ASD reduces radon entry by mechanically creating a suction beneath the foundation which is stronger than the vacuum applied to the soil by the building.
  - Must remove air from beneath home at a faster rate than what air is supplied to it.
- ASD collects radon prior to entry and exhausts it to a safe location outside of the building.
- Its application depends upon the foundation type, not radon concentrations.

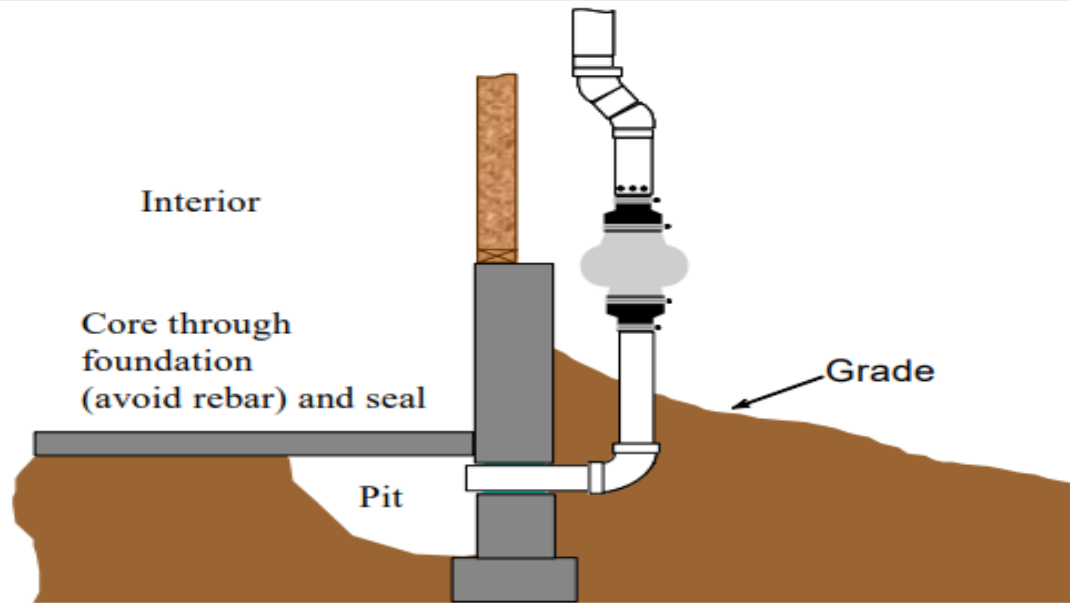
# Sub-Slab Depressurization



# Multiple Suction Points







*SSD systems can also be installed completely outside. Use rebar locator to avoid rebar. Seal nicked rebar to avoid rust. Use core rig for clean hole. Dig pit from outside. Seal pipe insert with backer rod and urethane caulk.*



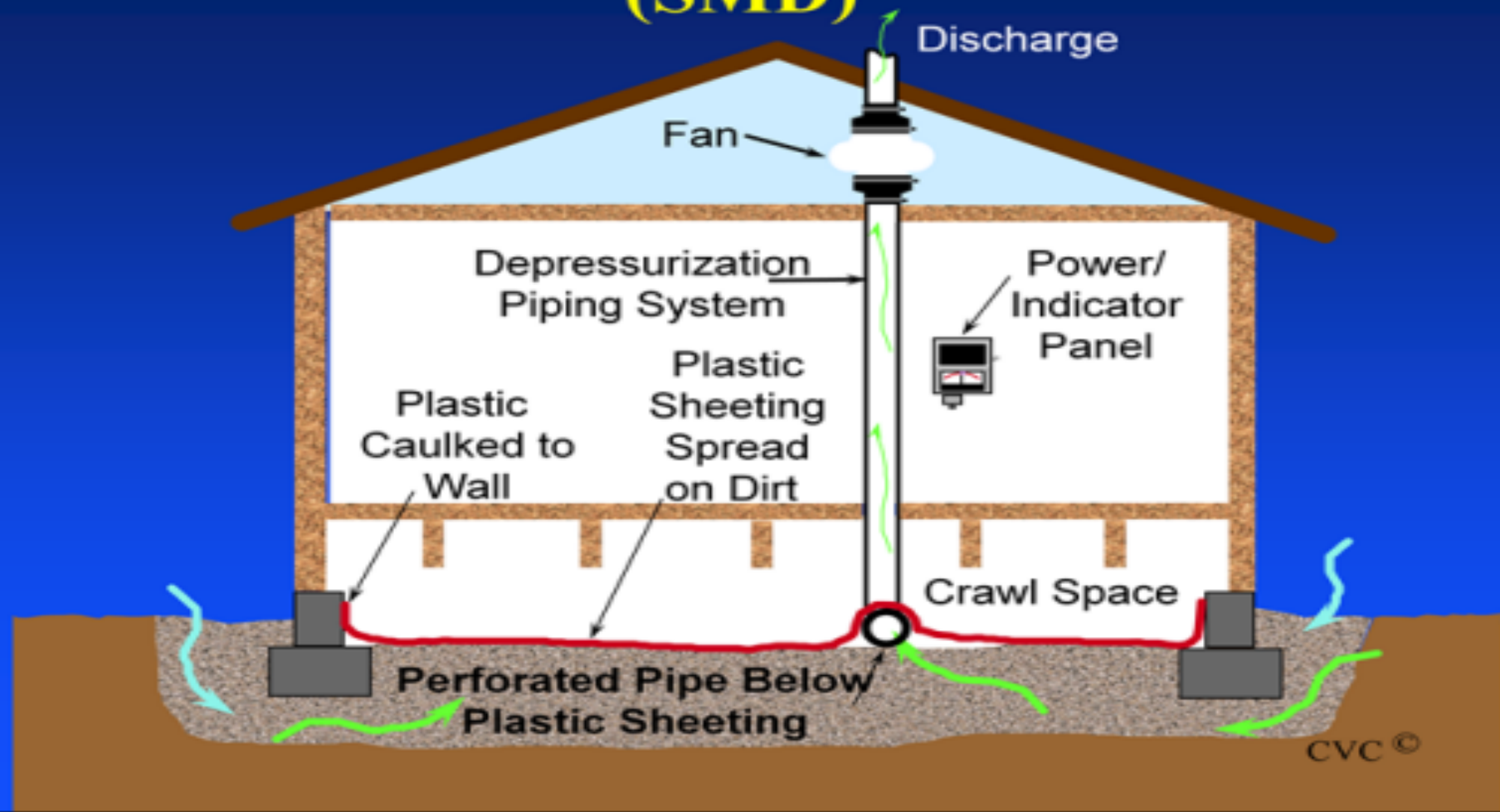








# ASD: Sub-Membrane Depressurization (SMD)



# Installation Planning



3-inch perforated pipe, run the length of crawlspace, is an excellent gas collector.

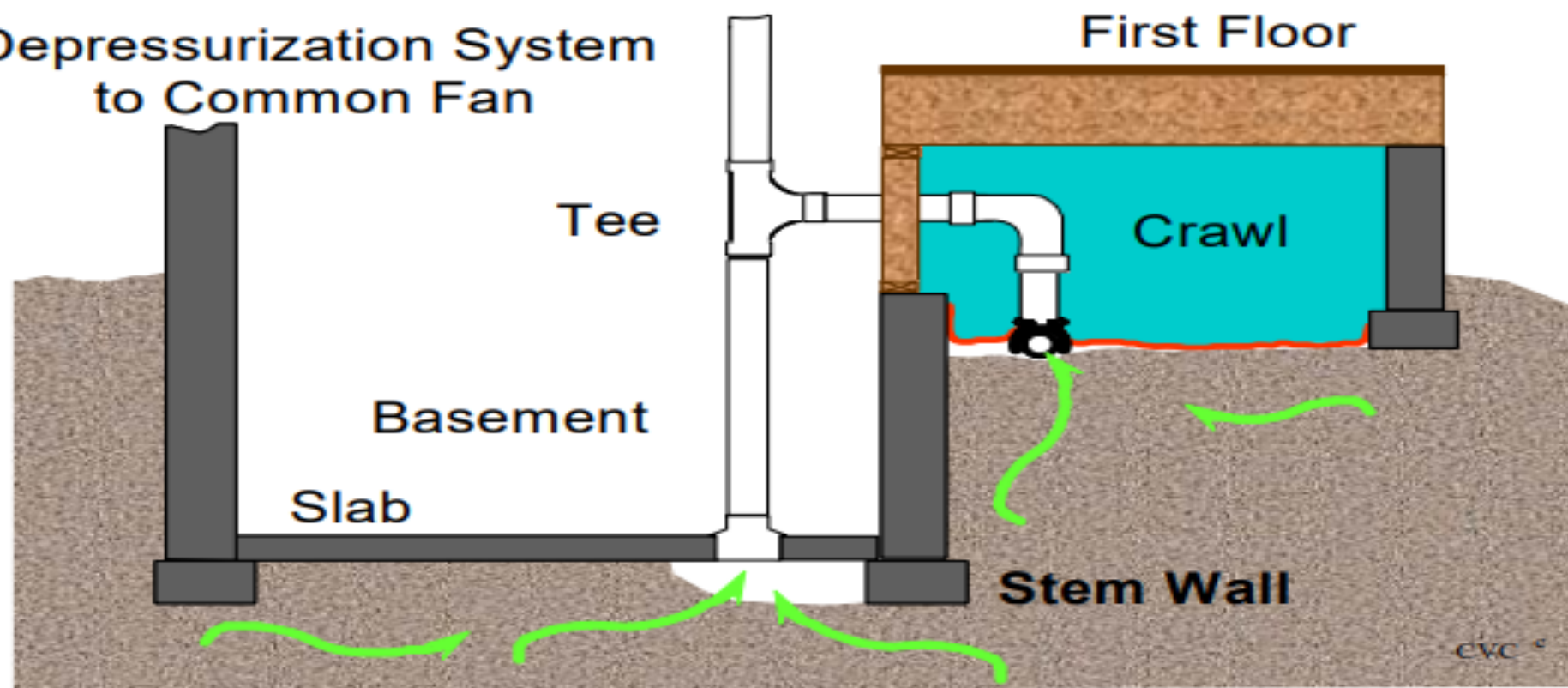


# Sealing Plastic



- The toughest part is sealing around all posts and penetrations.
- Makes system work better
- Avoids loss of conditioned air & back drafting.

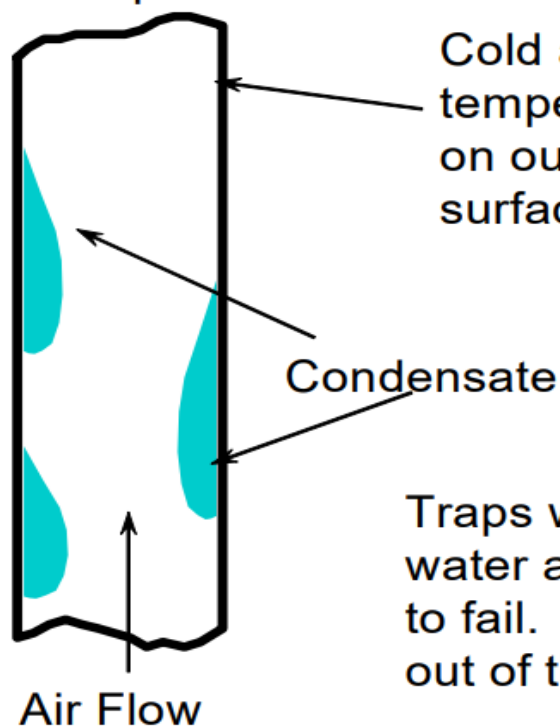
## Depressurization System to Common Fan



*You can tie a SMD and SSD system together and route piping to fan via a single riser. No need for dampers.*



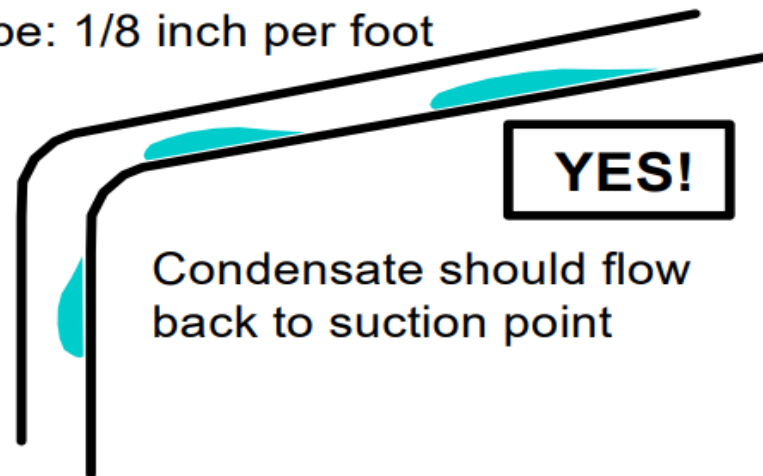
Water condensate or dew may form inside of pipe. It must be allowed to flow back to suction point.



Cold air temperatures on outer surface of pipe

Traps will accumulate water and cause system to fail. Don't cut the joist out of the way.

Slope Pipe: 1/8 inch per foot



Condensate should flow back to suction point

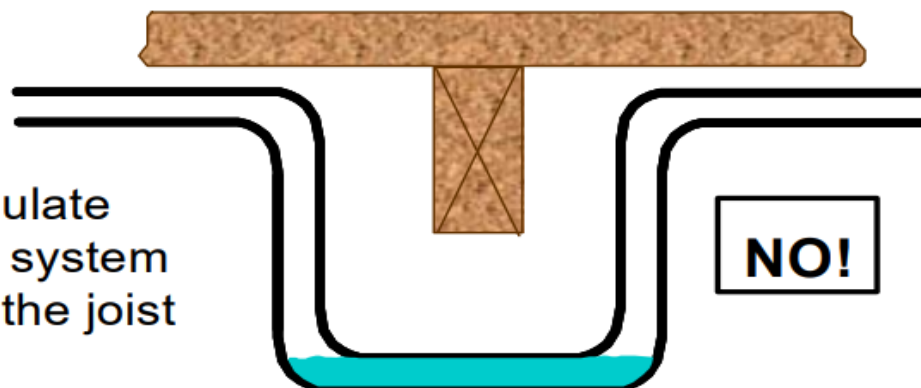
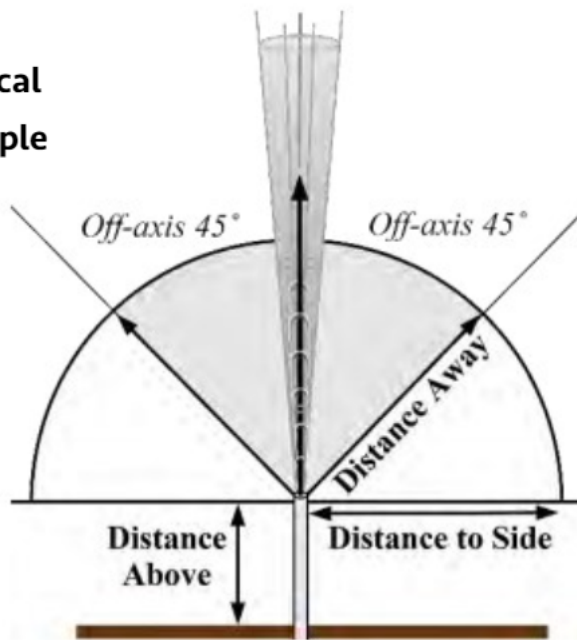




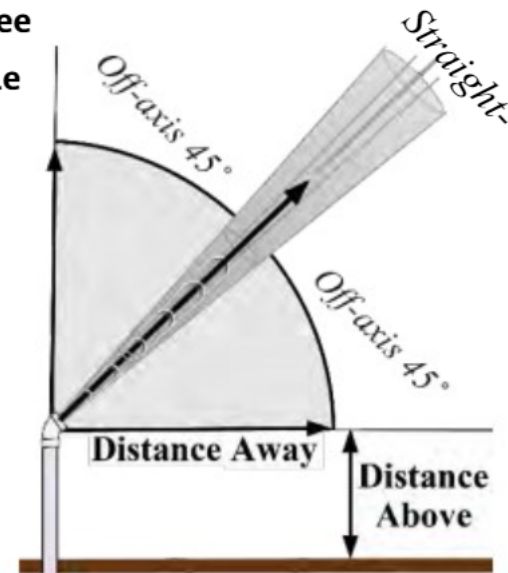
Figure 6.4

Grey areas cannot contain: *Openings* in structures, building materials and the breathing space where people congregate or traverse.

Vertical  
Example



45 Degree  
Example



#### 6.4.3 *Directional spread (restrictions)*

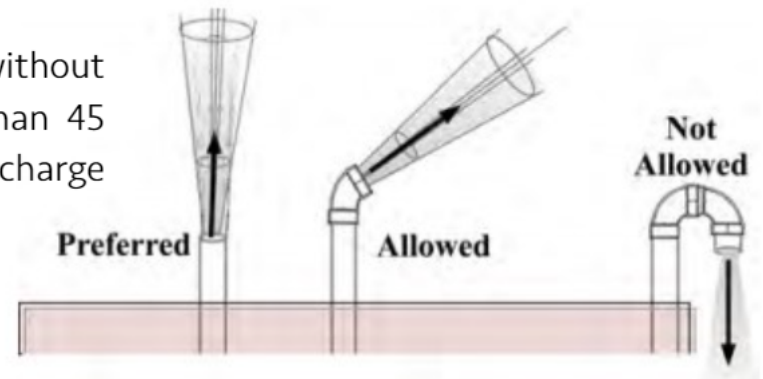
The *exhaust trajectory* with an *exhaust spread radius* of  $45^{\circ}$  shall not encounter *openings* in any structures, building materials or the breathing space where individuals congregate or traverse within 10 feet (3 m) from the *point of exhaust*.

**Exception:** Composite or otherwise layered water-tight roofing materials.

#### 6.4.9 *Angled Trajectories*

The *point of exhaust* shall be directed upward without obstruction at an angle that does not deviate more than 45 degrees from a vertical exhaust trajectory. The exhaust discharge shall not exhaust downward.

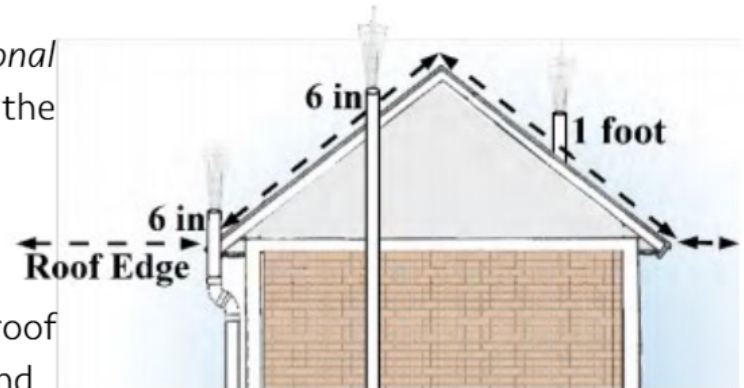
**Exceptions:** 90 degree horizontal exhausts shall comply with requirements in **Section 6.4.12**



## Roof

The *point of exhaust* shall comply with **Section 6.4.3 Directional spread** and, unless all requirements of **Section 6.4.11** are met, the *point of exhaust* shall be:

- a) not less than 1 foot (30 cm) above a pitched roof at the point penetrated;
- b) not less than 6 inches (15 cm) above the edge of the roof when ASD piping is attached to the side of a building; and
- c) not less than 18 inches (46 cm) above a flat roof.

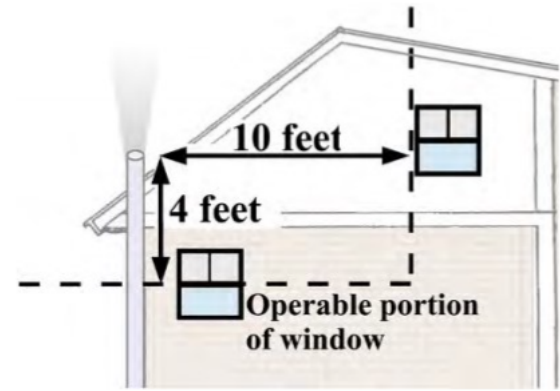


### *Separation from operable openings in structures*

The *point of exhaust* shall be compliant with **Section 6.4.3**

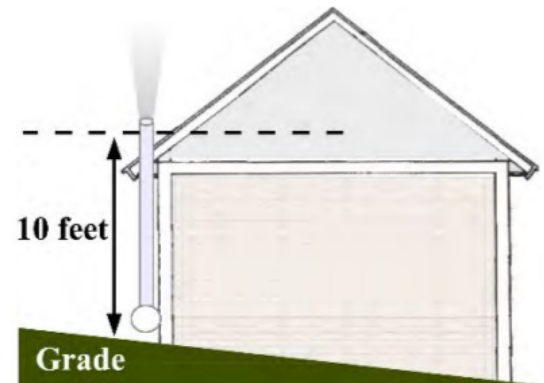
*Directional spread* and located either:

- a) not less than 10 feet (3 m) horizontally to the side *operable openings* in structures; and
- b) not less than 4 feet (120 cm) above *operable openings* in structures.



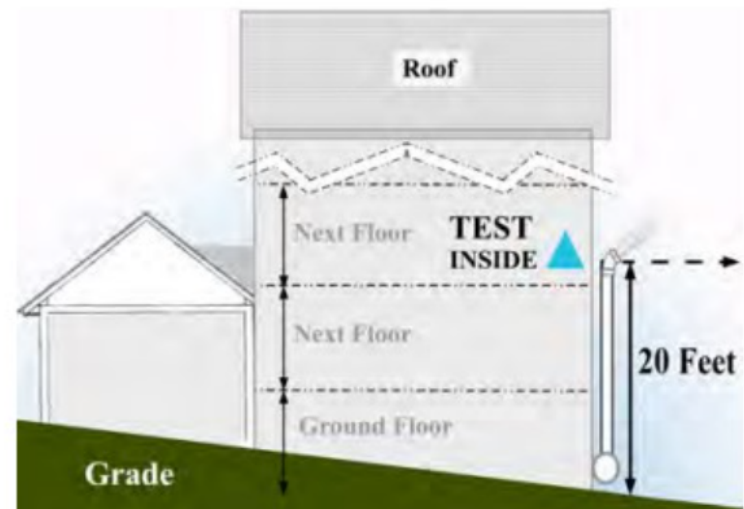
### *Elevation above grade*

The *point of exhaust* shall be located not less than 10 feet (3 m) above grade nearest to the *point of exhaust* and shall be compliant with **Section 6.4.3** *Directional spread* and **Section 6.4.4** *Straight-line trajectory*.



- a) The justification for not locating the exhaust above the edge of the roof shall be recorded in the operations and maintenance plan and shall be based upon either:
1. the inability to comply with other requirements of **Section 6.4** if the *point of exhaust* were located above the roof, or
  2. the edge of the roof exceeds 20 feet (6m) above grade nearest to the *point of exhaust*;
- b) The *point of exhaust* shall be not less than 20 feet (6m) above grade nearest to the *point of exhaust*; and
- c) Testing shall be conducted within the occupiable area that immediately adjoins the 45° *Directional spread* required in **Section 6.4.3**. This testing is required no later than in conjunction with the initial *post-mitigation* test and shall be recommended for inclusion in all future *post-mitigation* tests.

*Informative advisory*—Where time constraints allow, long-term testing subsequent to an initial short-term test is recommended.



# Post-Mitigation Measurements

- ❑ Perform between 24 hrs and 30 days after mitigation.
- ❑ Perform in same location as pre-mitigation tests.
- ❑ Conduct a minimum short-term test with an approved device.
- ❑ Recommend long-term testing, and re-testing once every 2 years.



# Discharge Terminations



Vertical  
Discharge

YES

Discharges up, up  
and away



Double Turned  
Down 90's

No

Discharges Down  
Toward Home



Rain Cap

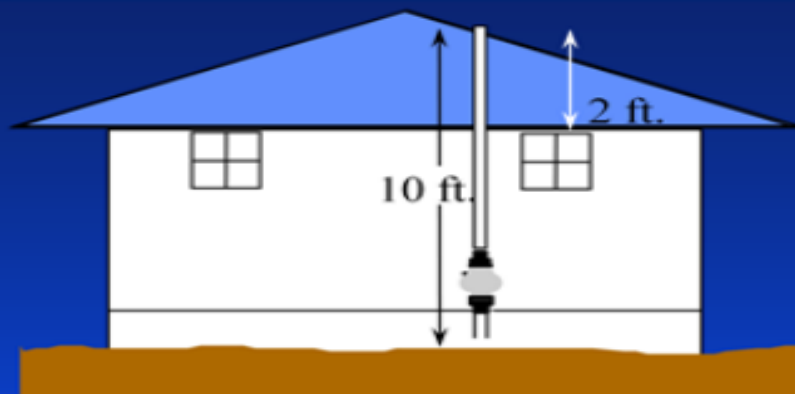
No

Discharges Down  
Toward Home

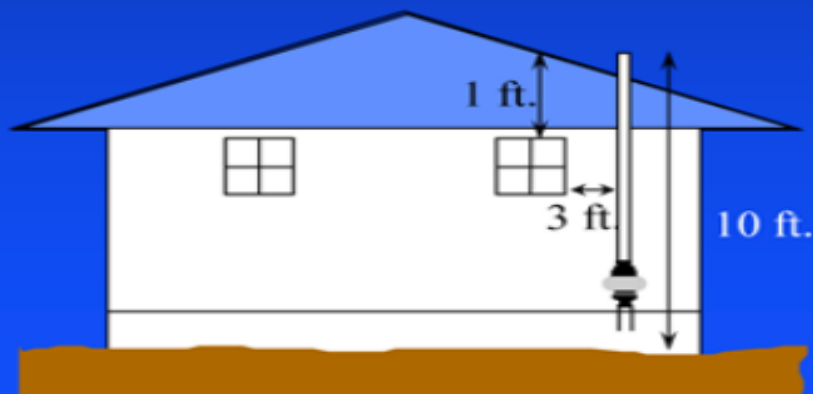
# Discharge Points



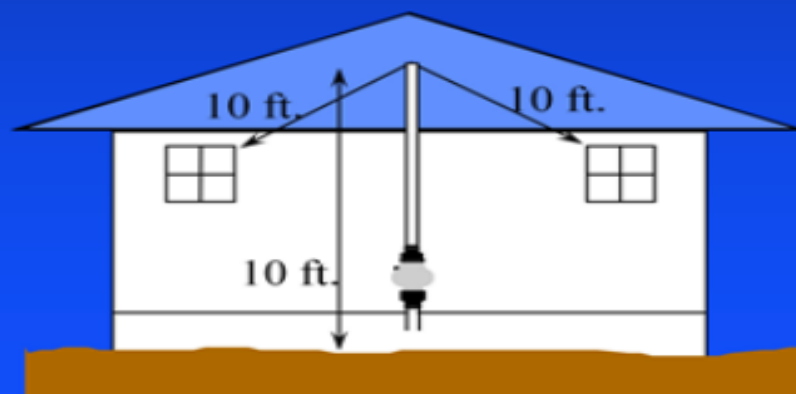
Case A. NO! (too low)



Case B. OK



Case C. NO! (too close to window)



D. OK





# Vent Piping

## ■ Type:

- Must retain moisture
- PVC or ABS
- Sheet metal leaks water and radon
- Metal downspout often used outdoors

## ■ Thickness:

- Schedule 40 preferred but required outdoors and when routing through garages.

## ■ Pressure rating:

- Drain waste and vent (DWV)

## ■ Size:

- Four inch is common
- Size will depend on air flow required
- Three inch is generally minimum
- Based upon diagnostics and experience

## Fan Monitors (Pressure Gauge)

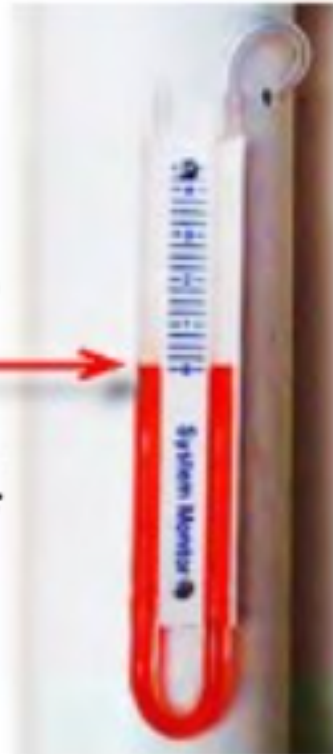
*Different?*

**GOOD**  
*Fan is on*



*Equal?*

**BAD**  
*Fan is off*



# US EPA Radon Mitigation Standards



*Fan should  
not be inside  
the home*



*Fan unsupported,  
mis-wired and  
discharge too low*



*Discharge too low  
and under a  
window!*

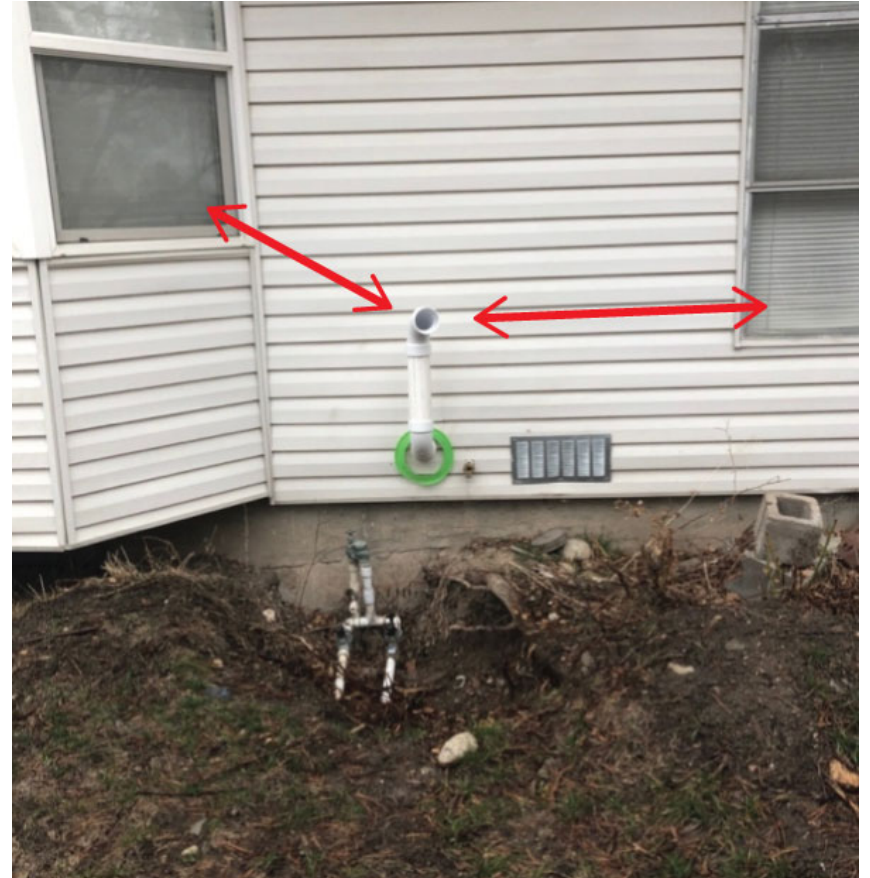
**Do it right or don't do it at all!**











## GENERAL INSPECTION — EXISTING RADON MITIGATION SYSTEMS

## SAFETY REVIEW

Advisory—This list is intended for use by homeowners and inspection personnel.  
It is not intended to verify compliance with local regulations or any published radon standard.



Radon Testing		If No, recommended action
<input type="checkbox"/> Was the most recent test within the last 2 years?	<input type="checkbox"/> Test for radon	
<input type="checkbox"/> Are recent test reports available?		
<input type="checkbox"/> Is there radon system piping and a radon fan?	<input type="checkbox"/> Test for radon. If readings are low, test again in the heating season	
Fan and Exhaust Location		
<input type="checkbox"/> Is the fan outside of occupiable space and not beneath an occupiable space (e.g., not in a basement, crawl space or attached garage that is under occupiable space)?	<input type="checkbox"/> Relocate the fan to meet compliance with current standards	
<input type="checkbox"/> Does fan electrical wiring appear safe?	<input type="checkbox"/> Correct unsafe electrical wiring.	
<input type="checkbox"/> Is the system exhaust at least 10 feet above grade?	<input type="checkbox"/> Take action to bring the exhaust location into compliance with current standards	
<input type="checkbox"/> Is the system exhaust at least 2 feet above or 10 feet to the side of operable openings in all windows, doors or other ventilation openings between outdoor air and indoor air?		
Radon Pipe Routing		
<input type="checkbox"/> Are building exits for fire and safety clear of obstructions?	<input type="checkbox"/> Take action to correct hazards	
<input type="checkbox"/> Does pipe routing retain fire protection and safe distances from electrical panels or meters for gas or liquid fuel?		
Radon Fan Monitor		
<input type="checkbox"/> Is there a viewable fan monitor?	<input type="checkbox"/> Install a viewable fan monitor	
<input type="checkbox"/> Does the radon fan appear to be running?	<input type="checkbox"/> Activate or replace the fan	
Openings to soil		
<input type="checkbox"/> Do all sump pits have rigid sealed lids?	<input type="checkbox"/> Seal or install a durable sump lid	
<input type="checkbox"/> Are sump lid materials durable and safe if stepped on?		
<input type="checkbox"/> Are accessible openings to soil closed or sealed except those that might compromise water drainage?	<input type="checkbox"/> As appropriate, seal openings in slabs and crawl space membranes	
Non-habitable air spaces		
<input type="checkbox"/> For less common systems that draw air from behind a wall, under a floor or from a crawl space, are openings closed or sealed between the non-habitable air space and both indoor and outdoor air surrounding the non-habitable air space?	<input type="checkbox"/> Take action to establish sufficient closure to prevent energy penalties or flue gas spillage from atmospherically vented combustion appliances	
<input type="checkbox"/> If radon testing indicates open foundation or crawl space vents are an important mitigation component, are permanently open vents installed?	<input type="checkbox"/> Take action to install non-closable vents or install a system that is effective during all seasons	

# GENERAL INSPECTION — EXISTING RADON MITIGATION SYSTEMS

## FUNCTIONAL INTEGRITY OF COMPONENTS

<p>Advisory—This list is intended for use by homeowners and inspection personnel. It is not intended to verify compliance with local regulations or any published radon standard.</p>	
<p>TYPE OF MITIGATION SYSTEM(S) INSTALLED</p> <p>( ) Sub-slab Depressurization    ( ) Sub-membrane Depressurization    ( ) Soil Vent Piping Without Fan</p> <p>( ) Sump Depressurization    ( ) Block Wall Depressurization    ( ) Other Method</p> <p>( ) Drain Tile Depressurization    ( ) Depressurization of Non-habitable Airspace</p>	
<b>Radon System Piping</b>	<b>If No, recommended action</b>
<input type="checkbox"/> Is piping watertight or free of visible water leaks?	<input type="checkbox"/> Take action to seal pipe joints
<input type="checkbox"/> Is piping sloped to drain water in the pipe to the soil?	<input type="checkbox"/> Take action to achieve drainage
<input type="checkbox"/> Is piping secured to the building in durable manner?	<input type="checkbox"/> Take action to correct piping deficiencies
<input type="checkbox"/> Is the exhaust air discharging freely without obstructions?	
<input type="checkbox"/> Are building materials safe from exhaust vapor damage?	
<input type="checkbox"/> Is the piping durable and in good repair?	
<b>Fans</b>	
<input type="checkbox"/> Is there a switch, plug or labeled breaker to turn off the fan?	<input type="checkbox"/> Take action to correct the fan installation
<input type="checkbox"/> Do flexible couplings connect the fan to piping?	
<input type="checkbox"/> Is the fan rated for safety and constant activation needed for radon systems and capable of draining water?	
<b>Sump Lids</b>	
<input type="checkbox"/> Are sump lids fastened and sealed in a manner that allows removal for service where closure is achieved with non-permanent materials such as silicone caulk or gaskets?	<input type="checkbox"/> Add features required in national standards that allow reasonable access to conditions inside the pit
<input type="checkbox"/> For suction piping found attached to a sump lid, does the pipe have a flexible coupling disconnect to ease access to the pit?	
<b>Sub-membrane Depressurization</b>	
<input type="checkbox"/> Are air intakes under the membrane free of obstructions?	<input type="checkbox"/> Take action to correct the deficiency
<input type="checkbox"/> Is the top of the membrane free of standing water?	
<input type="checkbox"/> Are all sizable membrane openings to soil closed?	
<input type="checkbox"/> Are the edges of the soil gas retarder closed or sealed?	<input type="checkbox"/> Improvements may be warranted to enhance system effectiveness and long-term integrity of the membrane
<input type="checkbox"/> Is durability of the membrane material adequate?	
<input type="checkbox"/> Is the soil gas retarder is not secured to walls for crawl space areas that are accessible for routine storage or other activity?	
<b>Less Common Radon Mitigation Methods</b>	
<input type="checkbox"/> Does the mitigation method solely consist of system piping, radon fan(s) and closure between soil gas and indoor air?	<input type="checkbox"/> Consult with a radon professional for evaluating Non-ASD systems

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