Identifying Preferential Pathways Over a Two-Story Open-Air Parking Deck

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Overview of Project

- Radon testing performed at change of ownership found elevated radon levels in three buildings
- Clean Vapor hired to do pilot study and develop mitigation plan
- Site walk done and buildings evaluated
- Two of the buildings are slab-on-grade
- Third building constructed over multilevel parking structure that extends under three different buildings and greenspace areas

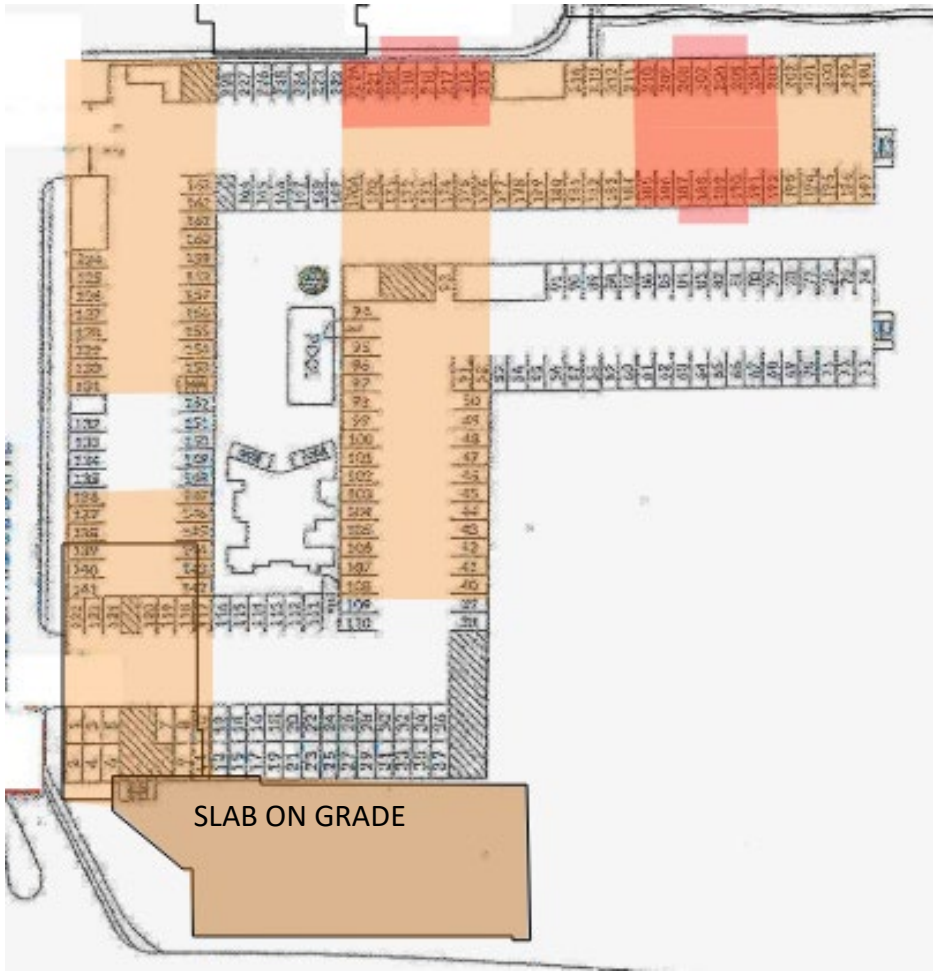
Property Details

- Large multifamily apartment complex in Southern California
- Buildings built in 1970
- Community sits on top of large hill with significant grade change from West to East
- NO air conditioning, only electric heating

What Does That Look Like?



The Parking Garage Extends Under Multiple Buildings



Slab on Grade Mitigation

- Pilot Study performed
- Extremely tight soil
- Pressure Field Extension is possible with high suction fans

Now, What About The Building Over The Parking Garage?

- Building and parking garage walked
- Parking garage has large fenced openings on one side (downhill side) and is mechanically ventilated on other side (uphill side)
- Cast podium deck under first floor units
- Upper floors have gypcrete over OSB decking
- Wall of parking garage is CMU filled with concrete
- Elevated radon levels found in unit 103, 104, 107 and **307**





Building Evaluation Findings

- Units 107 and 307 are directly adjacent to elevator shaft
- Unit 103 is over open-air side of parking garage
- Main electric service into building is located on bottom floor of parking garage below unit 103
- Unit 104 is over closed side of parking garage
- Multiple 1” PVC weep holes are installed through the foundation wall on the uphill side of the parking garage wall

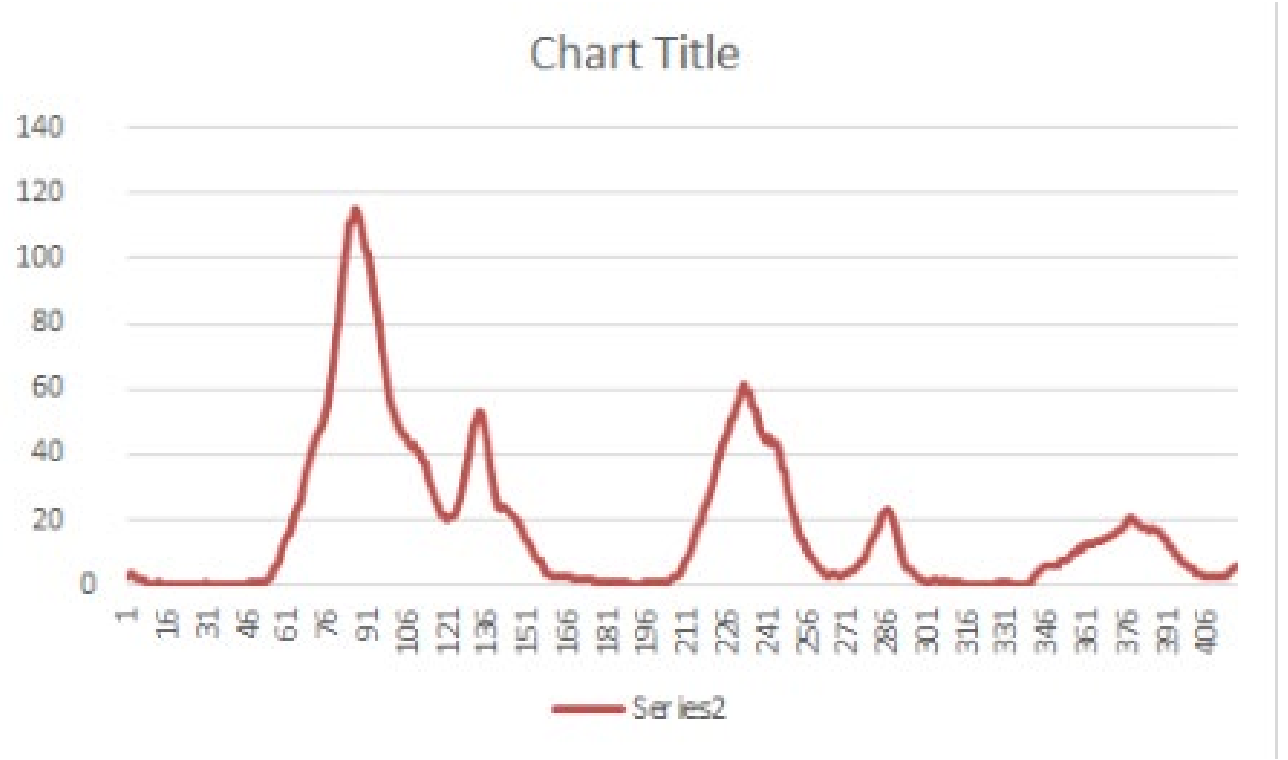
Analysis Process

CRMs placed in every unit, in both levels of parking garage, on exterior, in elevator

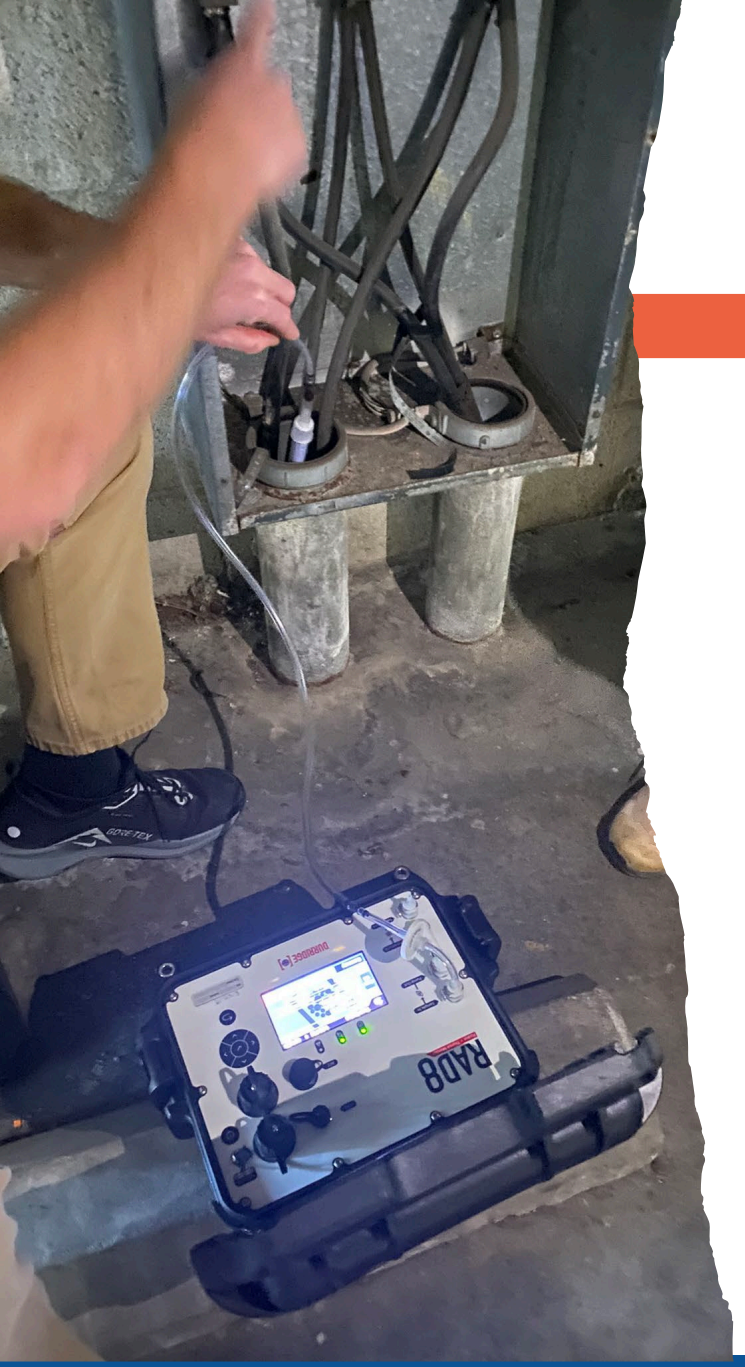
Emanation testing performed on first floor and on third floor in unit 307

Results of Initial Diagnostic Radon Testing

- Emanation testing did not find any significant radon contribution
- Low radon levels in every unit*
- Low radon levels in parking garage
- Low outdoor ambient radon levels**
- Radon levels in elevator are very high at night



Time to Bring in the Big Gun



- Sniffer used to measure radon and thoron
  - Under the slab around the parking garage
  - Under the elevator
  - Through weep holes on rear wall of garage
  - In conduit for main electrical service entry



Results of Sniffer Testing

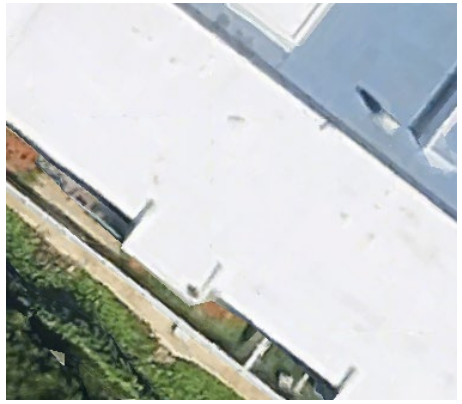
High levels of thoron and radon found under slab

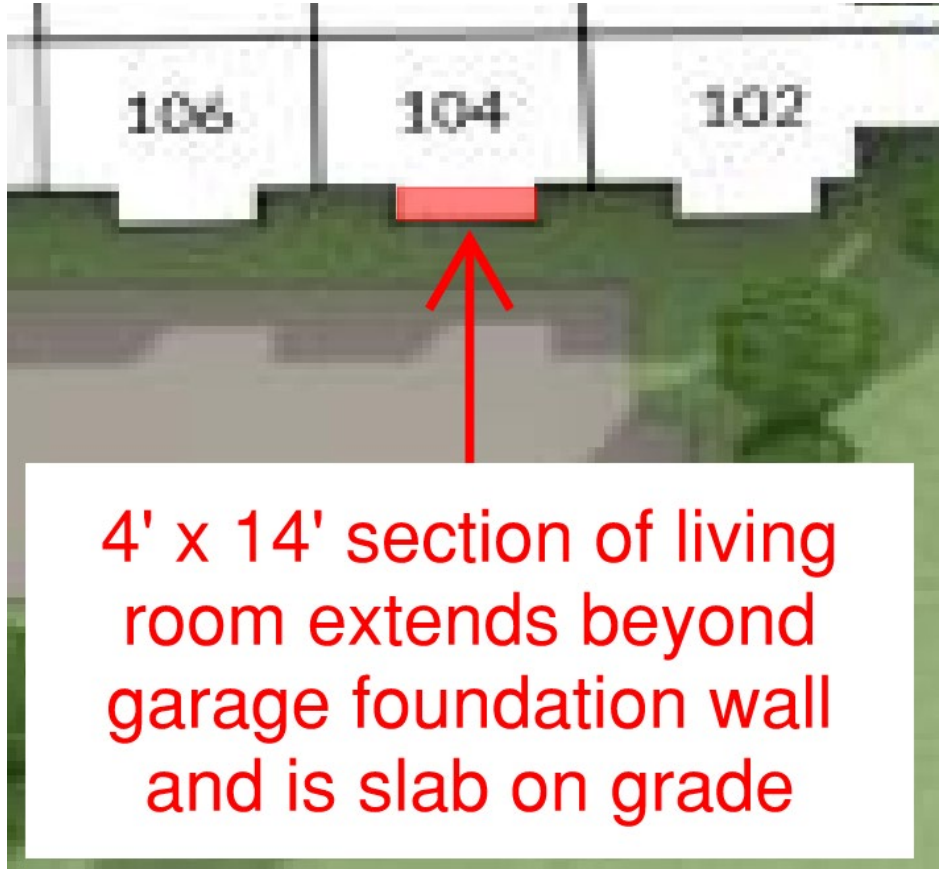
One of the main electrical conduits had not been sealed and high levels of thoron and radon were found

High levels of thoron and radon found in weep holes through wall

Preferential Pathways

- Units 107 and 307 – Elevator Shaft
- Unit 103 – Through main electrical conduit running from slab up through rear wall of unit
- What about 104?





And Now For Something Completely Different!

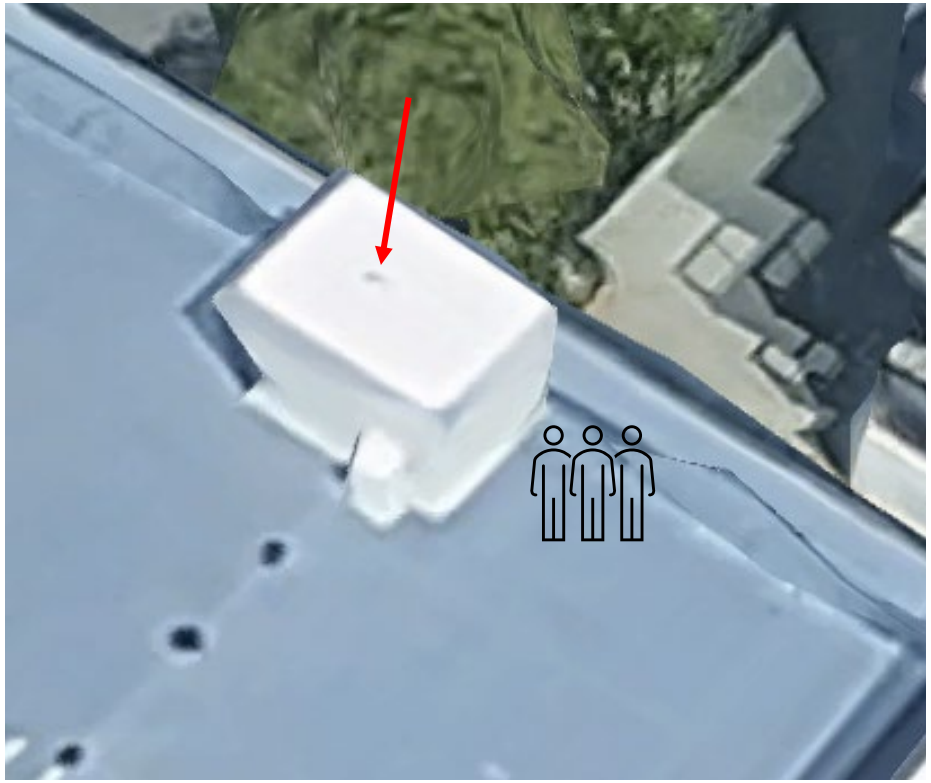
- Went onto the roof to look at the elevator shaft and talk about mitigation options (and check out the view)
- Unit 307 has a roof top deck – looking out over downtown LA





And Now For Something Completely Different!

- Wind blowing up the hill in our face
- Sniffer set down on the roof deck as we talked
- After 15 minutes, looked down and the radon levels were 4.0 pCi/L!
- Radon coming out of the vent at top of elevator shaft



Takeaway

- High radon levels always make sense; you just must figure out why
- Three different reasons for elevated radon levels above the parking garage
- Source – Pressures – Pathways
- When placing 10% radon tests on upper levels, choose your locations wisely
  - Near elevators
  - Near stairways
  - Near main electrical service conduit

Any Questions?

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



Thank you!