R.A.D.O.N.

Radiological Assessment, Detection, Observation, and Notification
for the NTU Crownpoint Campus

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Introduction

Radon is a naturally occurring radioactive gas.

Produced during the decay of uranium and radium.

Can accumulate in enclosed spaces.

Leading source of natural radiation exposure.

Uranium Decay: From Uranium to Radon

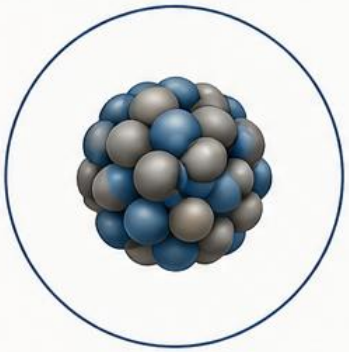
1

Uranium

Uranium is naturally found in rocks, soil, and groundwater.

2

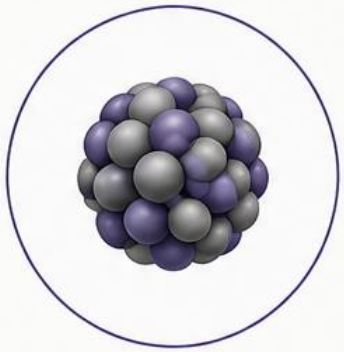
Uranium Decays to Radium



Uranium-238 decays over a very long time into radium-226.

3

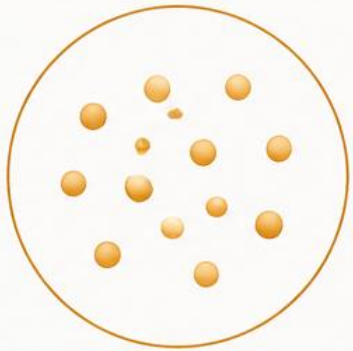
Radium Decays to Radon



Radium-226 decays into radon-222, a radioactive gas.

4

Radon Gas is Produced



Radon gas is released from the decay of radium.

Radon is a naturally occurring radioactive gas produced from the decay of uranium in rocks and soil.

MODES OF EXPOSURE

INHALATION
(PRIMARY PATHWAY)

Radon gas is inhaled into the lungs.

INGESTION
(WATER)

Radon can dissolve in water and be ingested.

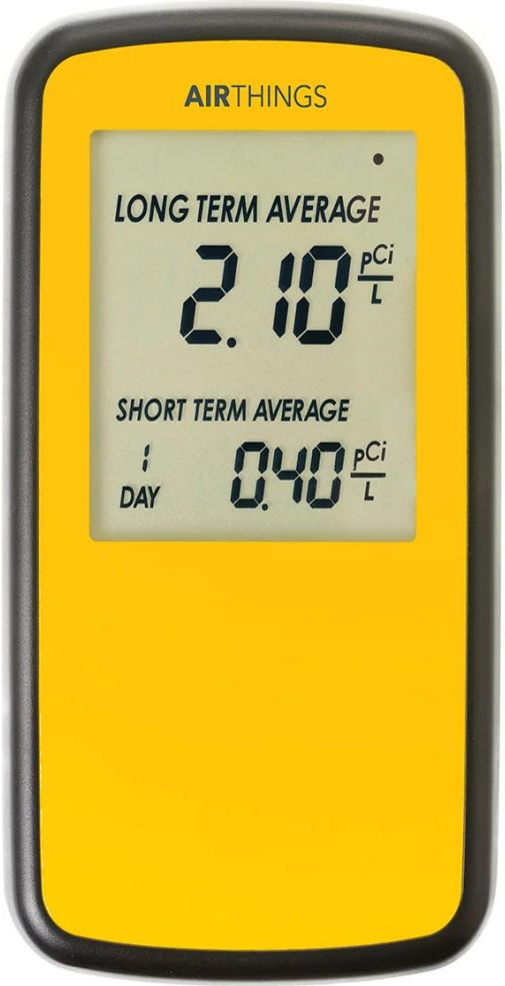
ENVIRONMENTAL PATHWAYS

Radon can move through soil, air, and materials.

KEY CONCERN: LONG-TERM LUNG EXPOSURE

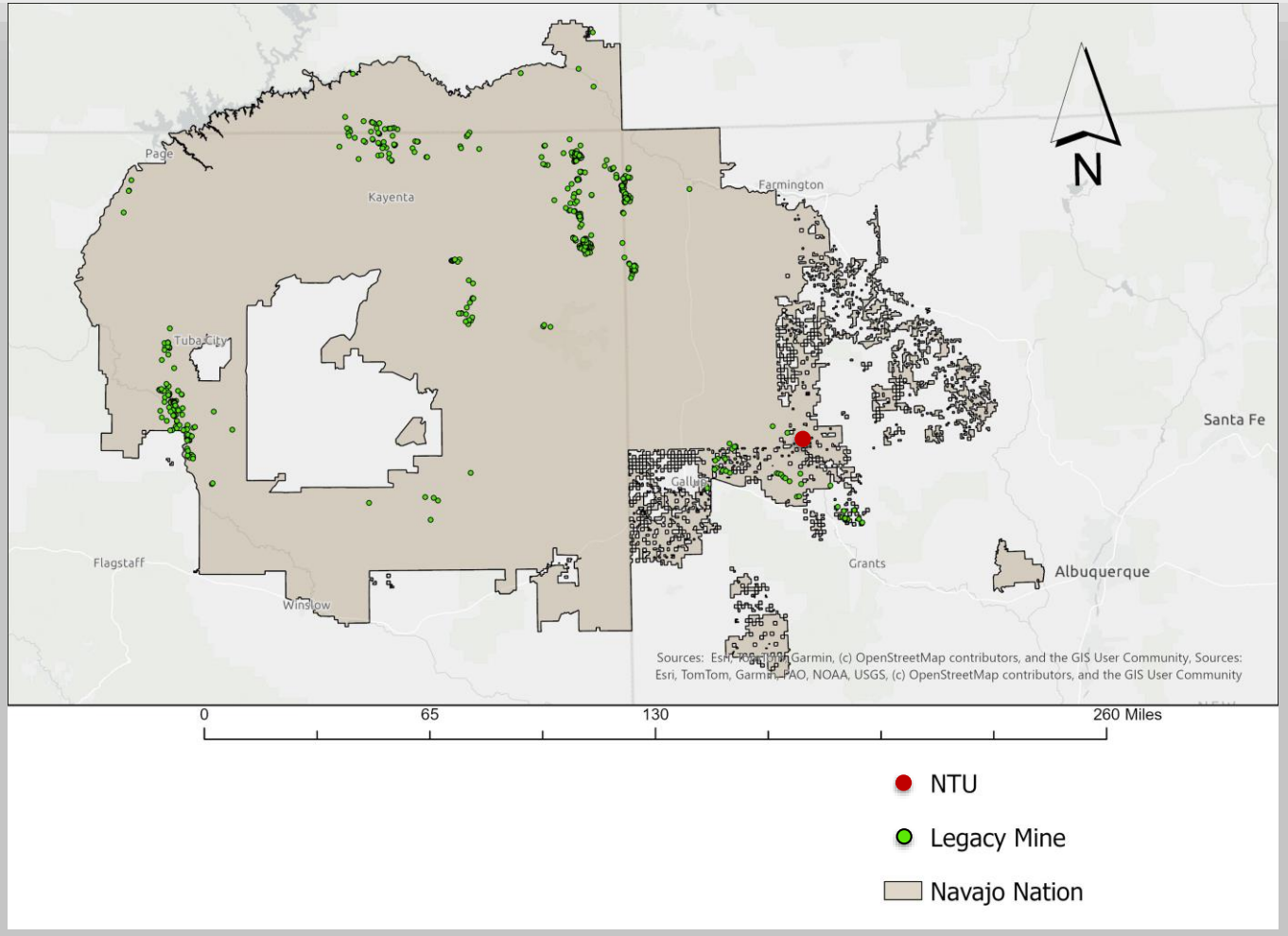
Exposure Limits

- EPA Action Level: **4 picocuries per liter (pCi/L)**
- WHO Reference Level: **100 becquerels per cubic meter (Bq/m³)** (≈ 2.7 pCi/L)
  – More conservative exposure target.
- EPA and WHO guidance were used to evaluate NTU radon measurements.



Uranium Mining on Navajo Nation

- Approximately 30 million tons of uranium ore extracted (1944–1986)
- 500+ abandoned uranium mines remain
- Potential impacts to air, water, soil, livestock, and communities



Why Uranium Matters

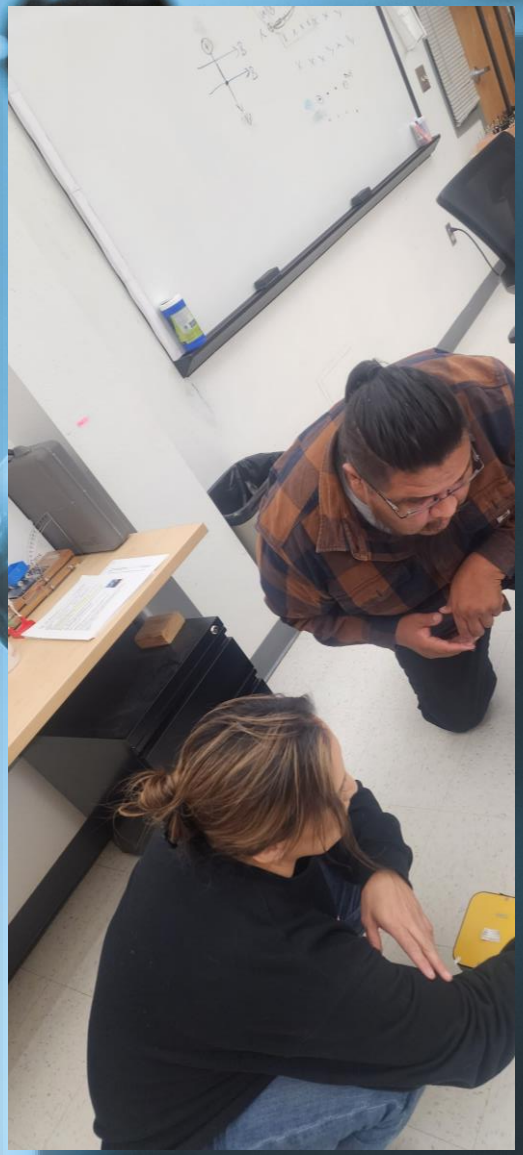
- Energy Production
- Defense Applications
- Industrial Uses
- Scientific Research

Research Objectives

- **Evaluate** radon levels around NTU premises
- **Compare** measurements between years
- **Establish** baseline environmental data
- **Support** future monitoring efforts

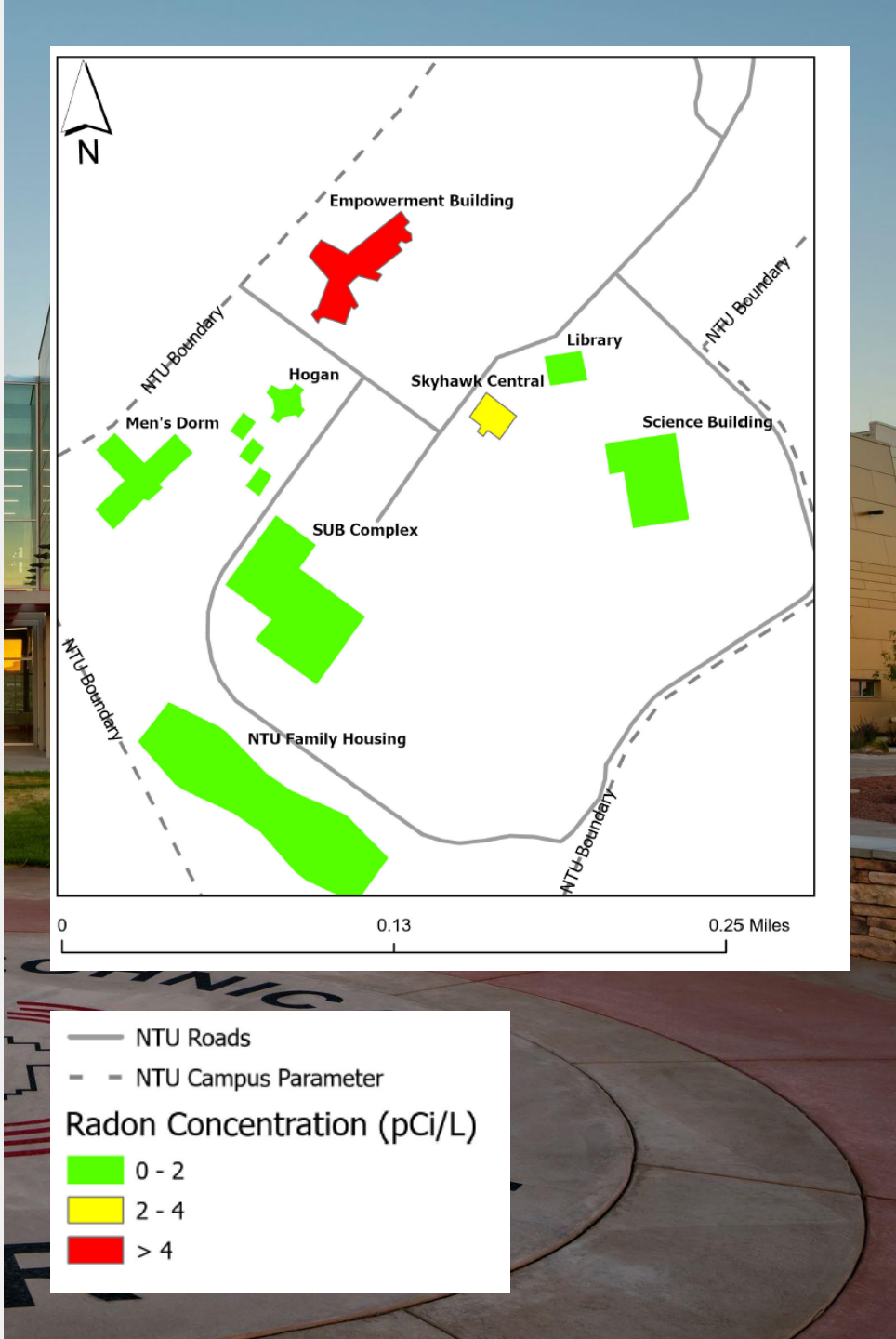
Methods

- Corentium radon detectors
- 48-hour sampling periods
- Multiple campus locations
- Results reported in **pCi/L**



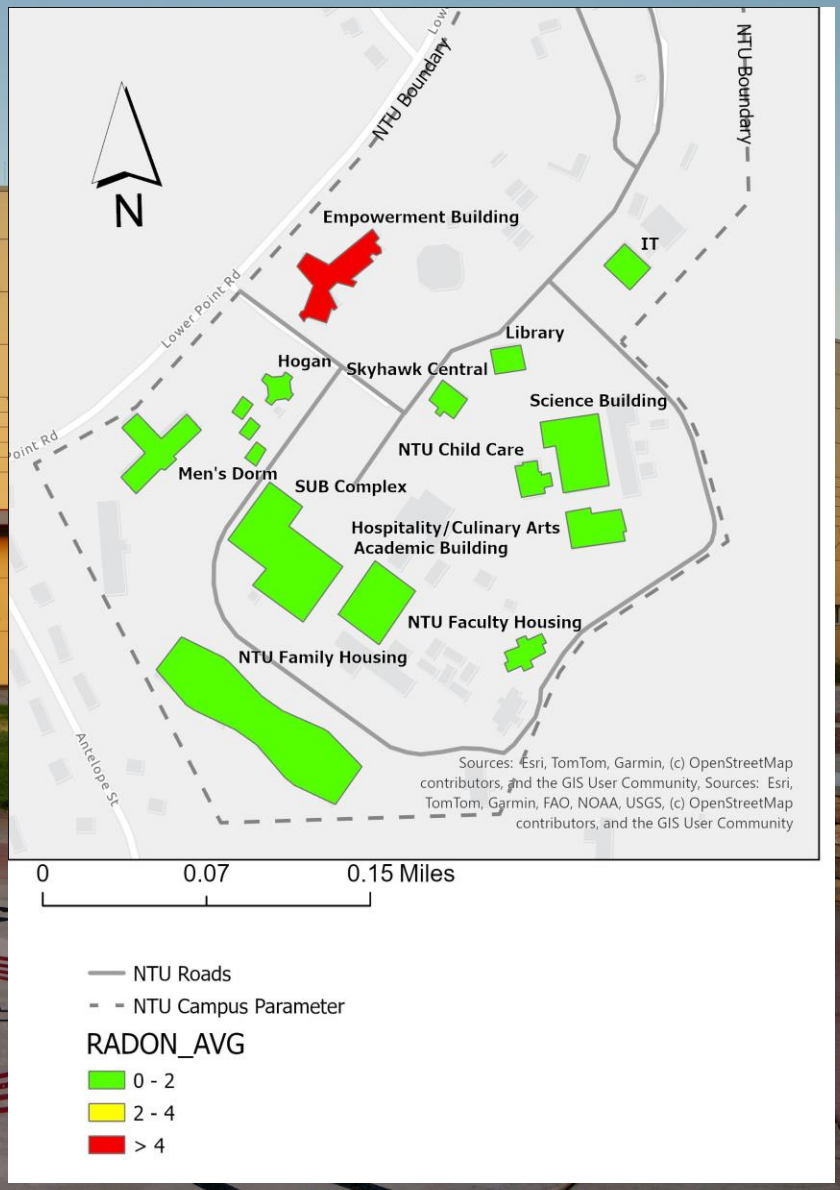
2025

- Campus monitoring established baseline radon conditions.
- The Empowerment Building showed the highest measured concentrations.
- Most campus buildings remained below the EPA action level.
- Results supported continued monitoring and targeted follow-up testing.



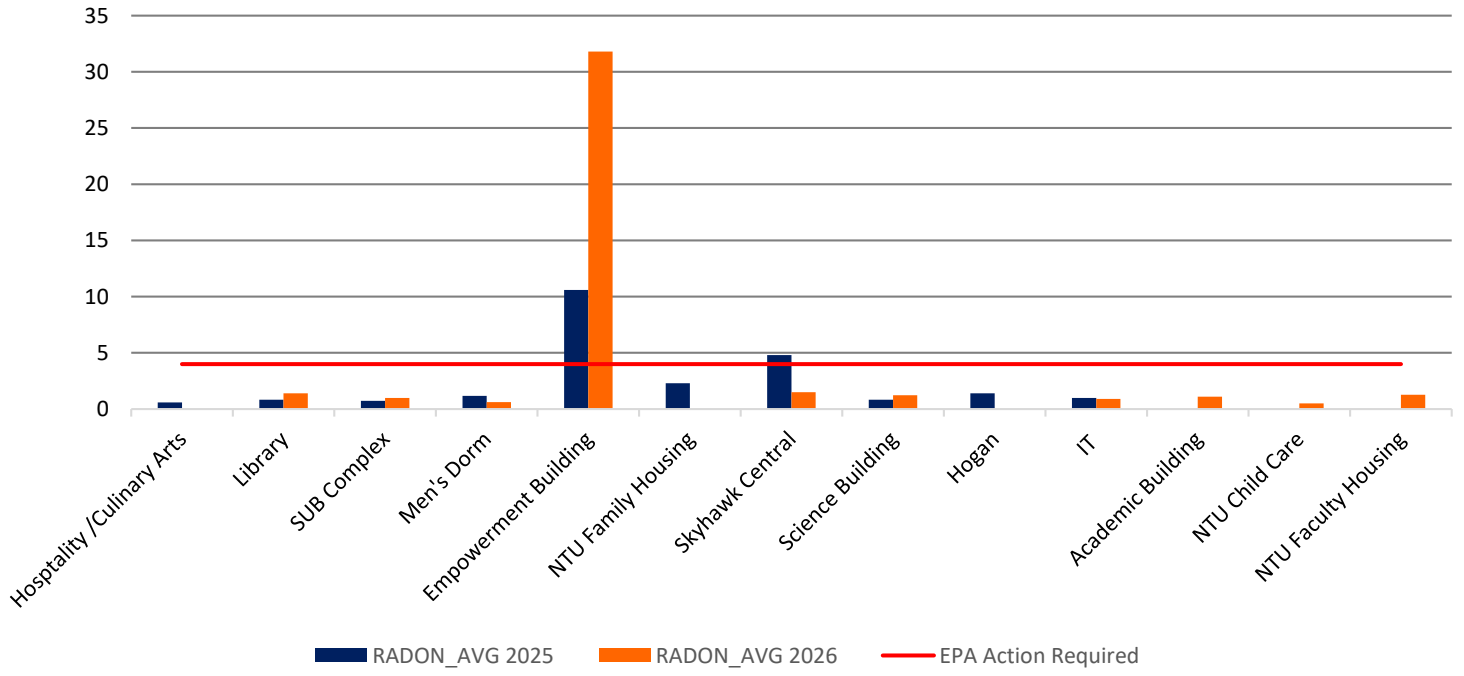
2026

- 12 of 13 monitored locations measured below the EPA action level.
- The Empowerment Building averaged **31.8 pCi/L**, exceeding the EPA action level.
- Elevated readings were concentrated in basement areas.
- Follow-up monitoring is underway

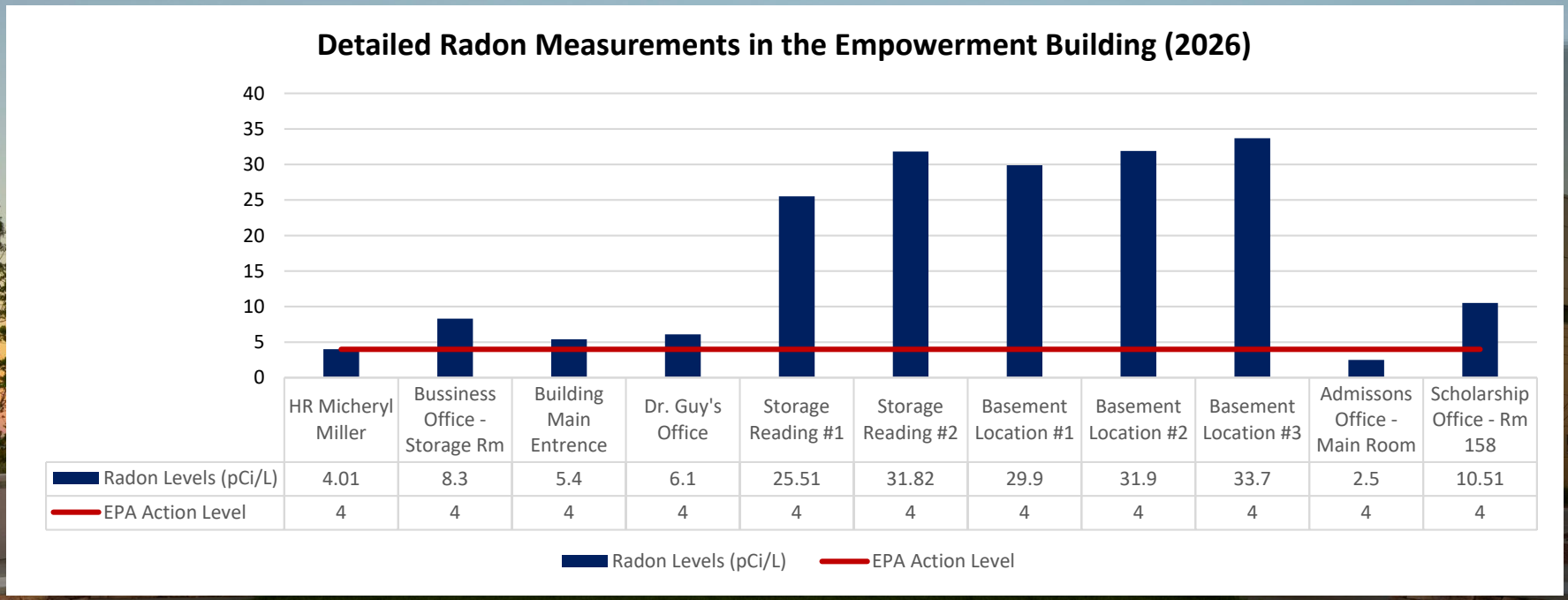


Comparison (2025 vs 2026)

- Most monitored locations remained below the EPA action level (4 pCi/L).
- Empowerment Building average increased from 10.59 to 31.8 pCi/L.
- Skyhawk Central decreased from 4.8 to 1.5 pCi/L.
- Highest readings were observed in basement environments.
- Additional monitoring is underway to evaluate elevated readings.



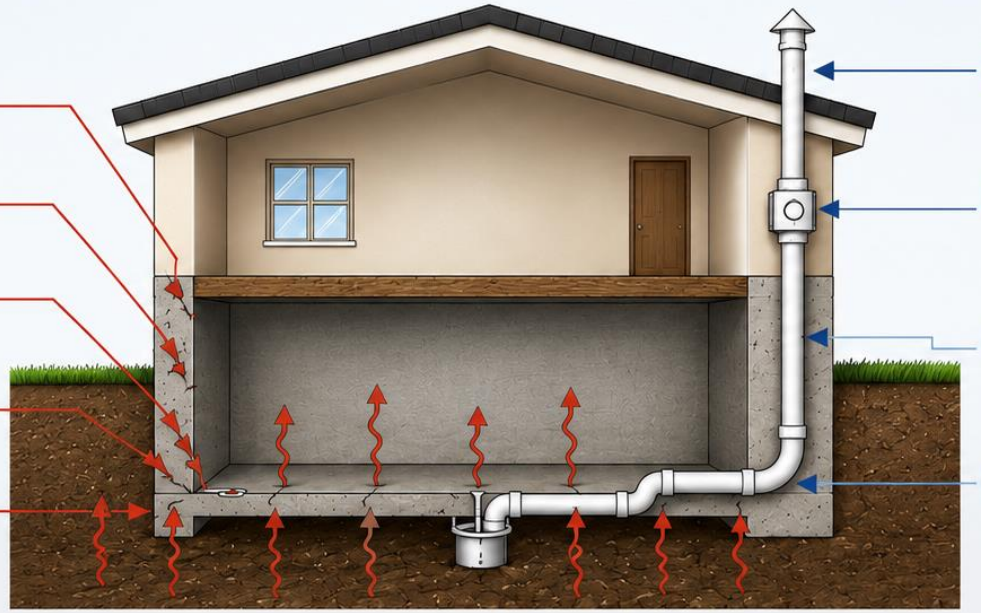
Empowerment Building Assessment (2026)



- Basement measurements ranged from **29.9–33.7 pCi/L**.
- Storage/cleaning area measurements ranged from **25.5–31.8 pCi/L**.
- Multiple locations exceeded the EPA action level of **4 pCi/L**, indicating the need for continued monitoring and evaluation.

Potential Mitigation Strategies

- Additional monitoring to confirm elevated readings and seasonal variation.
- Improve ventilation and air circulation in basement and storage areas.
- Inspect potential radon entry pathways such as cracks and utility penetrations.



Foundation Cracks
Gaps in floors or walls

Utility Penetrations
Pipes, conduits, and drains

Floor–Wall Joints
Gaps where floors meet walls

Floor Drains / Sump Pits
Openings that can allow radon entry

Porous Soil
Radon rises through the soil

Radon Vent Pipe
Discharges radon gas above the roof

Fan (Active System)
Creates suction to draw radon from below

Suction Pipe
Collects radon gas from beneath the slab

Sealing Entry Points
Seal cracks and penetrations to reduce radon entry

Radon measurements indicate concentration levels only. Health risk depends on multiple factors including exposure duration, cumulative exposure, and individual susceptibility. Additional monitoring and professional evaluation are recommended before mitigation decisions are made.

Conclusion

- Most monitored buildings were below the EPA action level for radon.
- Elevated radon concentrations were identified in the Empowerment Building basement and storage rooms.
- Radon levels varied significantly between different areas within Empowerment Building.
- Follow-up monitoring is underway to evaluate elevated readings.
- This study establishes an updated radon baseline for the NTU Crownpoint campus.

Future Plan

- Expand monitoring to additional campus buildings.
- Conduct seasonal and long-term radon monitoring.
- Investigate potential mitigation strategies for elevated readings.
- Continue developing a radon database for NTU facilities.

Acknowledgements

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