



Performance Evaluation of Radon Monitors with SNOLAB and Health Canada

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1 minute

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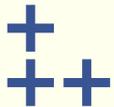
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Final Analysis and
Discussion

1.5 minutes

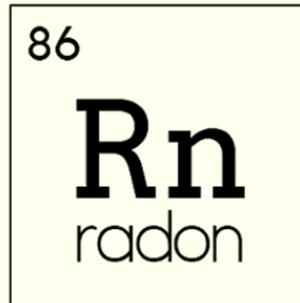
Conclusion and
Future Work

1 minute



What is Radon?

- ★ Radon Overview:
 - Radon is a radioactive gas from the decay of uranium and thorium.
 - It is invisible, odorless, and tasteless, making it difficult to detect.
- ★ Health Impacts:
 - Radon exposure is the second leading cause of lung cancer.
 - Accumulates in enclosed, poorly ventilated spaces, particularly underground.



<https://aktinovia.com/measurement-radon-gas-radiations/>



Project Rationale

- ★ Current Measurement Methods:
 - Traditional methods involve long-term monitoring and lab analysis.
 - Real-time monitors offer convenience but may lack accuracy.
- ★ Need for Reliable Monitoring:
 - Accurate monitoring is crucial for proper report of household measurements.
 - The project aims to evaluate and compare various radon monitors.



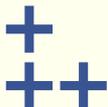
Figure 1: Hand-held radon detector

<https://www.homedepot.ca/product/airthings-corentium-battery-powered-digital-home-radon-detector/1001087503>



Figure 2: Modern electronic radon detector

https://ecosense.io/en-ca/products/radoneye?srsId=AfmBOopW3eOOpmTyY5mac7xv516UMxvygd_Oy9N98Xig3IXzV8nRkFX



Overview of the Project

- ★ Project Goals:
 - Evaluate the accuracy of 13 radon monitors provided by Health Canada.
 - Compare commercial monitors with professional-grade models like AlphaGUARD and RAD7.
- ★ Initial Setup: Monitors were tested at the surface level before being moved underground.

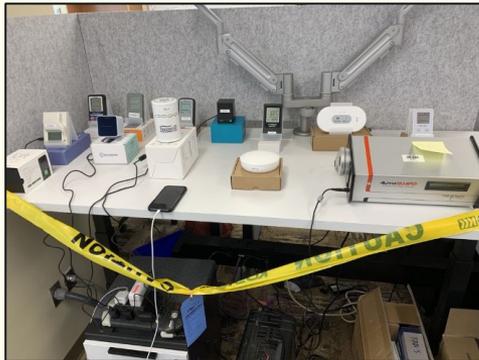


Figure 3: Initial Setup

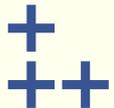


Figure 4: Underground Setup



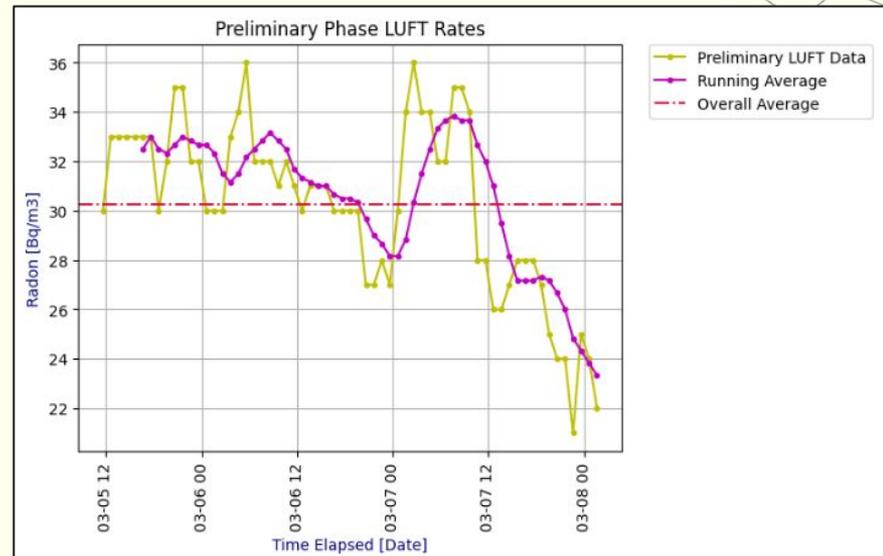
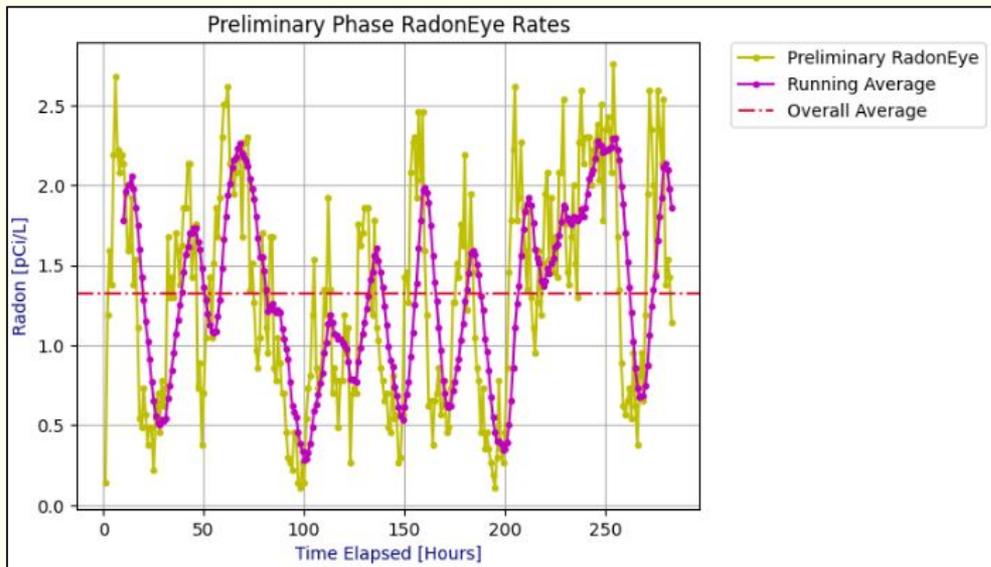
Preliminary Phase - Setup and Initial Data

- ★ Surface-Level Setup:
 - Monitors were arranged 10 cm apart in SNOLAB's surface building.
 - Data was collected manually and through photos and apps.
- ★ Initial Findings:
 - Some monitors faced connectivity issues, likely due to Wi-Fi compatibility.
 - Early data showed fluctuations, suggesting a need for calibration.



Preliminary Phase - Setup and Initial Data

- ★ Radon Variation: Significant differences in radon levels across monitors.
 - LUFT monitors were showing higher readings, while RadonEye monitors were highly accurate.



++ Figure 5: RadonEye Preliminary Phase Radon Monitor Rates with AlphaGuard

Figure 6: LUFT Preliminary Phase Radon Monitor Rates with AlphaGuard

Underground Phase - Setup and Monitoring

- ★ Underground Setup:
 - 45 monitors installed in SNOLAB's Low Background Lab, 10 cm apart.
 - Monitors separated by data collection type (manual vs. app-associated).
- ★ Routine Data Collection:
 - Manual monitors were photographed daily for data recording.

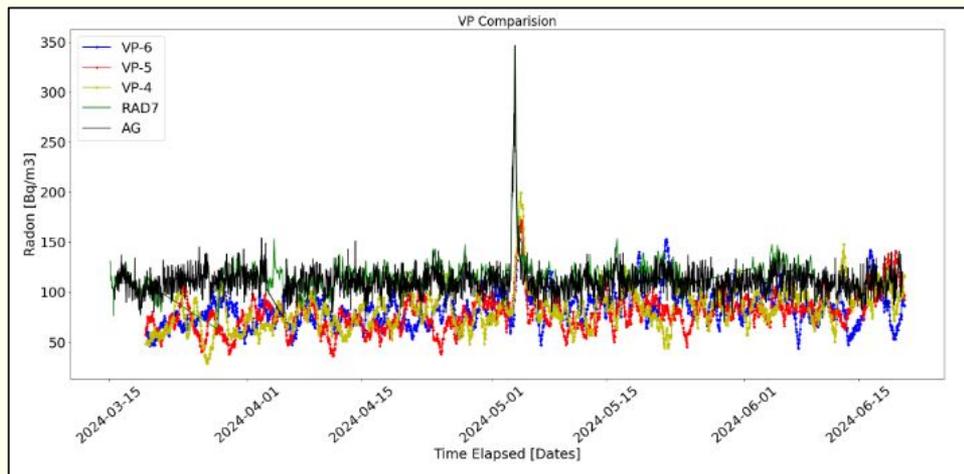
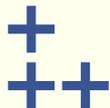


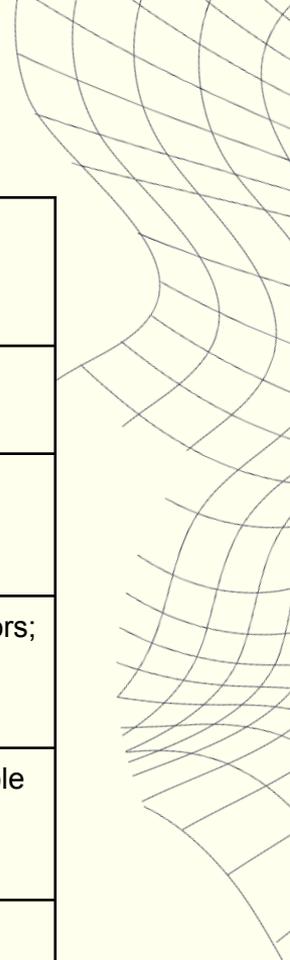
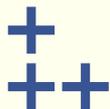
Figure 7: Underground Phase VP Radon Monitor Rates with AlphaGuard



Results

Monitor Type	Average Radon Level (Bq/m ³)	Accuracy (%)	Performance Summary
Life Basis Intelligent	81-93	-26.9 to -16.2	Generally underestimated radon levels.
Airthings View Plus	79-83	-28.9 to -25.3	Consistently low readings; significant underperformance..
Airthings Wave Plus	73-83	-35.2 to -26.2	Lowest readings among app-based monitors; poor accuracy.
EcoQube	135-139	+21 to +25	Overestimated radon levels; relatively stable performance.
RadonEye	113-117	+1.8 to +5.1	Most accurate monitor; minor deviations.

Table 1: Monitor Results



Final Analysis and Discussion

★ Key Findings:

- 24 out of 36 monitors were within 25% accuracy compared to AlphaGuard.
- RadonEye and CRAD monitors showed the highest reliability.

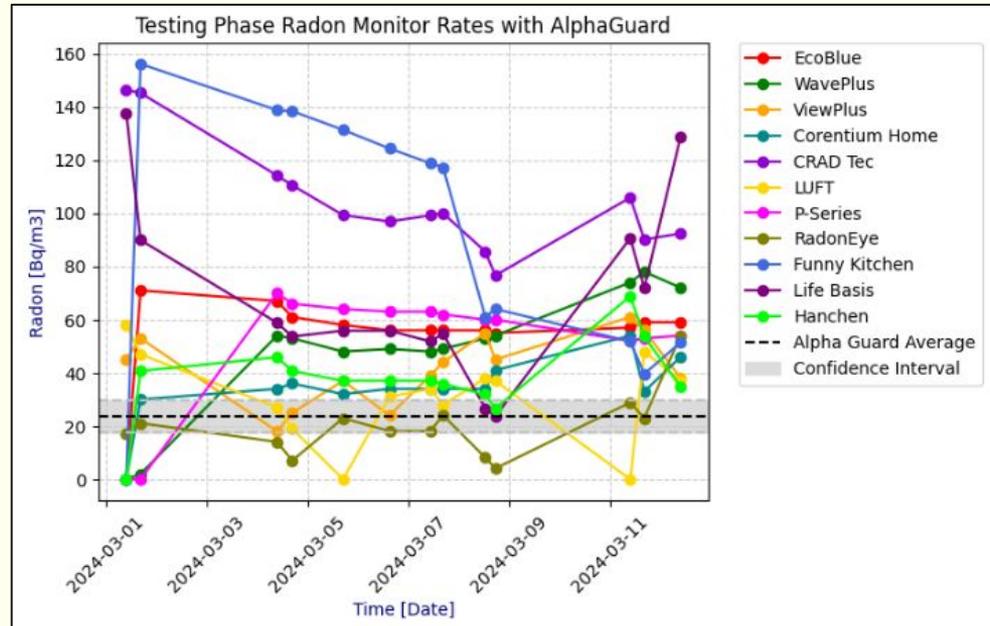


Figure 8: Testing Phase Radon Monitor Rates with AlphaGuard



Conclusion and Future Work

- ★ Summary of Results:
 - The project effectively evaluated the accuracy of various radon monitors.
 - Identified reliable monitors and areas needing improvement.
 - An STR presenting the results from this study is in progress.

- ★ Future Directions:
 - Implement radon progeny testing with an Alpha-Beta Counter.
 - Further research into environmental factors affecting monitor performance.



Questions?