

Determination of Radon Activity Concentration in Indoor Air at Groundwater Source Facilities in Albania

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Abstract

- Groundwater is the main source of drinking water in many countries. Owing to its continuous interaction with geological formations, high uranium concentrations in rocks may result in the release of radon gas, which can dissolve into the water. Part of this dissolved radon is then released into the environment when the water first comes into contact with air, as well as during its flow and agitation at the source. For this reason, increasing awareness among national authorities and the general public about the risks associated with radon exposure is of considerable importance.
- The regulatory framework in Albania, defined by Decision of the Council of Ministers No. 957, dated December 2, 2015, titled “Regulation on guideline levels of radon concentration in indoor environments and radionuclide concentrations in goods affecting the general public,” specifies in Article 6, a reference level of 300 Bq/L for radon concentration indoor.
- This study aims to determine the activity concentration of radon gas in air at the most frequented groundwater source locations in Albania. For each location, two parallel measurements were conducted.

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The measurements were carried out using the RADON EYE+2 instrument at the Institute of Nuclear Physics in Tirana, in close collaboration with the Faculty of Geology and Mining. This work was conducted within the framework of the project entitled “Chemical, radiological, and microbiological characterization of geothermal waters used for therapeutic purposes in Albania” (AKKSHI).

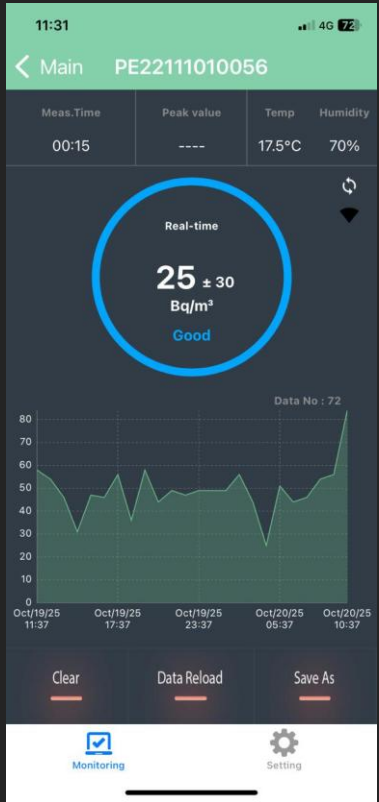
- The results showed that the levels of radon gas activity level in the waters samples were within reference level of 100 Bq/l.

Objectives

- The main objective of this study is to monitor and assess population exposure to radon gas originating from geothermal waters used for therapeutic purposes. Since thermal waters in Albania are widely utilized by the population for health-related treatments, it is important to identify any potential exposure and to establish continuous monitoring of natural radioactivity, specifically radon gas, associated with these water sources.

Study Areas

- The study focused on five major geothermal locations in Albania that are extensively used by the public for therapeutic purposes: Bilaj, Peshkopi, Elbasan, Benja (Përmet), and Sarandoporo (Leskovik).



Radon EYE +



Radoneye
plus2 characteristic

- **Measurement Range:** 7 to $(9,435 \text{ Bq/m}^3)$ (0.2 to 255 pCi/L)
- **Measurement Interval:** 10-minute update cycles (displays 60-minute moving averages)
- **Sensitivity:** (0.5 cpm/pCi/L)
- **Accuracy/Precision:** $(< \pm 10\%)$ at (370 Bq/m^3) (10 pCi/L)
- **Connectivity:** Wi-Fi (for remote/cloud monitoring) and Bluetooth LE (for local setup via app)
- **Smart Integrations:** Compatible with the mobile app (iOS/Android) and Amazon Alexa
- **Sensors:** Also monitors ambient temperature and relative humidity
- **Dimensions:** 80 mm (diameter) × 120 mm (height) | Weight: 240g
- **Display:** 0.96-inch OLED screen

Bilaj	Peshkopi	Elbasan
25±30 Bq/m ³	20±30 Bq/m ³	22±30 Bq/m ³
25±30 Bq/m ³	20±30 Bq/m ³	22±30 Bq/m ³

Radon values in the air with the active method (measurement and result obtained directly at the stations we have been to so far) measured using the Radon eye + device

Conclusions

- Bilaj showed the highest radon concentrations among investigated sites.
- Radon loss during water transport through pipelines may significantly reduce airborne exposure.
- Geological characteristics strongly influence radon concentration in groundwater.