

# Radon and Uranium Concentration Distribution of the Groundwater in Korea

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*Abstract – To know radon and uranium concentration variations in groundwater with regional difference, six hundred fifteen samples were collected at five different geological rock areas. The highest concentration values of radon and uranium were 1480 Bq/L and 402 µg/L, respectively. The mean radon and uranium concentration of five different geology areas are 66.5±81.8 Bq/L, 0.55±1.12 µg/L at metamorphic rock region, 59.6 ±128.2 Bq/L, 10.5±42.5 µg/L at plutonic rock region, 32.5±51.2 Bq/L, 1.51±9.61 µg/L at sedimentary rock region, 70.7±166.2 Bq/L, 0.59±1.02 µg/L at Okchun metamorphic rock region and 8.8±5.9 Bq/L, 0.06±0.09 µg/L volcanic rock region.*

*Keywords –radon, uranium, groundwater*

## I. INTRODUCTION

Since <sup>222</sup>Rn readily dissolves in water under pressure, groundwater is another source of radon accumulation. High concentration of <sup>222</sup>Rn may cause concern about its effects on health. Either drinking groundwater or breathing can give rise to exposure of humans to its radiation and may result in cancer deaths showed that approximately 1–7% of lung cancer fatalities in the USA relevant to indoor radon levels arise from groundwater.

In this paper, we present the first results of the investigation on the radon and uranium concentrations of groundwater in Korea with different rock region.

## II. EXPERIMENTAL

### A. Materials and methods

Groundwater samples were collected from 615 public and private wells. Before sampling, we pumped out groundwater in the well pipe for 10 min. The groundwater sample was collected in a 1 L beaker and special care was taken not to allow air bubbles in the sample, which may cause loss of radon gas. After than 8 mL radon sample was directly mixed with 12 mL cocktail solution contained 20 mL counting vial. We measured the <sup>222</sup>Rn concentrations after at least 3 hours had elapsed from the sealing, so that radioactive equilibrium between <sup>222</sup>Rn and its progeny could be reached.

## III. RESULTS AND DISCUSSION

The measured values of the <sup>222</sup>Rn and uranium concentrations in groundwater in Korea are displayed in Table 1. The highest average radon content was showed in plutonic rock region. The highest radon value was 1480 Bq/L in Okchun metamorphic rock sample and seventy five samples were exceeded 152 Bq/L. The most uranium content showed below 6 µg/L and plutonic rock region showed highest content. The samples of uranium content exceeded 30 µg/L, which was maximum contaminated level proposed by USEPA, were 19 and it was located in plutonic rock region.

Table 1. Average radon and uranium concentrations in the groundwater of five different geology

Geology	Sample	Mean	
		Rn(Bq/L)	U(µg/L)
Metamorphic rock	129	66.5±81.8	0.55±1.12
Plutonic rock	232	59.6±128.2	10.5±42.5
Sedimentary rock	155	32.5±51.2	1.51±9.61
Okchun metamorphic rock	89	70.7±166.2	0.59±1.02
Volcanic rock	10	8.8±5.9	0.06±0.09

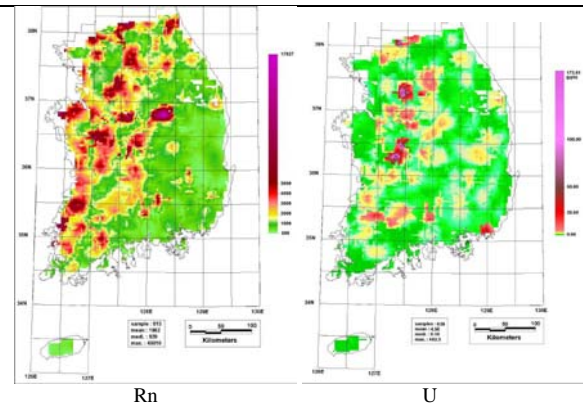


Fig. 1. Rn and U concentration distribution in Korea.

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