



Radon concentrations in community groundwater systems in Korea

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The CGS (community groundwater system) is the most popular groundwater supply system in Korea as portable water for rural and mountain areas where access to the nationwide water work is not easy. In 2013, there are more than 7,000 CGS in the country with an average capacity of 30 m³/day sufficient for 50 people. Because nearly two-thirds of Korea is composed of crystalline rock, radon levels in groundwater of some CGS would be high. Radon is one of the most important natural radionuclides with a half-life of 3.82 day by decay, commonly emitted from rocks, soils and groundwaters as an inert gas without color and odor. Radon present in water can accelerate an indoor radon level and induce the incident possibility of stomach cancer because it may also be released from water while using groundwater. Samples were collected from 3,821 CGS and analyzed for radon concentrations from 2007 to 2016. The well depth of the CGS ranged from 10 m to 450 m having a median value of 116.4 m. The measured radon level of 3,821 CGS ranged from 0.1 to 2,395.5 Bq/L, with a median value of 46.4 Bq/L. About 27.0 % of the CGS was equal to or greater than 100 Bq/L, WHO guideline value of 2011 and 4.5 % of the CGS was equal to or greater than 300 Bq/L, Finnish action level for units with more than 50 consumers. To see radon level of CGS according to the geology, 3,821 CGS was grouped into 10 geological units considering geologic era, lithology, and distribution coverage of each geology. Significantly high radon concentrations were found in CGS from granite rock area (CGRA, JGRA, and PGRA) and Precambrian metamorphic rock (PMET) area compared with other rock units. The lowest radon concentration was found from porous volcanic rock area (PVOL). NO CGS was observed exceeding 100 Bq/L of radon concentration from PVOL area. Average radon concentration of CGS from JGRA is 139.8 Bq/L and the percentage of CGS with radon concentration exceeding 100 Bq/L was found to be 52.4 %. To date, there has not been any recommended guideline values for radon in portable groundwater. However, there is a strong need to reduce radon level when exceeding the WHO guideline or such high radon levels in groundwater for ensuring the public health of the country.