

Geochemical and radionuclide profile of Gülbahçe Geothermal Region, Izmir City, Turkey

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Gülbahçe Geothermal Field (GGF) is located in northwestern Turkey on the southeastern Karaburun Peninsula. The stratigraphy around the GGF is represented by a Miocene volcano-sedimentary succession, including several sedimentary and volcanic units. GGF is located on the Gülbahçe Fault Zone that is controlled by NE/NW-trending strike-slip faults and NE/NW-trending oblique-slip normal faults. An association of these active faults accommodating deep circulation of hydrothermal fluids of sea water origin is the primary control mechanisms of geothermal systems of Gülbahçe. Soil and water samples were collected from 2011 to 2014 to determine geochemical and radionuclide properties region. Physical and chemical properties of water measured in situ. The result shows that surface temperature of fluid range from 31 to 37°C. Geothermal fluids of GGF have high salinity (EC > 34 mS/cm) and low enthalpy. In addition, the natural radioactivity concentrations in the soil samples were determined using gamma-ray spectrometry and the outdoor absorbed dose rates in air from naturally occurring radionuclides in soil were calculated. The soil activity concentrations range from 21 to 52 Bqkg⁻¹ (averaging 35 Bqkg⁻¹) for ²³⁸U, from 22 to 58 Bqkg⁻¹ (averaging 38 Bqkg⁻¹) for ²³²Th, from 498 to 1178 Bqkg⁻¹ (averaging 750 Bqkg⁻¹) for ⁴⁰K. The highest values of ²³⁸U and ²³²Th were found in the soil samples obtained from an area close to the hot springs.

Keywords: Geothermal Fluid, High Salinity, Natural Radioactivity, Absorbed Dose, Gülbahçe.