



Geochemical evaluation and conceptual modeling of the Edremit geothermal field (NW Turkey)

Özgür Aşar (1), Nilgün Güleç (2), and Mahmut Parlaktuna (3)

(1) Muğla Sıtkı Koçman University, Department of Geological Engineering, Muğla, Turkey, (2) Middle East Technical University, Department of Geological Engineering, Ankara, Turkey, (3) Middle East Technical University, Department of Petroleum and Natural Gas Engineering, Ankara, Turkey

The Edremit geothermal field is located in the Edremit Graben, which forms an integral part of the Western Anatolian Graben System in Turkey. In the field, the geothermal energy is currently used in heating 5000 houses. A total of 21 wells were sampled in this study for the purpose of hydrogeochemical conceptual modeling. Chemical analyses results indicate that the waters belong to three different types of hydrogeochemical facies, namely Na+K – SO₄, Ca – SO₄ and Ca – HCO₃ type. According to the stable isotope results, all hot and cold waters are meteoric in origin. Radiocarbon dating revealed a positive correlation between the wellhead temperatures and the residence times of waters. “Mixing” and “water rock interaction” are the main subsurface processes that are affecting the water chemistry. By detailed investigation of well logs, two intersecting buried faults are detected in the field. The geothermal system is highly affected by these faults. The groundwater is fed by precipitations on highlands, percolated towards the deeper parts of the crust through deep seated, graben forming step faults, and heated at depth. During its ascent towards surface, geothermal water invades two superimposed aquifers, lower confined and upper unconfined. Mixing between hot and cold waters takes place in the aquifers.