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## **HALL – C [ThS25]-Geothermal**

### **Structural Controls on Gülbahçe Geothermal System and Its Hydrogeochemical Properties (Western Turkey)**

*Taygun Üzelli<sup>1</sup>, Gamze Gül Mungab<sup>2</sup>, Alper Baba<sup>2</sup>, Hasan Sözbilir<sup>3</sup>*

<sup>1</sup>*Hacettepe University, Department of Geological Engineering, Ankara, Turkey*

<sup>2</sup>*Izmir Institute of Technology, Geothermal Energy Research and Application Center, Izmir, Turkey*

<sup>3</sup>*Dokuz Eylül University, Department of Geological Engineering, Izmir, Turkey*

Gülbahçe Geothermal Field (GGF) is located in eastern parts of the Karaburun Peninsula and is about 45 km away from the city of Izmir, Turkey. The stratigraphy around the GGF is represented by a Miocene volcano-sedimentary succession, including several sedimentary and volcanic units. These units overlie the basement rocks of the Karaburun Platform Carbonates and Bornova Flysch Zone which consists of carbonate blocks embedded in sandstone and mudstone alternations. GGF is located on the Gülbahçe Fault Zone, and are composed of series of NW-SE to NE-SW trending faults, extending from Sığacık Bay to Gülbahçe Bay. While most of the geothermal systems in western Turkey are controlled by normal faults, geothermal systems at the Gülbahçe are 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.

The hydrogeochemical properties of GGF show 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. Piper and Schoeller diagrams indicated that geothermal fluid is in NaCl facies. The isotopic data (oxygen-18, deuterium and tritium) represent that geothermal fluid are formed by local recharge and deep circulation of sea waters.

**Keywords:** *Geothermal fluid, Gülbahçe Fault Zone, Isotope, High salinity, Western Turkey*

### **Hydrothermal Alteration Studies in Balçova Geothermal Field**

*Mine Alacalı<sup>1</sup>*

<sup>1</sup>*Atatürk University, Oltu Faculty of Earth Sciences, Dept. of Petroleum and Natural Gas Engineering*

Balçova Geothermal Field is located 10 km western part of Izmir city. The lithology in the field, from oldest to youngest, are the Upper Cretaceous Izmir Flysch, Miocene aged Yeniköy Formation consist of sandstone, claystone and limestone, Pliocene aged Cumaovası Volcanites consist of agglomerates, tuff, andesites and rhyolites, Quaternary alluvium and debris flows. By examining the structural, hydrogeological, geochemical properties of the Balçova Geothermal Field, the relationship between these and geothermal potential of the field has been searched. Hot water samples have been taken from the deep wells of the Balçova Geothermal Field. The analysis of the samples have been run in the computer program named "Aquachem 3.70" and classified by the diagrams obtained. Afterwards the examination of the well-logs of the several deep wells; cutting samples and well-cores have been taken from the appropriate levels and have been studied by the means of petrology and hydrothermal alteration. As a result; 3 zones have been determined in the field. These are; montmorillonite + kaolinite zone (100-200°C), transition zone (150-200°C) and chlorite + illite zone (200-250°C).

**Keywords:** *Balçova, Geothermal, Hydrothermal alteration*