

Similarities between Green River oil shale (Colorado, Utah and Wyoming, USA) and Cayirhan oil shale (Bey pazari, Ankara, Turkey)

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Bituminous rocks comprise the second largest potential fossil fuel in Turkey. The current resource is 1.6 billion tons; the total resource is predicted to be much more. One of the most important oil shale deposit is located in Cayirhan (Bey pazari, Ankara). Miocene aged Cayirhan oil shale formed in an extended limnic basin. Oil shale, trona and lignite occur in the lower part, and sodium sulfate and gypsum occur in the upper part of the sedimentary sequence in the Miocene aged Cayirhan basin. In the basin the host rocks are marlstone and claystone in which organic matter is heterogenously and finely dispersed. The occurrence of authigenic zeolites and preservation of the organic matter indicate hypersaline conditions prevailed in the closed basins. The oil shale occurs in the Hancili Formation consist of marlstone, claystone, dolomitic limestone, dolomite and magnesite, intercalated with tuffaceous horizons and chert. The formation contains trona alternating with oil shale and resembles the Eocene Green River Formation in Colorado, USA. The amount of the resource having a calorific value >1000 kcal/kg is around 330 million tons. The organic carbon content of Cayirhan oil shale is approximately 6.5%. The average calorific value is 3.5 MJ/kg; the oil content is 5.4% from Fischer assay, and based on this value, it contains on average 60 l/ton shale oil. The largest known oil shale deposits in the world are in the Green River Formation (GRF) of Colorado, Utah, and Wyoming. Lacustrine sediments, predominantly marlstone, consist primarily of carbonate and silicate minerals of the GRF were deposited in two large lakes in the Piceance, Uinta, Green River, and Washakie Basins. Fluctuations in the amount of stream inflow caused large expansions and contractions of the lakes, as evidenced by widespread intertonguing of marly lacustrine strata with beds of land-derived sandstone and siltstone. During arid times, the lakes contracted in size and the lake waters became increasingly saline and alkaline. The warm alkaline waters provided excellent conditions for the abundant growth of cyanobacteria (blue-green algae), which are thought to be the major precursor of the organic matter in the oil shale. The section with the richest oil shale can exceed 40 gallons of oil per ton of shale and is commonly over 100 feet thick.