

The effects of abandoned and active coal mines near Küçükdoğanca region (Keşan-Edirne) on environment

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Thrace Basin is one of the most important coal basins in Turkey. There are a lot of coal deposits in the basin and they are generally low rank (subbituminous or lignite) formed. The coals have low calorific value, low total sulfur, high moisture and high ash contents. In the basin, in which the rural settlements are widespread, groundwater is almost the sole drinking water source. This study deals with effects of coal mines around Küçükdoğanca on the physicochemical features of the ground- and surface waters. Coal and water samples (in both dry and wet seasons) were taken from different locations. Coal samples were analyzed in terms of mineralogical and chemical composition, while the water samples were analyzed for major and trace element composition. The obtained results were evaluated together in terms of environmental impact. It has been determined that sulfur minerals, such as pyrite and pyrrhotine, content in overall coal samples representing Küçükdoğanca field is low and range only from 1 to 3 %. Sulfur values in coal ash analyses were correspondingly low and resulted in 1.32-7.76 % interval. Heavy metal analyses on coal ash reveal that contents of elements as As, Be, Cd, Co, Cu, Hg, Mn, Ni, Pb, Sb, Se, Th, U, V, Mo and Zn are high and transcend the world average in some samples. Especially, contents of such trace elements as Ni, Co, V,

Cu, Pb, Zn, As, Be, Th and U are well over the world average. For instance, concentrations of U, Th and As range from 5,8 to 11,2 ppm, 11,2 to 32,9 ppm and 8,2 to 247,9 ppm, respectively. In-situ measured pH and EC in water samples range from 6,55 to 9,12 and 6,94 to 8,63 and from 708 to 4470 $\mu\text{S}/\text{cm}$ and 642 to 4820 $\mu\text{S}/\text{cm}$, in wet and dry seasons, respectively. The lowest pH and highest EC values have been reached on the ground waters passing through coalfields. On the other side, SO_4 concentrations of the water samples varied from 97,23 mg/lit to 2829,06 mg/lit in the wet season and 43,07 mg/lit to 1592 mg/lit in the dry season, and higher contents are also related with the coalfields. The water samples were analyzed for Ag, Al, As, B, Ba, Be, Br, Cd, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se, Sn, U and Zn and it was concluded that the results are substantially comply with the drinking water standards accepted by WHO. Among these elements, only the Mn content in samples collected from three wells exceeded the limits of the standards. The joint interpretation of results obtained from coal, coal ash and water samples suggest that, around Küçükdoğanca area, the possibility of environmental pollution sourced from mineralogical and chemical properties of the coal deposits is low.

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