



Occurrence of PAH Contamination in a Volcanic Rock Aquifer in Relation to Paleoenvironmental Development

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The volcanic rock aquifer underlying the large plain of Kayseri City, central Turkey is recharged mainly from snowmelt water from the snow-ice cover of the Erciyes Volcano. The aquifer is composed of various volcanic rocks of different hydraulic characteristics and has a high yield owing to the large openings as lava flow tubes and slag layers. Pumping tests suggested that well yields may be as high as 400 L/sec/m. With regard to inorganic constituents including trace elements, the groundwater of the volcanic rock aquifer is classified as very high quality. The total dissolved solids are about 240 mg/l and the hardness is lower than 14F. The volcanic rock aquifer is overlain by alluvium deposits, which form a secondary aquifer in the region. The shallow groundwater in the alluvial aquifer is contaminated mainly by domestic wastes and agrochemicals. No evidence was found that the volcanic rock aquifer is contaminated although the overlying alluvial aquifer is contaminated by domestic wastes and agrochemicals. This is because, the alluvial aquifer is separated from the underlying volcanic rock aquifer by thick massive less fractured basaltic layers. However, the groundwater in the volcanic rock aquifer was found to be contaminated by polycyclic aromatic hydrocarbons (PAH), considered as carcinogenic contaminants. Analyses have revealed that the total PAHs occurs in the groundwater as high as 0.0536 mg/L. The study on the origin of the PAHs suggested that peat layers that exist in the alluvial deposits overlying the volcanic rock aquifer are the source of PAHs. The peat layers have occurred within the alluvial deposit as a result of sequential warm and humid periods in the geological history of the plain.

This paper aims at demonstrating the importance of the paleohydrologic/paleoenvironmental development in understanding the hydrogeological systems in terms of water quantity and quality.