

The environmental impacts assessment of Aghdarband coal mine, NE Iran using geochemical and soil/water pollution indexes

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Coal mines as the second fossil fuel, after oil reservoirs, have a significant potential to impact on the environment by releasing different pollutants such as heavy metals and non-metallic elements. Aghdarband coal mine (ACM), located in 145 km NE of Mashhad – Iran, with annual coal and waste production capacity of about 20,000,000 and 6,000 tons, respectively, has a strong potential to pollute the environment. In this paper, to investigate the ACM impact on the environment, samples were taken from water, sediments and coal wastes during washing and coke processing. All water samples filtered, acidified with nitric acid and kept at fridge until analysing. Soil samples were collected from depths of 30 cm and all samples were kept in dry and clean plastic containers. Water samples were analysed using atomic absorption spectrometry (AAS) and soil samples were analysed using graphite furnace and AAS, after preparation and dissolving in nitric acid.

Calculated pollution indices of the Metal Index (MI>1) indicated that river water was polluted seriously. This can be confirmed by calculated Contamination Degree Index (Cd), which shows 60% of water samples significantly contaminated. According to calculated Enrichment Factor (EF) and Geoaccumulation Index (I_{geo}), more than 75% (EF < 2) and 56% (I_{geo} < 0) of soil samples have minimum contaminations or not polluted. In general, the ACM surrounded soils have been affected less by ACM wastes than river water. The correlation between water and soil heavy metals clearly indicate that river polluted water had a very low influence on sediments, which could be due to low permeability of sediments.