

Environmental impact assessment of coal mining at Agdarband, NE Iran

RAHIM DABIRI¹, FEZEH ADLI², MOHAMMAD
JAVANBAKHT³

¹Department of Geology, Islamic Azad University,
Mashhad Branch, Mashhad, Iran,
rahimdabiri@yahoo.com

²Department of Geology, Islamic Azad University,
Mashhad Branch, Mashhad, Iran,
fezeadly@gmail.com

³Department of Geology, Islamic Azad University,
Mashhad Branch, Mashhad, Iran,
mo_ja58@yahoo.com

The present research was conducted in order to assess the soil and water contamination with by heavy metals and potentially toxic elements caused due to Aghdarband's coal mine. This mine is located in about 140 km South East of Mashhad. To achieve the research goals, 21 soil samples and 8 water samples was picked randomly.

Soil geochemical results indicate that, in terms of enriched factor's (EF) mean, the region's soils has the strong enriched factor comparing to As, Cd, Mn, S, Sb, and little enriched factor compared to Cu, Mn, Pb, Zn indicates that most of the elements are in the contaminated area in terms of contamination intensity. This is confirmed by calculating the degree of contamination in the region. Also, the contamination factor (CF) indicates that Cd, Pb elements, S has a moderate pollution in the region. correlational analysis of soil's chemical parameters based on the Pearson correlation coefficients, cluster analysis and principal component analysis shows that sulfur, arsenic, molybdenum and copper have been distributed under the influence of anthropogenic origin (coal washing plant), and magnesium, nickel, cadmium and chromium because of the Lithogenic origin (ultramafic rocks) Environmental impact assessment shows the contamination of soil and sediments in the area with sulfur and cadmium and partly arsenic, lead, and manganese. Geochemical distribution maps show that the elements have maximum concentration in coal washing and coking plant and concentration is gradually reduced by distancing from these sites. Also, sequential extraction method donated that metals Fe, Pb and Cd were bounded to liable fractions (exchangeable and carbonate bound) while Ni, Zn and Cr were associated with residual fraction. Evaluation of contamination indexes (MI and HPI) shows the area contamination of surface water and non-potable water in that region. According to Schuler's diagram, the water resources in the region were in the good to acceptable level. The main factor controlling the regional water chemistry according to Gibbs graph is weathering of rocks and vaporization.