The role of acid mine drainage (AMD) in formation of environmental minerals in Karmozd Coal Mines, Central Alborz, Mazandran Province

M. Gholipour*, A. Mazaheri2, M. Raghimi3, G.H. Shamanian3

1- Islamic Azad University of Gorgan, Young Research Club,
2- Geology Department, Faculty of Sciences, Ferdowsi University of Mashhad.
3- Geology Department, Faculty of Sciences, Golestan University

(Received: 14/11/2009, in revised form: 22/4/2010)

Abstract: Nowadays, acid mine drainage (AMD) is one of the most important problems in coal mine contamination. The Karmozd coal mines in Mazandaran Province are one of the largest and oldest coal extractions in Central Alborz Coal Basin. The samples of coals, host rocks, mine drainages and secondary surface minerals have been collected in summer season of 2005. On the basis of hydrogeochemistry studies of drainages mine in Karmozd, two types of waters including: 1) acid drainage of Mg-SO4 type (pH=4.59) and 2) alkali drainage of Na-HCO3-SO4 type has been recognized. The most important factor in acid drainage formation is non-evacuation of mine drainage in active tunnel number13 and a long term contact of mine drainage with sulphidic minerals. As a result, the concentration of SO4²⁻ contemporary with oxidation of pyrite is increased. The scatter diagrams indicate that with increasing SO4²⁻ which causes the pH and HCO3 to be reduced; while heavy metals, alkali metals, earth alkali metal, (PO4)3⁻, electrical conductivity (EC) and total dissolved solid (TDS) increase in the water. Hydrogeochemistry modeling indicates that minerals such as jarosite, alunite, iron oxide, oxyhydroxide, Al oxide and oxyhydroxide are mainly in over saturation state, while carbonate minerals like calcite, dolomite and aragonite are undersaturated. X-ray diffraction (XRD) proved the existence of natrojarosite, pickeringite, halotrichite, gypsum and iron oxide and oxyhydroxide precipitated due to acid drainage. Gibbs diagram indicates that lithology is the most important factor in increasing the ionic concentration of mine drainage from acidic and neutral to alkali drained.

Keywords: acid mine drainage, coal, Karmozd mine, central Alborz, Mazandaran Province.