

Water-quality Characteristics of Abandoned Coal Mine Drainage and Mine Voids

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Characteristics of acid mine drainage in mining areas continue to be discharged through mine adits even after the mine has been closed, thereby polluting the surrounding environment. One particular method for improving this condition consists of combining several mine drainage sources and guiding them to a single treatment plant to promote an economical water treatment or sealing the mine adit for the purpose of reducing the quantity of mine drainage and improving water quality.

In this study, the impact of mine drainage was evaluated by investigating the drainage and surrounding water systems at the abandoned Waryong–Jeongwon coal mine. The samples for water quality measurement were collected from the mine drainage, minefield, wells around the mine, leachate, and streams.

The mine drainage through the adit was found to be acidic with a pH of less than 3 and had a high concentration of iron (630–580 mg/L). The leachate around the mine was analyzed to have sulfate ion concentration of 104 mg/L and iron content of 3 mg/L. Opposite to the stream direction, the concentration of sulfate ion was 11.5 mg/L, which increased to 50.3 mg/L after passing through the mine area. These results verify the influence of the mine drainage activity.

As per the results of drilling, the groundwater level distribution varied from 13–62 m below the surface, and the borehole 2 had the lowest water level. Moreover, borehole 2 had a pH of 3.73, indicating acidic water, whereas other boreholes had pH values between 5 and 6. Borehole 2 was, therefore, considered an acid mine drainage of the same origin as the Waryong–Jeongwon coal mine water due to its low pH, high electrical conductivity, and high concentration of sulfate ions.

The data obtained from this study could be used as basic data to suggest an optimal location for sealing the mine adit.