

# **Development of a Co-Disposal Protocol for the Neutralization and Amelioration of Acid Mine Drainage with Fly Ash**

**Damini Surender<sup>1</sup> and Leslie Petrik<sup>2</sup>**

<sup>1</sup>Eskom Enterprises – TSI Division, Lower Germiston Road, Rosherville, Private Bag 40175, Cleveland, 2022, Johannesburg, South Africa, <sup>2</sup>University of Western Cape, Private Bag X17, Bellville, 7535, Cape Town, South Africa

**KEYWORDS:** Acid mine drainage, fly ash, co-disposal, and neutralization

## **ABSTRACT**

The primarily coal based production of electricity in South Africa results in approximately 20 Mt of highly alkaline, aluminosilicate fly ash being produced per annum

Acid mine drainage (AMD) associated with coal mining is produced by pyrite oxidation resulting in highly acidic waters with elevated sulfate, certain heavy metals and total dissolved solids (TDS) levels. AMD leaching into groundwater has a deleterious impact on the environment.

In this study, the potential of co-disposing AMD with fly ash was investigated at laboratory and pilot plant scale. The primary goals were development of a co-disposal protocol aimed at neutralization and amelioration of AMD and preparation of high capacity adsorbates. The co-disposal process was optimized at laboratory scale based on the following parameters: ash neutralization potential, final pH desired and the potential for high capacity adsorbate preparation. Batch processes were conducted at pilot scale by direct mixing of the fly ash with AMD at pre-determined AMD:fly ash ratios. Reduced heavy metal and sulfate concentrations with a corresponding decrease in conductivity were observed post co-disposal. Mixing the AMD with fly ash at pre-determined AMD:fly ash ratios and pH values enhanced the formation of zeolites from the precipitates that form during the co-disposal process. The successful co-disposal of AMD with fly ash provides a technology suitable for neutralization and amelioration of AMD as well as the potential production of high capacity adsorbates for further application in water remediation.

Submitted for consideration in the 2005 World of Coal Ash, April 11-15, 2005, Lexington, Kentucky, USA