

# Investigation of the origin and distribution of heavy metals around Ebenezer Dam, Limpopo Province, South Africa

**JS Ogola<sup>1\*</sup>, HR Mundalamo<sup>1</sup> and G Brandl<sup>2</sup>**

*<sup>1</sup>Department of Mining and Environmental Geology, School of Environmental Sciences, University of Venda, Private Bag X 5050, Thohoyandou 0950, South Africa*

*<sup>2</sup>Council for Geoscience, PO Box 620, Polokwane 0700, South Africa*

## **Abstract**

This study was based on the outcome of the soil geochemical survey which was conducted by the Council for Geoscience around Ebenezer Dam during 1995-1996, the results of which indicated high concentrations of lead (Pb), zinc (Zn) and arsenic (As). The current study therefore focused on the origin and distribution patterns of Pb, Zn, Cu, As and Cr within the environs of Ebenezer Dam and their potential impacts on the environment and human health. The work involved soil, sediment, rock and water sampling and analysis. Atomic absorption and x-ray fluorescence spectrometry were used to determine the metal concentrations. The occurrence of anomalous concentrations of these metals in the study area was established. The anomalies registered maximum concentrations of (mg/g): 57 for Pb, 157 for Zn, 313 for Cu, 73 for As and 888 for Cr. The concentrations of these metals in sediments along the streams were high near the anomalies, but decreased downstream. Concentrations of heavy metals in water around the Ebenezer Dam were found to be less than 0.01 mg/g, except for As which was less than 1.0 mg/g. Thus Pb, Zn, Cu and Cr values were below the target water quality ranges for domestic, irrigation, livestock watering and aquatic ecosystem use. The study confirmed that the distribution of heavy metals in this area is localised within and around the source rocks that are felsic in nature, namely; granites and pegmatites that formed domes in the area.

**Keywords:** Ebenezer Dam, heavy metals, distribution patterns, anomalies