



INTEGRATED STUDY OF GEOPHYSICS AND GEOLOGY STRUCTURAL IN THE IDENTIFICATION OF ACID MINE DRAINAGE IN URANIUM MINE

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Abstract

The Osamu Utsumi open pit mine, located in the city of Caldas in the south of the state of Minas Gerais, is the first uranium mine in Brazil. The mine operated until 1995 and is currently in the decommissioning phase. One of the main environmental problems at the site is the presence of acid mine drainage (AMD). The understanding and diagnosis of preferential zones of generation and flow of AMD are fundamental to establish mitigation measures for long-term environmental sustainability in any mining undertaking in the stage of decommissioning. Thus, this study provides an analysis of the main mechanisms of acid drainage generation and where they occur in the region of the old pit of the Osamu Utsumi Mine, an area affected by the liability. A geophysical investigation was carried out along each from of the mine pit using electrical resistivity tomography (ERT), using dipole-dipole and Schlumberger arrays. The spacing between electrodes adopted was 10m. For a better understanding of the local fractured aquifer system, a structural mapping of the open-pit area was necessary. Hydrochemical data from monitoring wells along the pit were also used to add to the interpretation of geophysical data. The compilation of field results and geochemical data from monitoring wells provided conditions to distinguish areas where water flows through fractures in the massif and areas with a greater contribution of acid water, with electrical resistivity values below 15 Ohm.m. Contributions of acid drainage were identified in all exploration fronts of the pit, associated with remaining mineralized zones. The geophysical method of Electroresistivity proved to be adequate for the purpose of the study. The results of the study contributed to decision-making related to the mine's environmental remediation.