

عنوان مقاله:

Numerical Evaluation of Two-dimensional Multi-layer Cover System to Regulate Acid Mine Drainage of Tailing Dams

محل انتشار:

ماهنامه بین المللی مهندسی، دوره 36، شماره 10 (سال: 1402)

تعداد صفحات اصل مقاله: 18

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خلاصه مقاله:

In the mining industry, cover systems for tailings are an effective means of reducing acid mine drainage. An example of this type of system is the multi-layer cover system that is used in arid climates where the annual evaporation rate is greater than the annual rainfall. For users and designers of mine tailings dams, the current research is aimed at identifying the optimal cover system and engineering of the mine waste disposal site, as well as investigating effective geotechnical parameters in controlling the oxygen gas entering the mine waste disposal site. In this research, after careful examination of scientific literature and data collection, it is first validated using numerical modeling, Finite Element Method (FEM) based on the VADOSE/W software, and then modeling is done based on the collected data. One-dimensional modeling has often been used in studies on the evaluation of cover systems, but in this research, two-dimensional modeling has been used to analyze the behavior of coating systems. The key to the successful operation of cover systems is maintaining the storage layer at a saturation level of about 85% throughout the year. The two cover systems, "storage and release", "optimized storage and release," are ineffective in maintaining the storage layer at about 85% saturation. However, the capillary barrier cover system has worked successfully and maintained the degree of saturation of the storage layer at about 80%. Due to the use of low-sulfide waste material as an oxygen-consuming layer, the performance of all three cover systems was acceptable. However, it is worth noting that the capillarity barrier cover system was able to immediately cut off the diffusion of oxygen due to the high degree of saturation of the storage layer, while in the other two cover systems, this decrease in diffusion and oxygen concentration was gradual. Therefore, the capillary barrier cover system is suggested as the most optimal system according to the weather conditions and the type of waste materials.

کلمات کلیدی:

Tailing dam, Acid mine drainage, cover systems, Oxygen Diffusion, Numerical modeling

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