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Risk assessment and prevention of surface subsidence in deep multiple coal seam mining under dense above-ground buildings: Case study

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ABSTRACT

Recently, solid waste backfill mining has rapidly developed, finding application in the control of surface subsidence and reduction of accumulated solid wastes. However, with the mining depth, the technique faces a number of other problems, in regard to the source of backfill materials, transportation costs, and control of the surface subsidence in deep multiple coal mining. In this article, an integrated system comprising deep mining, coal-gangue dressing, and underground backfill mining is proposed on the basis field-work. Analysis of the type, construction, and protection standards of the buildings resulted in the elaboration of numerical model aimed at studying the surface subsidence and deformation. Research results demonstrate that backfill mining of the coal seam group leads to a gradual increase in maximum surface

subsidence, horizontal movement, inclination, and horizontal deformation, whereas the key index to control is the compression ratio of backfill materials. The results of surface subsidence prediction and measurements in the Tangshan Coal Mine show that the solid waste backfill mining technique can effectively control the surface subsidence, deformation, and safety of buildings. This study is highly instrumental in sustained deep mining and environmental protection.

KEYWORDS:

risk assessment | surface subsidence | backfill mining | dense buildings | environmental protection

Conflict of interest

The authors declare no conflict of interest.

Additional information

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