

Abstract

The current outlook for coal within the global energy market compels South African based collieries to re-strategize their current methods of extraction, with the decline of coal reserves within the Witbank coalfield. An economically feasible alternative would be secondary extraction methods that are relatively low in financial and safety risk. However, efficient mining can only occur where optimal rock engineering practices are used.

The No. 2 Seam (thickness of about 6m) has always been a favoured deposit for extraction within Goedeheop colliery, consisting of ‘good quality’ economical coal. Where previously mined at about 4.5m, a possible 1.5m remains either in the roof or floor for extraction (when mined in conjunction with the No.1 seam in areas of thin seam parting).

Despite the remaining coal having the potential to be included in future plans, the current concern is the stability of pillars within panels associated with the progressive failure due to minimal roof support and poor rock engineering design, without accounting for the risk of failure. If the failure of the pillars were to occur, it will cause the sterilization of the No.4 seam that is currently being mined above the No. 2 Seam.

A bottom/top coaling case study was looked at Goedeheop colliery with the aim to evaluate the stability of pillars within the panel/s using stability criterions (Factor of Safety (FOS), Probability of Failure (POF) and Probability of Survival(POS)). Using the pressure arch theory and applicable strength equations to the No.2 seam, the stability of individual pillars was evaluated, where previously coaling had taken place. The results estimated the likelihood of failure of the pillars within the selected panel. The results from the study showed that if and where coaling has taken place it is likely that the pillars would remain stable well above the FOS value limit of 1.6 and resides within the 99% POS limit of production panels.