

ABSTRACT

Backfill plays a significant role in maintaining mine stability, improving safety and increasing the rate of extraction in deep underground mines. Backfill must be prepared such that it effectively and efficiently stabilises underground excavations for the short and long term. Factors causing variability of backfill strength affect the effectiveness of backfill to successfully stabilise underground excavations. Studies were conducted to determine the effect of factors such as preparation, mixing of tailing with the binder and curing on the strength of backfill material. The results indicated that the backfill strength is mostly affected by the mixing and curing procedures.

Inconsistency of the backfill strength results was caused by ineffective mixing before sampling is conducted and the curing environmental conditions. The change of sizes of the binder orifice affected the flow rate of the binder mixing with the tailings and the strength achieved after a certain curing period. The inconsistent curing temperature at different positions within the curing room affects the development of strength over the curing period. Identifying and understanding the effect of these factors can maintain consistency of backfill strength and reduce backfill operational cost. This thesis presents factors contributing to the variation of backfill strength test results at backfill operations and the effects of these factors on the strength of the backfill material.