**Challenges and Opportunities in Implementing Combined Paste and Aggregate Fill Systems: Lessons Learned and Potential**

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# ABSTRACT

The Combined Paste and Aggregate Fill (PAF) system represents an innovative approach to sustainable waste management in underground mining, designed to integrate the simultaneous placement of cemented paste and aggregate for improved ground stability and reduced surface waste. This paper evaluates the implementation of a PAF system in an underground mining operation, where the technical feasibility of concurrent disposal was validated. Still, operational success was hindered by design flaws and unanticipated challenges.

Key issues impacted the system's overall performance, including inefficiencies in process integration, equipment reliability concerns, and inadequate adaptation to site-specific conditions. Despite these obstacles, the project highlighted the potential of the PAF system to optimise underground backfill operations, reduce surface waste disposal, and support sustainable mining practices.

This paper provides a detailed analysis of the challenges encountered during implementation, the opportunities identified for improving system performance, and the lessons learned from the project. It emphasises the importance of proper design, robust maintenance strategies, and process adaptability to achieve the full potential of combined paste and aggregate systems.

This study aims to encourage continued research and development in this field by offering actionable recommendations and demonstrating the value of the PAF concept. The findings underscore the importance of advancing sustainable waste management practices in mining operations, paving the way for future innovations in backfill technology.