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Mine-life Slope Stabilization by Water Pressure Control: toward a Reliable Systems Approach

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Abstract The economic benefit of designing steep slopes is well known; it is almost always beneficial to invest the resources required to enable safe mining to the maximum slope angle that is available. The economic benefit of stabilizing failing slopes is also well known: it is always far less expensive to prevent a slope failure than it is to recover from one - indeed large slope failures can constitute enterprise threats.

The angle at which a slope can be safely mined is determined by material strength, rockmass structure, and water pressure. Water pressure is the only slope stability factor that is available for manipulation for the purpose of maximizing the safe slope angle of mines at design time, and stabilization of mined slopes during and after excavation.

The presence of water in mine slopes is the result of water infiltration, water flow, and water drainage before, during, and after mining. The time required to control and modify the groundwater pressure systems within mine slopes is often in the order of the time taken to mine the orebody, and the effort and cost can be comparable with other major mine components. The design, justification, installation, and successful operation of the mine water control systems required to maximize the economic benefit of steep mine slopes requires a reliable systems approach, integrated into the entire mine plan and operation.

This paper presents the business case for a systems approach to implementing reliable slope water pressure control for large surface mines, by minimizing slope pressurization and optimizing slope depressurization.

Keywords slope stability, water pressure, reliability