Operational Insights to Carbon-In-Leach Processing Through Dynamic Simulation

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ABSTRACT

Gold cyanidation is the most established gold extraction process worldwide and carbon-in-leach (CIL), as an affiliate process, the subject of extensive research and model development work. Most of the CIL process modelling efforts have focused on steady state scenarios for process design considerations. In this multiphase, counter-current process, however, steady state conditions are rarely the case and linking short-term operational results to these steady state models remain a challenge.

Utilizing a comprehensive dynamic simulation model of the CIL process, Barrick metallurgists have been able to gain insights into the interactions of various process parameters and their effect on key process performance indicators, including recovery, carbon loadings, and tails gold assays, with the time dimension incorporated. Carbon management is multifaceted and its complex process relationships are best understood through modelling various operating scenarios. The difference between slurry and carbon residence times in the circuit result in significant process lag differences that should be considered for day-to-day carbon management and grade control decisions. Where carbon elution and kiln regeneration are process bottlenecks, the decision of routing eluted carbon to the kiln or directly back to the CIL circuit is a trade-off of short and long-term benefits, and a function of the expected plant feed grade schedules during that time.

This paper presents some of the highlights of our findings using dynamic modelling to understand short-term process trends. Further, it explains how this approach can help to guide short and medium-term process decisions with regards to carbon management and grade control.

Keywords: Simulation, Dynamic, CIL, Optimization