

A Novel Low pH Antiscalant Delivers Significant Savings to the Mining Industry

Background

A North American multi-metal mining operation began experiencing severe, tenacious calcium sulfate deposition in their leaching operation shortly after coming on-line. The site reconfigured their operation to incorporate a thickener as an additional clarifier to reduce scale formation and promote precipitation of calcium sulfate. While the reconfiguration reduced scale formation, the leach circuit still required monthly shut downs to mechanically clean the process water lines and tanks. The mine looked for more economical solutions.

Problem

Calcium sulfate deposition at the mine site was difficult to address because the process water pH was highly acidic, typically 1-2. Many deposit control chemistries are ineffective at this low pH. The low pH and use of seawater for process water also made assessment of antiscalant program performance difficult. Low pH is corrosive to mild steel, and seawater is corrosive to stainless steel, making it difficult to use traditional scale coupons to monitor the results of deposit control programs.

The thickener reconfiguration resulted in a copper production loss of approximately 6 percent. The mine lost additional productivity from reduced flows and periodic cleaning shutdowns due to scale buildup in the process lines and equipment.

The mine wanted to reduce or eliminate scale formation in their leach circuit and be able to monitor program performance.

ChemTreat's Solution

ChemTreat laboratory and technical personnel worked with the mine's metallurgical group to screen potential antiscalants, leading to the development of ChemTreat ML708 scale and deposit control agent. ChemTreat then designed and fabricated scale coupons made of titanium and fiberglass that were effective at low pH and in seawater. Finally, ChemTreat developed a pilot unit that assessed the process water flow and scale formation both before and after the injection of ChemTreat ML708 to validate the antiscalant program's performance.

Baseline data prior to the ML708 antiscalant addition revealed a calcium loss of 2.5 percent through the leach circuit, which translated to a daily precipitation of approximately 2 tons of calcium sulfate. The coupons also showed rapid scale buildup. Application of ChemTreat ML708, however, consistently kept the calcium in solution throughout the circuit, as evidenced by clean coupons and the mine's ability to operate without interruption during the initial month-long program evaluation. The pilot unit also verified the efficacy of ML708 in preventing scale formation.



Summary

ChemTreat ML708 proved effective in inhibiting calcium sulfate scale formation under the acidic and highly-ionic conditions of the mine's process water. Its unique chemistry allows it to function in operations where commonly-used antiscalant polymers show limited or no success in controlling scale because of low pH or high brine strength.

ChemTreat designed and built retractable titanium and fiberglass scale coupons. Calcium analyses performed by the mine's laboratory validated the antiscalant program's ability to maintain calcium concentration across the leach circuit. The ChemTreat team met the mine's objectives to reduce calcium scale in their operation and monitor and validate the performance of the program. (Photographs follow.)

Satisfied with ChemTreat's custom approach and technology, the mine has embarked on program optimization discussions to accommodate changes in mine operations.



Coupon before treatment with ChemTreat ML708



Coupon after treatment with ChemTreat ML708