

Impact of Over-Flocculation in PLS



Problem Statement

A copper solvent extraction plant in Zambia needed to shut down. The origin of the problem was:

- During the rainy season, ore treated at the plant naturally segregated and fine solids had settled at the bottom of mine ore. Ore containing a high level of fines created issues with solid/liquid separation upstream of the SX plant.
- To address the slimes, customer added flocculants directly into the weir of the first CCD thickener, whose overflow goes to the PLS pond
- Although fine solids could not be visually observed, after just one week, phase separation times had increased significantly and a massive layer of floating crud had been generated, whose source was not understood.
- A-in-O entrainment was extremely elevated

After shut-down, the plant personnel consulted with Solvay to help resolve the issue.

Solvay's Approach

- During site inspection the SX plant it was found that:
 - All mixers had been running in aqueous continuity before system shutdown
 - Important amounts of slimy and jelly-like crud were floating on the surface of the settler making it very difficult for the operators to scoop
 - A lot of aqueous was present in the LO tank
- To rule out the possibility of a silica event, diluent/PLS test was conducted, coming out negative.
- Further assessment led to conclude that the root cause of the problem was over-flocculation as the presence of residual flocculants in PLS was confirmed through comparison of settling rates using PLS from the pond and PLS overflow after flocculants addition was cut off.
- Solvay advised the site to suspend the dosing flocculants into the overflow weir and recommended that all mixers be run in organic continuity in order for the crud to compact. Since the inventory was low, site was also advised to add more diluent to the circuit (no extractant adjustment was needed since vol% was still high given the PLS grade)

Results

- The customer implemented all recommendations from Solvay and restarted the plant step-by-step the day after the visit.
- After two days, the operation was already running stable and all the production targets were being achieved
- Customer commended Solvay team for their technical savvy and quick response time, highlighting their intervention saved them about 0.1 M USD daily of loss copper production.