

Flocculant Program Improves Recovery and Product Quality at a Copper Mine

Background

A copper mine in North America experienced lower product recovery and quality because of poor flocculant performance in its iron cementation and settling operation. Receiving minimal support from their supplier and service provider to resolve the decline in copper recovery efficiency, the mine looked for a technically-sound and economic solution from a partner who would provide active support.

Problem

Copper recovery through cementation using scrap iron is a lost art in the mining industry, because it has been replaced by solvent extraction. However, this mine continued to use the cementation process because the reaction and precipitation of copper in solution onto iron is a spontaneous and inexpensive process. The mine set-up included three tanks for copper cementation followed by a Kennecott sedimentation cone for final settling of the precipitated copper. Any overflow of copper beyond this equipment meant a revenue loss for the mine. As seen in the accompanying photographs, the overflow clarity was poor with turbidity levels of 500 Ntus, indicating copper carryover and poor flocculant performance. The mine attributed its inefficiency to both the choice of flocculant and the dosing method.

ChemTreat Solution

ChemTreat laboratory and technical personnel worked with the metallurgical group at the mine to screen potential flocculants, leading to the selection of an emulsion polymer used to floc solids in a thickener application in a mining process stream. Since the mine also was concerned about their current polymer feed program effectiveness, ChemTreat engineers designed and installed a makedown tank to prepare the emulsion polymer solution prior to a separate feed tank. ChemTreat also provided a pneumatic pump with an air regulator to control the dosage more accurately. As a result, the product consumption rate improved, with a 60 percent decrease in the amount of product used versus the competitive emulsion polymer. This improvement resulted from use of the right chemistry and process improvements including separation of the preparation and dosage tanks and better dosing equipment.

As seen in the accompanying photographs, these changes provided superior performance, as evidenced by the clarity of the overflow, with turbidity levels dropping to 30–50 Ntus. These results showed that more copper was settling in the sedimentation cone, instead of leaving the process. The mine estimated improved copper recovery by 7 percent.

Summary

ChemTreat's emulsion polymer proved extremely effective in improving copper recovery in an iron cementation process. Mine personnel validated its performance in improving copper capture and effluent clarity.

The ChemTreat Team clearly met the mine's objectives in reducing treatment costs, improving the ease of chemical addition and control, and most importantly, increasing production. Based on the increase in throughput, the mine gained an additional 7 percent in revenue stream. The copper mine was clearly satisfied with the ChemTreat approach, technology, and program support.



BEFORE: High turbidity in the settling ponds



AFTER: Low turbidity in the settling ponds



BEFORE: High turbidity in the overflow of the settling ponds



AFTER: Low turbidity in the overflow of the settling ponds