

A Customized Frother Program Increases Copper and Moly Recovery in a Western US Mine



INTRODUCTION

For the last several years, Nalco Water has developed customized products that solve specific flotation problems encountered in a variety of operations. This case study summarizes the success in the area of copper/moly flotation and highlights improved metallurgical performance for both metals.

SITUATION

A copper mine in the Southwestern United States was challenged with processing a more difficult type of ore, decided to look for a treatment program that would help improve the recovery for both copper and moly, and ultimately reduce total cost of operation. The ore contained economic quantities of molibdenite, making it even more critical to increase the recovery for both minerals.

The ore is composed of intrusive stocks with chalcocite, in a matrix of quartz, mica, feldspar mostly altered to clay, and sediments that also contains chalcopyrite associated with gangue minerals, including magnetite, pyrite, garnet chlorit, and epidote. This composition made it very difficult for the plant to achieve its production goals.

The mill was using a collector plus a dual frother reagent scheme based on the ore type processed. The performance of the incumbent program was regular only when processing their normal ore, but poor results were obtained when processing the skarn ore from the new pit.

PROGRAM

Nalco Water's comprehensive approach was based on determining the mineralogy of the ore, surveying the operational conditions of the circuit, and knowing the metallurgical objectives of the customer, to better identify and design a customized program FROTHPRO™ 507. Extensive laboratory tests and a plant trial contributed to a modification of this new reagent technology that affords superior metallurgical performance while reducing reagent consumption and minimizing volatile organic compounds for copper sulfide and primary molybdenite. The technology also has the unique ability to capture ultrafine molybdenite that is not recovered using traditional flotation reagents.

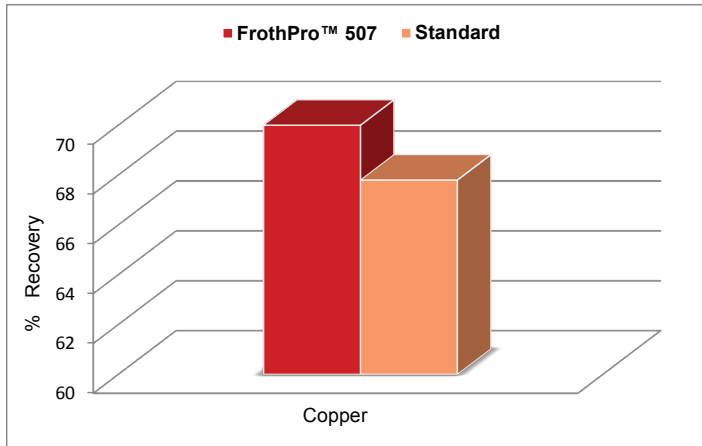


Figure 1 - Copper Flotation Recovery

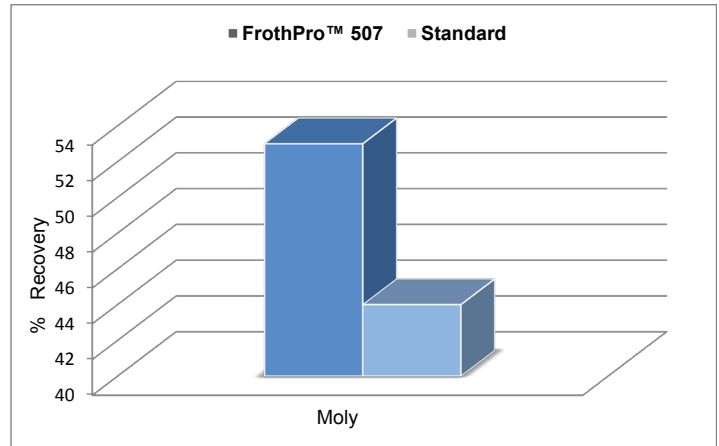


Figure 2 - Moly Flotation Recovery

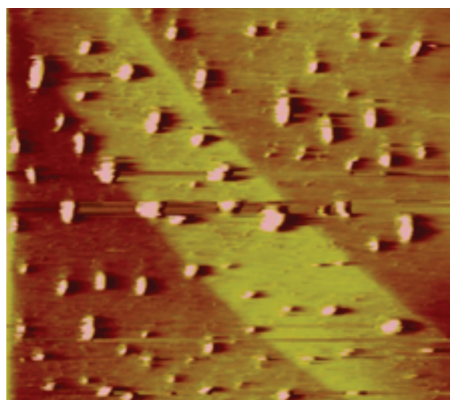
RESULTS

After testing different schemes of collectors and flotation reagents, the laboratory and field results showed significant advantages with the new frother FROTHPRO™ 507 with respect to the standard program used in this copper mine. The Nalco Water frother recovered 2% more copper at the same dose as the standard product (See Figure 1).

Moly recovery when using FROTHPRO™ 507 was even greater at 9% when compared with the same dose as the standard product from competitor (See Figure 2).

The statistical analysis showed the difference is significant at a 95% confidence level.

These circuits require flexible reagent programs that enable operators to quickly respond to changing ore conditions in the plant feed. The Nalco Water FROTHPRO™ 507 frother program delivered an increase of 2% of copper recoveries and 9% of moly recoveries, without negatively affecting the grade, which also contributed to a reduction of the total cost of operation.



CONCLUSION

More often customers are challenged to increase recovery with increasingly complex ores with high pyrite and clay content, and mixed compositions. When facing these types of conditions, froth quality and metallurgical performance can suffer when using traditional flotation reagents.

Nalco Water is committed to assist customers in adapting and implementing the right flotation program to help operators meet their production goals, producing more with less, and positively impacting the product quality.

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