



Optimer™ IQ Flocculant Technology helps major gold mine in Eastern Europe to save over \$3.5 million in gold production



INTRODUCTION

As easy to treat gold ores are being exhausted, mineral processing is becoming a more and more complicated and difficult to manage. This case study discusses a major gold mine in Eastern Europe that started production in the early 1980s and is unique in that it actually has a cluster of different processing facilities to help manage the complex ore body. Each mineral processing step then affects other down-stream processes. In one plant, part of the refractory sulphide ore is processed through a floatation and bacterial oxidation (by *sulfobacillus acidophilus* at 50°C and pH 2) to liberate the gold followed by a solid/liquid separation using centrifugal decanters and cyanide leaching. Poor operation of these decanters was resulting in gold losses into down-stream processes. Nalco Water was asked to apply its new Optimer IQ Flocculant Technology that excels in high-shear environments to improve the operation of this centrifuge.

CURRENT SITUATION

Upon meeting with the mine management, their priority was the treatment for acidic bio-slurry separation by decanter centrifuges which was resulting in gold losses and all previous attempts to improve had failed.

THE CUSTOMER'S GOALS

The customer's goals for this project included:

- A reduction of solids in secondary decanter centrifuges overflow to ≤ 2 g/L what would allow re-circulation of a low pH solution and elimination of further neutralization, cyanidation and detox.
- Decrease consumption of sodium - cyanide, lime and detox chemicals.
- Increase capacity in an adjacent plant by reducing reprocessing of the centrifuge filtrate and consequential increase in the processing capacity of floatation concentrates.

CUSTOMER IMPACT

Production increase by 36,470 oz/year

Elimination of 220 m³/h acidic centrifuge liquid neutralization-recirculation back to bio oxidation process



ECONOMIC RESULTS



Production is associated with US\$3,56 Million per year



Reduction in energy consumption for lime production (heavy oil)

Reduction of lime and energy consumption \$50,000 per year

SOLUTION

Conventional treatment options had not been successful in the past, so Nalco brought in a team of international experts to test a range of advanced treatment products. The innovative Optimer IQ flocculant program was found to excel because of its ability to operate in extreme chemical conditions and its ability to produce highly shear resistant flocs that was a big advantage in these decanters. The mine had no pilot centrifuge decanter unit and so a cylinder test was used for lab screening of Optimer IQ flocs. Following the laboratory optimization program, a plant trial was performed using the Optimer 823IQ, which produced better floc stability in the high shear stress environment that existing in the centrifuge. During the trial, the dosing point, the polymer solution strength and the dosing rate was optimized.

RESULTS

The below results were archived upon two weeks of plant trial:

- Solids in filtrate reduction: from 13.5 g/L → 1.25 g/L
- Bio cake production increase + 2,7 t/h
- Decrease in moisture content in bio-cake +4%
- Reduction of rotational momentum on centrifuge drum for 3 - 6% and drum speed from 1,300 rpm to 950 rpm

A gold loss reduction lead to increase in its production of 2,7 t/h amounting to \$3,65 Million per year.

REDUCTION IN LIME CONSUMPTION

An additional impact of the Optimer IQ program was a reduction in lime consumption. Prior implementation of Nalco Water program, the acidic wet cake coming from the centrifuge needed to be pH adjusted from 2 to pH 10 though lime addition. Since we were able to decrease the moisture content of the cake we were able

to skip this step of the process and as a consequence reduced lime consumption by approximately US\$50,000/year.

Other unquantifiable savings Include:

- More stable operation decanter centrifuges,
- A lower centrifuge bearing temperature and less vibration - lower maintenance costs,
- A lower consumption cyanide and detox chemicals. The customer has had a payback period of 24 days for his investment.

CONCLUSION

A structured approach to the problem, good coordination with Nalco Water's Global Mining team, implementation of the new Optimer IQ Technology and a well prepared and executed plant trial, lead to successful application of a chemical program enhancing work of secondary decanter centrifuges. It increased gold production and reduced production costs by improving Key Performance Indicators.

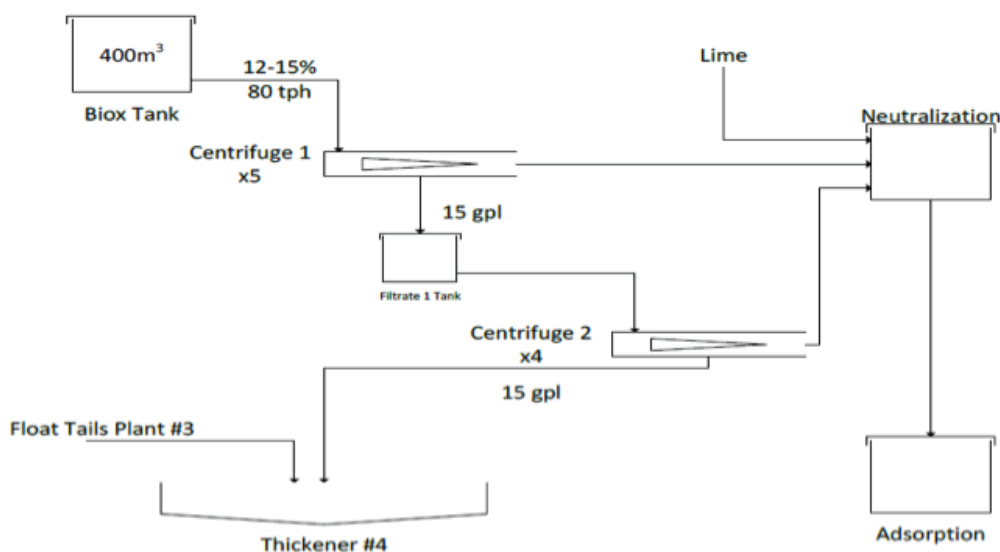


Figure 1 - A diagram of bio slurry solid/liquid separation by centrifuge decanters

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