Nalco Water New Technology FloteFeed and On-Site Expertise Increases CHPP Flotation Product Yield and Process Stability in Excess of $8 Million.

NALCO Water
An Ecolab Company

CASE STUDY – MINING
CH-2125

INTRODUCTION

Flotation kinetics are often the limiting factor when trying to maximise flotation yield and recovery. The newly developed Nalco Water FloteFeed technology increases flotation kinetics particularly when mixing energy or conditioning time are limiting factors.

ENVIRONMENTAL INDICATORS	eROI℠	OUTCOME
Collector FloteFeeder increased flotation yield 15.6% or 5 t/hr.	ASSETS	This yield increase over 3,600 hrs and at $80/t sale price resulted in 18,000 additional saleable tonnes at a price of $1,440,000
Frother FloteFeeder increased plant yield 2.1% or 23.1 t/hr.	ASSETS	The frother FloteFeed yield increase includes less flotation startup time, more feed on time and reflects the increased plant stability. The additional saleable coal reported by the customer for this improvement amounts to 83,160 t for increased revenue of $6,652,800.
Flotation concentrate reported to HVBF 9 minutes earlier due to increased CHPP operating stability.	ASSETS	This 9 minute improvement represents 12.7 t more production after each stoppage. For two stoppages per shift this represents additional coal sales of 12,150 tonne per annum or $972,000 extra sales revenue and is reflected in the above numbers.
Flotation stability improved with the dispersed frother. Flotation stability was reflected in over frothing of the cells and onto the CHPP floor. This required operators to continually clean up the spills. The easy option was to automatically lower the cells when trouble arose and lose flotation production.	ASSETS	Flotation stability removed the over frothing of the cells and continual need for operators to hose up due to froth outs.

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

BACKGROUND

A decommissioned Hunter Valley Coal Handling and Preparation Plant (CHPP) was brought back on line to toll wash a single underground coal seam. Nalco Water had been the flotation reagent supplier prior to decommissioning and were engaged to assist bringing the CHPP back on line. An upgrade of CHPP electrics saw all previous control loops re-written and extensive work was needed to recommission flotation and horizontal vacuum belt (HVB) dewatering.

SITUATION

On initial commissioning the dewatering performance of the HVB was poor with high vacuum pressures of -80 kPa. The filter cake was very wet and flotation was restricted to stop the HVB discharging sloppy cake product. Flotation yield was around 27 t/hr on the HVB and the site was expecting in excess of 75 t/hr on this seam. The Nalco Water team became engaged to assist on how best to apply the range of flotation, dewatering, clarification and antiscalant products that the site utilises. The two shift operations had a very experienced day shift crew and a relatively new crew to coal preparation on the afternoon shift. Mine production from a second party determined the CHPP operating hours.

SOLUTION

A FloteFeed G2 (Figure 1) had been introduced onto the Nalflote collector feed line prior to commissioning. Figure 1 shows the flotation yield with the FloteFeed off (white circle) and on (green circle) and delivering a 15.6% yield increase.

The poor operations of the HVB was preventing further optimisation of the flotation circuit. A high -80 kPa vacuum pressure was indicative of cake capillary issues so flocculant application was optimised (pump upgrade and dilution water) to allow increased flotation product to be treated on the HVB. The vacuum fell to -70 kPa indicating open cake capillaries. At this point more flotation product could now be run to the HVB.

The HVB filtrate water sump was then continually tripping as more tonnage and water was treated on the HVB. A control loop had to be implemented from scratch involving the control room operator manually controlling the HVB speed and flocculant dose as flotation yield was increased. A point was reached where flotation yield was at maximum but still below site expectations and it was thought that the flotation kinetics could be improved with a FloteFeed G2 unit on the Nalflote frother. (Figure 2)

RESULTS

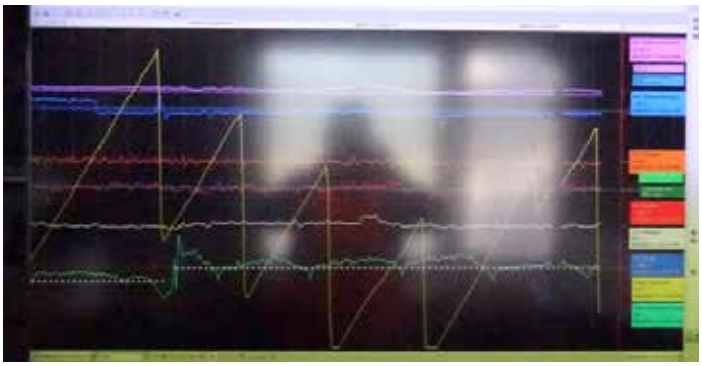

Figure 1: FloteFeed G2 effect with Nalflote collector – trend over 2 hours.

In Figure 1 above the light blue trend is the HVB cake weightometer t/hr. It is averaging 32 t/hr with the FloteFeed OFF (white circle) and averaging 37 t/hr with the FloteFeed ON (light green circle), a 15.6% yield increase.

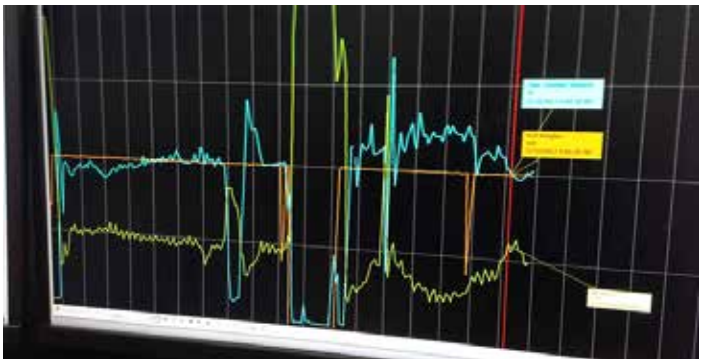

Figure 2: FloteFeed G2 effect with Nalflote frother – trend over 4 hours

In Figure 2 the light blue trend line is the cake conveyor weightometer with the white circle showing FloteFeed OFF and averaging 84 t/hr product. The light green circle shows FloteFeed ON and averaging 90 t/hr; an increase of 7.1% or 6 t/hr flotation product. The orange trend line is plant feed t/hr.

Control room operators commented immediately that the FloteFeed on the frother helped plant stability. As they were still in commissioning mode when feed was taken off the plant for a brief time they found the flotation circuit returned coal to the HVB much quicker. It had taken six minutes for cake discharge on the HVB as opposed to fifteen minutes before the frother FloteFeed

units installation. This extra flotation production up-time represented 12.75 t/hr or Over the first two weeks of frother FloteFeed addition the plant reported a 2.1% yield increase (23.1 t/hr) which site attributed to improved flotation kinetics and process stability on the short residence time flotation cells.

At this stage in commissioning the flotation yield was 85 t/hr and slightly above the initial target communicated by the customer.

CONCLUSION

Nalco Water's involvement delivered quick results to this Hunter Valley customer. Our team's technical understanding of sequentially optimising the CHPP dewatering and flotation processes assisted in recommissioning and FloteFeed units on the frother and collector doses greatly enhanced flotation kinetics.

The plant stability and product tonnes increased to $8,092,800 per annum.

Nalco Water, an Ecolab Company

North America: 1601 West Diehl Road • Naperville, Illinois 60563 • USA
Europe: Richtistrasse 7 • 8304 Wallisellen • Switzerland
Asia Pacific: 2 International Business Park • #02-20 The Strategy Tower 2 • Singapore 609930
Greater China: 18G • Lane 168 • Da Du He Road • Shanghai China • 200062
Latin America: Av. Francisco Matarazzo • nº 1350 • Sao Paulo – SP Brazil • CEP: 05001-100
Middle East and Africa: Street 1010, Near Container Terminal 3, Jebel Ali Free Zone, PO BOX 262015, Dubai UAE

ecolab.com/nalco-water

NALCO Water
An Ecolab Company