

Nalco Water's FilterMax™ 88251 improves dewatering efficiency at an Australian phosphate plant to deliver \$730,000 AUD per annum in value

CASE STUDY

► BACKGROUND

A phosphate plant in Australia is processing high-grade phosphate rock deposits into a concentrate containing 34-35% P_2O_5 (used in fertilizer production). This concentrate is primarily intended for domestic use and export throughout the Asia-Pacific region.

The phosphate plant is designed to beneficiate the run-of-mine ore by removing undesirable minerals and materials. These contaminants are often very fine, making particle separation and desliming the primary methods of beneficiation.

Some contaminants adhere to the phosphorite pellet surface and require energy to remove. This is accomplished using attrition cells. Rejected material from the beneficiation plant is directed to a tails thickener and disposed of in the Tails Storage Facility. The beneficiated concentrate is dewatered, washed, and stored in intermediate or concrete stockpiles.

This plant has faced significant challenges related to the dewatering process of phosphate concentrate. Excessive moisture content in the dewatered beneficiated concentrate can lead to transportation delays, storage issues, and reduced production

efficiency. To address these challenges, a Nalco Water dewatering aid, FilterMax 88251, was applied at the processing plant. This case study examines the benefits of this application, including improved cake moisture, reduced drying times, increased haul deliveries, and mitigated production bottlenecks.

The final phosphate concentrate has encountered several issues:

- **High moisture content:** The average final cake moisture content is 20.25%, consistently exceeding desired levels, and impacting transportation and drying storage.
- **Extended sun drying:** Concentrate required an average of 20 days of sun drying before it could be hauled for export.
- **Production bottlenecks:** The lengthy drying process created a bottleneck in the drying pad, production line, and ultimately limited overall output.
- **Inefficient haul deliveries:** The extended drying period reduced the frequency of haul deliveries, impacting transportation costs and efficiency.

eROISM by Ecolab

ANNUAL SAVINGS



ENERGY

72,000 liters fuel savings



GREENHOUSE GASES

195,000 kg CO₂ reduction



LABOR PRODUCTIVITY

3,200 hours



ASSET PROTECTION

\$110,000 AUD

Due to grader and loader maintenance savings



TOTAL VALUE DELIVERED

\$730,000 AUD

► SOLUTION

To address these challenges, a Nalco Water dewatering aid product, FilterMax 88251 was introduced to the plant dewatering process. The product was specifically designed to enhance the dewatering efficiency of phosphate concentrate moisture by:

- **Improving cake structure:** The Nalco Water dewatering aid helps to form a more compact and permeable cake structure, facilitating water drainage.

- **Reducing capillary forces:** The product reduces the capillary forces that hold water within the concentrate, allowing for more efficient water removal even after the processing or in the laying areas for sun drying.
- **Enhancing filtration:** The dewatering aid improves the filtration properties of the concentrate, enabling faster water separation.

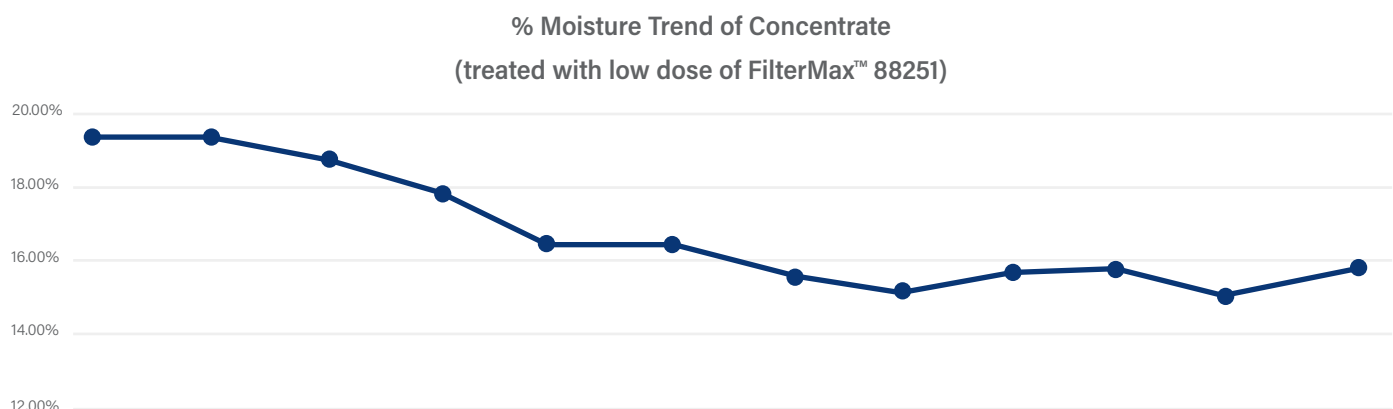
► RESULTS

The implementation of **FilterMax 88251** yielded many significant benefits, including the following:

- **Reduced cake moisture:** Final concentrate moisture decreased by 36%, improving drying time before shipment.
- **Continuous dewatering:** The aid enabled continuous operations, reducing the need for extended sun drying
- **Shorter drying time:** Sun drying time decreased from 20 to 12 days, boosting production efficiency
Note: Final drying time can vary due to weather
- **Increased haul deliveries:** Shorter drying times allowed for more frequent deliveries, increasing transportation capacity and reducing bottlenecks
- **Mitigated production bottlenecks:** The improved dewatering process helped alleviate bottlenecks, enhancing overall plant throughput

Time	Sample Location	Percent	Comments
9:15:00 AM	Stockpile	19.05%	Untreated sample
	Stockpile	19.05%	Untreated sample
11:00:00 AM		18.61%	Started Nalco Water 88251 dose: 4 liters/hour @ 50% product concentration
		17.99%	
11:30:00 AM	Stockpile	16.70%	Treated sample
		16.75%	Treated sample
12:00:00 AM	Stockpile	15.72%	Treated sample
		15.50%	Treated sample
	Conveyor belt cut	15.72%	Treated sample
12:30:00 AM	Stockpile	15.80%	Treated sample
	Stockpile	15.30%	Treated sample
	Conveyor belt cut	15.30%	Treated sample
13:00:00 PM	Stockpile	19.11%	Turned off dose of Nalco FilterMax 88251
	Stockpile	18.17%	Untreated sample
13:10:00 PM			Untreated sample
14:10:00 PM	Stockpile	19.11%	Untreated sample
	Stockpile	18.71%	Untreated sample

Table 1 : Moisture results for treated and untreated slurry.



Graph 1 – Moisture trend after Nalco Water treatment program

► CONCLUSION

The successful application of Nalco Water's FilterMax 88251 dewatering aid product at the phosphate plant in Australia demonstrated significant benefits in terms of improved cake moisture, reduced drying times, increased haul deliveries, and mitigated production bottlenecks. The implementation of this solution has enabled the plant to optimize its dewatering operations and enhance overall production efficiency, resulting in estimated annual savings of \$730,000 AUD.



Figure 1 - Phosphate beneficiation plant in Australia



Figure 2 - Nalco Water FilterMax 88251 shows its ability to increase the permeability of the concentrate, which allows filtrate to more easily flow out



Figure 3 – Nalco Water FilterMax 88251 is still working in the final drying area, as evidenced by the presence of filtrate release. The pressure at the bottom of the stockpile is forcing more water to flow out



Figure 4 – Here the concrete pad drainage grates are being cleared to remove the free-draining water from the stockpile to keep the moisture down