WaterShed

REINVENTING THE WAY WATER IS MANAGED

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WaterShed

Accelerated water recovery with dry, stable tailings

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Improved tailings management can be a major contributor to mine profitability

Environmental concerns have resulted in ever-more-stringent operating restrictions and regulations for permitting mined tailings storage facilities (TSF). Many operations are constrained by the mismatch of operating rates with turnover of permitted impoundment space, as well as limited availability of water, terrain and/or space that can virtually eliminate the option of a traditional impoundment. As a result, until now, operators are often forced to resort to mechanical dewatering/filtration or constructing individual slurry cells that compartmentalize deposits to better contain slurries and make them more manageable.

Individual cells are easier to control and more environmentally friendly, reducing the risk of catastrophic dam failure. However, whether cellular or not, TSF's can limit the pace of mine development and production. Cells can improve flexibility but must typically be filled and dewatered sequentially, one at a time and they must then be left for extended periods to solidify. Until now, only a few mechanical alternatives offered more rapid solids densification than that of a typical slurry cell such as:

- Twin belt, vacuum or pressure filters
- Paste or deep cone thickeners

While these options can ease waste slurry management issues and prolong impoundment life, they also have major drawbacks.

- Long lead times for start up
- High capital, start-up and maintenance costs
- Limited operational portability and flexibility
- Increased expense for transport of filtered solids

In addition, the cost of formal decommissioning of an impoundment site can often negate the benefit of less expensive short-term disposal strategies which do not facilitate reclamation.

Effective tailings management must be an integral part of overall mine planning. And it must continue throughout the operational life of the TSF through closure and decommissioning. An effective strategy will need to:

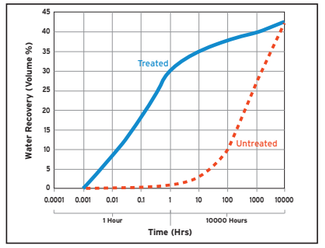
- Optimize conditions to allow rapid drying and consolidation
- Prevent formation or pockets of unconsolidated slimes
- Rapidly separate process water from tailings to conserve and reuse water

In short, exactly what a customized WaterShed program delivers.

Immediate effect at the tailings storage facility

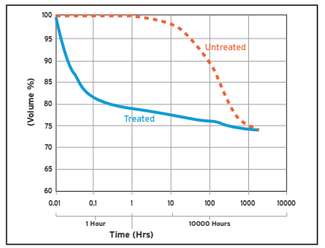
The effects of the WaterShed program are immediately apparent as the treated underflow enters the storage facility. A significant amount of water is released almost instantly and the separation process continues rapidly in the TSF. In fact, laboratory testing has demonstrated that it takes only 1 hour to recover 30% of the available water! Compare this to the 1,000 hours it would take for an untreated cell to recover the same amount!

Water Recovery



Fast and thorough water separation results in rapid beaching, creating a faster drying load-bearing structure that is ready more rapidly for the next lift. Fines are incorporated into a solids matrix that maintains structural integrity. You get a drivable surface in short order, for more efficient fines removal and/or TSF remediation. Permitted TSF space lasts longer, and surface drying time is cut to as much as half. You can also cap existing dams with the dried tailings material.

Consolidation



The numbers are remarkable. Laboratory testing shows a mere 15 minutes required to produce 21% as supernatant, versus 200 hours with untreated underflow.

even more value

Water is an increasingly scarce commodity. The water liberated by a WaterShed program is of high volume and clarity. It's pure enough for direct discharge into the environment. But more importantly, it's available for reuse in your mine. Plus, substantially less water is lost to evaporation. With WaterShed, Makeup water requirements from other sources are minimized, and your total water cost is reduced substantially.

Environmental impact is substantial

The WaterShed program delivers more rapid TSF turnover and longer TSF life, extending useable space by up to four or more times that expected with untreated tailings. Less real estate means your environmental footprint shrinks. Additionally, reclamation of TSFs is simplified since the dried tailings can be driven on and handled easily and much sooner after deposition. These provide a solid base for environmental reclamation, and are also available for use to capping or rehabilitating existing tailings dams.

Expert evaluation of your unique mine needs

Every mining operation faces unique challenges. Nalco Water's experience...in every type of mine and mineral, as well as every global region...brings a unique perspective and deep level of expertise that facilitates a customized solution. We will thoroughly evaluate your tailings management challenges, as well as your total mining operation and bring together the right combination of chemistries and the control systems to put them to work. The solution will be custom-tailored to your operational and regulatory constraints.

Simple equipment, low capital investment

The mechanical and control aspects of a customized WaterShed program are simple and overall costs are low compared to alternative approaches. Forget the multi-million dollar capital outlays for deep cone thickeners or the maintenance complexities of mechanical filters. A successful WaterShed program requires selection of the right chemistry, bulk storage, pumps, minimal power, integrated controls and a proprietary mixing system that injects those chemistries into the underflow at proven intervals.

Equipment typically has only a small footprint and is well-suited for portability enabling maximum operational flexibility.

A WaterShed system can be containerized, fast and easy to install, simple to maintain and easy to adapt to changing mining conditions. And it's designed to operate anywhere, even in the most harsh and remote locations.

WaterShed

Tailings Management Program

The Nalco Water WaterShed program has delivered value in many types of mines, worldwide.

Base Metals

"In the first month of using the WaterShed program, we had an increase of beach height at the drop point of over 3 meters. And the beach was drivable in an incredibly short time."

Coal

"We have increased our coal dewatering rate, improving the time for evacuation of the ponds. So we've increased pond dewatering capacity, and have a material that is stable and easy to handle."

Bauxite

"The WaterShed program has helped us meet aggressive goals for improved residue storage, rehabilitation and reuse. With this kind of rapid and thorough water removal, we manage residue in a way that encourages use of tailings as a resource, and allows remaining residue to be stored in an environmentally acceptable form."

Mineral Sands

"The results of WaterShed speak for themselves. We've been recovering 65% to 74% of the water in the tails, dramatically reducing our demand for fresh water makeup. And the waste consolidates faster, enabling more rapid rehabilitation back to native state...which has always been a challenge for our industry."

Sand and Gravel

"Due to the limited supply of water in the area, our plant has a permitted cap on how much fresh water that we can pull from our wells each year. The WaterShed program allows us to recover more clean water from the settling ponds and keep under our permit limit."

A customized Nalco Water WaterShed program means...

- More efficient tailings management
- Rapid response to changing conditions
- Lower capital cost
- Minimal maintenance and operating costs
- Reduced environmental footprint
- Reduced evaporative and seepage losses
- Rapid water recovery and return to processing operations
- Improved quality of liberated water
- Smaller and safer footprint for tails dams
- Reduced need for new impoundments
- Enhanced "beaching" with uniform deposition and a stable high solids material
- Open, free-draining structure that is rapidly load-bearing
- Decreased TSF turn-around time

As a leading supplier of process solutions to the mining industry, Nalco Water can help you develop an effective and innovative tailings management and water recovery strategy. A Nalco Water WaterShed program works quickly to:

- Produce a high solids cake-like load-bearing material for easy handling and disposal.
- Recover more and cleaner water, faster.

And more easily handled material stacks better, consumes less TSF space and allows more rapid cycling. In fact, WaterShed treated material dries so quickly that you can use it to assist in capping or rehabilitating existing tails dams.

With Nalco Water's WaterShed program, permitted TSF space lasts longer and surface drying time is cut by as much as half. This allows rapid refill, maximum density and quicker cover in preparation for the next lift of solids. As a result, your mining operation can maintain or perhaps even increase throughput while efficiently managing your water requirements.

Using the Nalco Water MudMaster computer program, your thickener and TSF can be modelled to determine the potential amounts of water that can be recovered and quickly recycled back to your process.