

Requires no chemicals – Quick return on investment – Installed with a site management system, keeping you in total control 24/7 from your cellular phone – Requires no skilled labour to manage or maintain – Saves you money!

Gold Mine: Cooling Towers

High cooling costs in Biox Plant: Energy, water, chemicals, downtime & Labour.

Barberton Mines' Fairview mine uses the Biox process which was developed by Gencor/Goldfields of South Africa, now owned by Bateman Engineering. The process entails the use of bacteria to break down the sulphide mineral matrix in the ore being treated, thus freeing the occluded (closed) gold for subsequent cyanidation. The bacteria attach themselves to the metal sulphide surfaces in the ore, resulting in the accelerated oxidation of the sulphides. The reactors are aerated and the slurry temperature is maintained at the optimum level of 40-45°C. As the oxidation reactions of sulphide minerals are exothermic, it is necessary to cool the tanks so to maintain the slurry temperature within the optimum range. This is done by circulating cooling water and removing the excess heat via a cooling tower. In the past the mine could not keep the temperature during peak hot season due to lack of cooling capacity and had to slow down production. Scale built-up in the cooling coils abating heat transfer was identified as the reason. Apart from treating the cooling towers with chemicals, the mine had to frequently clean the coils with acid, which meant disconnecting the coils, connecting them to an acid tank and circulating the acid until the scale dissolved. This is a dangerous job as it is taking place on top of the elevated tank using hazardous chemicals.



Going green saves a fortune with Payback <12months

WESU offered the mine is a risk free environmentally friendly water treatment machine, which uses no chemicals at all. It requires a

negligible amount of electricity only, WESU machines provide scale corrosion and biolife protection, and capable of dissolving historical scale, even with very hard water (effluent, process water and even RO Brine can be used as makeup for cooling towers). Within six months the mine experienced an excess capacity of cooling water. Whereas they needed 190KL/hr in the past they now need only 24KL/hr during hot summer and 10KL/hr during winter time. As a result they had to shut down one of the 45kw pumps, and the other pump will have to be replaced with a much smaller pump of 12kw, and will also shut down one cooling tower. The cooling tower filling media is clean and will not have to be replaced any more. The frequent dangerous acid cleaning of the coils was stopped as well as the effluent blowdown associated with chemical treatment. Removing the chemicals off site reduced safety hazards and the administration involved with it and the cost saving. The carbon emission savings are significant and now adding to the mine profit down line.

Annual cost savings:

Water Savings;	\$39,945	R 290,000
Chemicals savings:	\$8,264	R 60,000
Acid for cooling coils cleaning	\$6,612	R 48,000
Labour Savings:	\$13,774	R 100,000
Cooling Towers Fill Media:	\$8,264	R 60,000
Energy savings:	<u>\$41,322</u>	<u>R 300,000</u>
Total Annual Savings:	\$118,182	R 858,000

Environmental consideration:

- Carbon Emission Saving (Ton/annum) **680**
- Potable water savings
- No effluent blowdown
- No hazardous chemicals



SCALED



SCALE



NO MORE



Clean Fill



COILS

Barberton Mines' Biox Plant Manager

When we started with the WESU system the old cooling coils was scaled up and the WESU system was busy removing the old scale. We had very low delta T of 9°C (across the cooling coils), we currently running at 24°C. (Now) we have a very high heat transfer rate through the cooling coils. In general we used to run two (45kw) pumps now we run one pump only. Yes, we have an excess cooling capacity. We have five cooling towers in the plant. We will look if we can use the excess of cooling either (to) stop one of the cooling towers or connect the two cooling pipe systems and close off two cooling towers. We don't have to bleed off (the cooling towers) to prevent scaling. The WESU system scales the carbonates in the WESU reactor and not the cooling pipes, where you don't want it. As long as water is flowing through, (and) nobody tempers with the valves it runs by itself. We had a set pattern that we had to replace (the cooling towers') packing every two years, it looks as if we will be able to extend it indefinitely. They (WESU) use the inherent chloride that is present (in the water) as a disinfectant, with the electrolysis, they generate chloride and Hypochlorite. The WESU system has an SMS system that gives you warning the gives you warning if there is any parameter that are out of the set parameter, if there is a power failure I know about it, if there is no air, I am getting pre-warning, they (my operators) find it strange that I know what happens in the plant. It does not use our operators. At the beginning, we were monitoring the flow rates, (later) it was left to work on its own Yes it is self monitoring and self maintained piece of equipment. Compared to chemicals there is chemical cost saving and the fact that you don't need chemicals you don't have the worry about people being poisoned by chemicals that are situated on the plant. The cost in terms of maintenance is low.

We already referred them (WESU) to a gold mine in Kazakhstan, and we are happy to refer them to different customers.