

UET

Naturally Treating Water

Case Study
Barberton Mine
South Africa



Updated 2016

Basic Facts

- UET systems were installed at the Barberton mine in 2008
- Previously had problems of scale build-up in the water system, and with the use of chemicals, including leaks
- They were looking to reduce costs and chemical usage, and to solve scaling problems



About Barberton

Barberton is Pan African's flagship gold project, producing 115,000 oz per year at an average cash cost of approximately US\$778/oz.

Additionally, it is the birthplace of BIOX[®] ('Biological Oxidation'), an environmentally friendly process of releasing the gold from the sulphide that surrounds it, using organisms that perform this process naturally.

Barberton is still used as the training facility for all BIOX[®] plants globally.

The Cooling Tower

- Number of cooling towers: 2 in the service of bio reactors
- Cooling tower type: Direct contact heat exchanger
- Cooling circulation rate: $\sim 250 \text{ m}^3/\text{h}$



UET's Treatment Scope:

- Complete solution for scaling and corrosion in the water system
- Chemical elimination
- Water savings by increasing the cycles of concentration



UET's Designed Solution

Set of UET units – fed by a side stream from the cooling recirculation stream, and designed to remove scale and produce biocide for water disinfection.

The mine was offered an environmentally friendly water treatment machine, which uses absolutely no chemicals. It requires only a negligible amount of electricity to provide protection from scale, corrosion and bio-life, and is 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 only need during hot summer months and 10KL/hr during the winter time.



As a result, they 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 blow-down 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.

Reported Annual Cost Savings

Water Savings:	\$39,945
Chemicals savings:	\$8,264
Acid for cooling coils cleaning	\$6,612
Labor savings:	\$13,774
Cooling towers fill media:	\$8,264
<u>Energy savings:</u>	<u>\$41,322</u>
Total Annual Savings:	\$118,182

Added savings:

Carbon Emission Saving (Ton/annum) 680

Potable water savings

No effluent blow-down

No hazardous chemicals



Cycles of Concentration:

With UET, the CoC was raised to between 5-6 cycles, compared to chemical treatment which could only maintain 2-3 cycles.

Summary of results from UET water treatment

- Cooling coils are scale free, resulting in increased heat transfer
- Less electrical and water usage
- Historical scale removed over time
- Cycles of concentration raised from 2-3 to 5-6
- Saved costs
- Removed harmful chemicals
- Environmentally friendly

Reference comments

Excerpts from comments made by Charl Fourie,
Barberton Mine's Biox Plant Manager

When we started with the UET system, the old cooling coils were scaled up, so it was busy removing the old scale.

We previously had a very low delta T of 90C across the cooling coils; we are currently running at 240C.

We now have a very high heat transfer rate through the cooling coils. *In general, we used to run two 45kw pumps, but now we only run one pump.*

We don't have to bleed off the cooling towers to prevent scaling *as the UET system scales the carbonates in the reactors and not the cooling pipes.*

We previously had a set schedule to replace the cooling towers' packages every two years. It now looks as if we will be able to extend it indefinitely.

Compared to chemicals, there is a chemical cost savings, and due to the fact that you don't need chemicals, you don't have the worry about people being poisoned by chemicals that are situated in the plant. The cost in terms of maintenance is low.

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NATURALLY TREATING WATER

UET LTD.

Tel. 972-8-649-4889

uet@uet.co.il

www.uet.co.il