

case study – lethabo power station west side cooling reticulation system



the use of the proprietary product “DECONT-A™” in the reduction of total bacteria and legionella counts in cooling tower water and the maintenance thereof.

problem

One of the major problems in water cooling systems of power plants is microbial fouling, leading to a loss of cooling efficacy and system corrosion. To prevent this, the cooling water is treated with a biocide and bio-dispersant. The programme at Lethabo Power Station was using a biweekly dosage of isothiazalone and a bio-dispersant.

During the three months from 7th September 2015 to 3rd December 2015, DECONT-A™ was used in a field trial at the Lethabo Power Station.

The cooling water drawn from the Vaal River or the onsite reservoir was being used as a heat transfer fluid in ESKOM operations. It was used to condense the steam in the heat transfer condensers before being pumped to the cooling towers. Such a system provides the ideal condition for bacteria to grow, which secrete a film of slime further reducing heat transfer. These microbes generate acids that affect the water chemistry damaging equipment, infrastructure, productivity and people.



The water treatment at the Power Station requires the minimal use of chemicals to adjust the pH of the water, combined with a biocide programme and bio-dispersant programme.

solution

DECONT-A™'s positive charge on the ammonium ion allows it to penetrate cell walls and is effective over a broad pH range. As DECONT-A™ is a non-oxidizing biocide, it also reduces the corrosion problem. Most importantly DECONT-A™, with its combination of natural ingredients is not only powerful enough to combat these harmful microbes, but also has a lower environmental impact than the products that were being ineffectively used.

trial methodology

A baseline of the microbial load during treatment with isothiazalone was initially established before using DECONT-A™. During this period a biocide only was used and not a bio-dispersant. After DECONT-A™ application the microbial load in the water increased due to the bio-dispersing effect of DECONT-A™, followed by a decrease in the microbial counts as DECONT-A™ killed off the microorganisms released from the biofilm.

The cooling water system was loaded with approximately 18ppm of DECONT-A™ and within one hour achieving a high kill rate, circulating the solution through the whole system.

scope

The purpose of this three month trial was to verify the anti-microbial efficacy of DECONT-A™ against the bacteria present in the cooling water system. Areas that were tested included:

- Quantitative analysis of both total bacterial counts and Legionella species
- Testing concentrations and variations in applications and dosing elimination.

area sampled

Eskom chose four points as their preferred sample points.

1. Raw water collection
2. Central cooling tower outlet
3. Clarifier outlet
4. Condenser West

testing

Samples were taken the day before the conventional biocide dosing, on the day of the addition and the day after. The same approach was used for the dispersant with two cycles being monitored.

The biocide was then switched to DECONT-A™ which was added on a two week cycle, replacing their biocide and bio dispersant dosing.

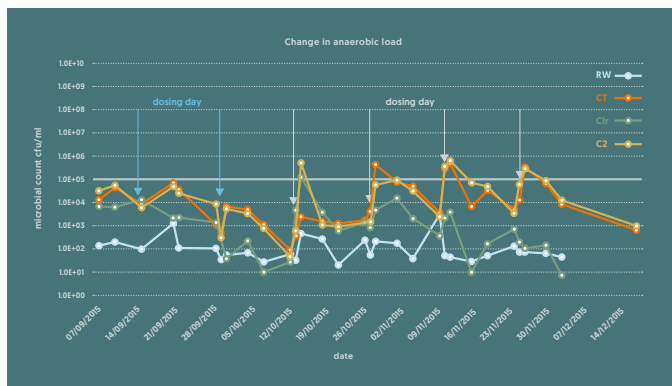


Figure 1: The change in aerobic bacterial load over the course of the trial. DECONT-A™ dosing is indicated in green. The bacterial count subsequently decreased as the biocidal properties of DECONT-A™ killed the released bacteria. It was also noted that the bio-dispersant properties of DECONT-A™ were able to remove the aerobic layer of the biofilm but also penetrate the anaerobic layer.

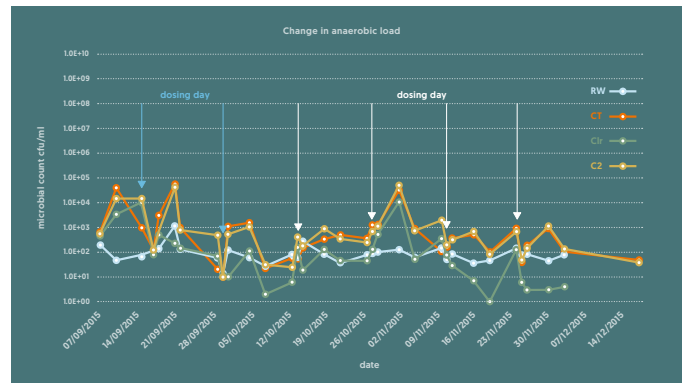


Figure 2: The change in anaerobic bacterial load over the course of the trial. DECONT-A™ dosing is indicated in green.

conclusion

DECONT-A™ is an environmentally safe biocide/bio dispersant safe to use to maintain the microbial contamination in the cooling water of Power Stations. It is capable of disrupting the biofilm, while maintaining the microbial levels within the limits set by ESKOM.

A further advantage of the DECONT-A™ system is the reduced negative environmental impact of the original product. The combination of the natural additive improves the performance of the formulation.