

Nalco Water Non-Phosphorus Corrosion Inhibitor and 3D TRASAR™ Technology Help Indonesian Palm Oil Customer Stay Ahead of Regulation Standards



BACKGROUND

One of Indonesia's largest palm oil refineries uses advanced chemical processes to produce various palm oil derivative products. As the environmental awareness has increased tremendously in recent years, the government implemented regulations that limit cooling tower blowdown quality to be discharged to the environment, including maximum Zinc (Zn) levels of 1.0 ppm and maximum phosphate (PO_4) levels of 10.0 ppm.

Parameter		Control Limit
pH	Unit	6.0 – 9.0
Free Chlorine	ppm Cl_2	1.0 max
Zinc	ppm Zn	1.0 max
Phosphate	ppm PO_4	10.0 max

Source: Indonesia Ministry of Environment

Previously, the customer used Nalco Zn- PO_4 treatment program for their cooling water system with Zn control between 1.5 to 2.5 ppm and PO_4 control between 10 to 20 ppm.

To comply with local discharge regulations, the plant needed to treat the cooling tower blowdown first in their wastewater treatment plant before it

could be discharged to environment, thus adding to their cost of operation.

To reduce operational costs in their wastewater plant and stay ahead of more stringent environmental regulations in the future, the customer asked Nalco Water to propose an action plan to meet the regulation for cooling tower blowdown without sacrificing cooling water performance that has been maintained since 2009.

SOLUTION

The Nalco Water team proposed the use of 3DT437, a new non-phosphorus (non-P) corrosion inhibitor, to help the customer comply with discharge limits while maintaining corrosion control.

Nalco Water's non-P corrosion inhibitor utilizes advanced polymer to replace PO_4 in a Zn- PO_4 treatment program. To improve the effectiveness of this program, 3DT437 requires a Zn level above 1.0 ppm to maintain corrosion-control performance. This dual combination allows customer to meet the PO_4 discharge requirement.

ANNUAL SAVINGS



WASTE

Reduced cooling water discharge to wastewater treatment plant by 38,632 m³ to save

USD \$51,509
Per year



COSTS

Avoided fines for violation of local discharge regulations to save

USD \$68,966
Per year



ENVIRONMENTAL RESPONSIBILITY

Reduced oxidizing biocide use by 24% to save

USD \$2,226
Per year



HUMAN HEALTH & SAFETY

Reduced handling and disposal of hazardous chemical pails by

1,223 kg
Per year



ASSETS

Maintained corrosion protection and heat exchanger performance at levels consistent with phosphate program



TOTAL VALUE DELIVERED

USD \$122,701
annually

To further improve dosage control in the new proposed program, 3D TRASAR™ Cooling Water Technology was implemented. In addition, the Nalco Water System Assurance Center provided 24/7 monitoring of the system and generated monthly system health reports for the customer and the Nalco Water team.

Combining with lab water chemistry analysis data and on-site water sample testing, the team gained a complete view of operational status and system health, including the key parameters such as corrosion rates, free residual chlorine (FRC) levels, actives and cycles of concentration.

RESULTS

Implementation of the 3DT437 treatment program and 3D TRASAR technology allowed the customer to meet government discharge regulation with adequate performance over corrosion control in all three of their cooling systems (CT#1, CT#2, and CT#3).

The program delivered excellent control over Zn and PO₄ (Figures 1a and 1b), allowing blowdown water to be discharged directly to the environment without having to go through the wastewater treatment plant. The customer also saw improved biocontrol and required 24% less oxidizing biocide to maintain the same concentration of FRC in the cooling water (Figure 2). Corrosion rate performance (Figure 3, 3D TRASAR controller data) was also well maintained, exceeding customer specifications. Overall system

performance management is consistent with past performance.

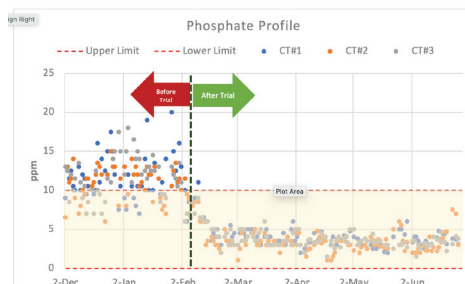


Figure 1.a. Phosphate level was maintained below <10.0 ppm throughout the trial period. With the same dosage with previous program, Non-P corrosion inhibitor reduces 50% phosphate level in the system (from ± 12.0 ppm to ± 5.0 ppm PO₄)

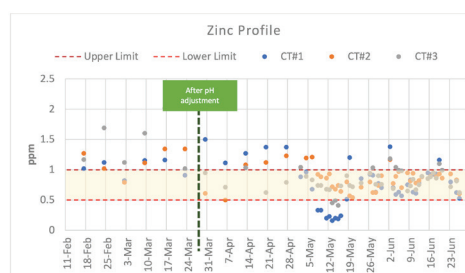


Figure 1.b Zinc level could be maintained below <1.0 ppm at least 80% during the trial period after maintaining pH 8 - 8.5. Non-P corrosion inhibitor program reduced the consumption of Zn program, 3DT129, because of lower phosphate level. The program was further optimized after trial.

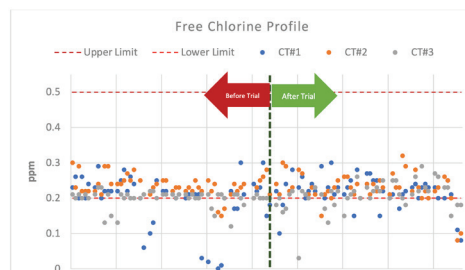


Figure 2. Chlorine level was maintained below 0.5 ppm Cl₂. Non-P corrosion inhibitor program reduces 24% consumption of oxidizing biocide



Figure 3. Average Steel Corrosion Rate. Corrosion rate for all cooling tower are maintained same as previous treatment program

CONCLUSION

Nalco Water's new non-phosphorus corrosion inhibitor along with 3D TRASAR™ Technology helped this customer reduce Zn and PO₄ levels as desired without compromising corrosion protection or heat exchanger performance. This implementation also improved system performance and extended asset life. It improved safety at customer site as well, as fewer hazardous chemicals (oxidizing biocide) were handled. This program helped the customer stay ahead of governmental restrictions on environmental discharge and maintain their brand image as a sustainable company.

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