



**Better. Safer.
Cleaner.**



Sanosil[®]

Sanosil C Water Microbiocide

WATER TREATMENT CAN BE A TOUGH JOB.
ALLOW US TO HELP.



Keeping water treatment costs under control; continually seeking ways to reduce the amount of water and energy your facility uses; increasing the operational performance of your facility while reducing maintenance downtime; and do it all while maintaining compliance with regulatory and safety mandates. **Sanosil C Water Microbiocide**, a proven broad-spectrum oxidizing biocide, is a unique formulation of hydrogen peroxide and silver. Sanosil is the most powerful, safe and economical alternative to the biocides presently being used by industry today. Unmatched in its killing action, Sanosil also delivers long lasting anti-microbial protection. Sanosil is safe, decomposing entirely into environmentally harmless components.

Within the following pages learn more about how using Sanosil C Water Microbiocide can help reduce the challenges you face with your water treatment program.



Sanosil C Water Microbiocide®

A UNIQUE AND POWERFUL SOLUTION

Sanosil C Water Microbiocide provides a powerful anti-microbial solution for water treatment. It is EPA approved for disinfecting and controlling bacteria, algae, fungi and biofilm in recirculating cooling water systems. (*EPA Registration Number: 84526-3*). Over 200 independent tests and satisfied customers worldwide have endorsed the economic, safety and efficacy advantages of Sanosil.

BROAD-SPECTRUM EFFICACY

- Multi-faceted killing mechanism prevents the formation of resistant organisms
- Dislodges and eliminates:
 - *Biofilm*
 - *Filament-Forming Bacteria*
 - *Sulphate-Reducing Bacteria (SRB)*
 - *Legionella, Salmonella and E.Coli*
- Eliminates all other gram positive and gram negative bacteria, fungi and yeast
- Significantly reduces the risk of microbiologically influenced corrosion (MIC)
- Does not show any gaps in efficacy
- Oxidizes and degrades organic matter

SANOSIL PROTECTS WORKERS, THE COMMUNITY & THE ENVIRONMENT

- Sanosil reduces environmental and water footprint
- Sanosil does not generate any Volatile Organic Compounds (VOC), which have an effect on the environment and human health. Only oxygen is released to the atmosphere. This also includes trihalomethanes (THM) such as chloroform; Sanosil therefore does not create any absorbable organic halides (AOX)
- Sanosil does not generate salt or other deposits

PATENTED TECHNOLOGY

Sanosil technology harnesses the true, oxidizing power of hydrogen peroxide by infusing it with our patented oligo-dynamic (anti-microbial activity of minute quantities of metallic ions) technology. During this intricate process, the hydrogen peroxide is stabilized and boosted with silver ions. The result is a radical, fluid architecture that is capable of destroying a broad spectrum of microorganisms including pathogenic bacteria, viruses, yeast, fungi and protozoa.

REDUCES OPERATING, TREATMENT, AND MAINTENANCE COSTS

- Sanosil reduces the need for other water treatment chemicals like corrosion and scale inhibitors, pH stabilizers, etc.
- Sanosil does not increase conductivity and allows for increased cycles-of-concentration, reduced blow down and less make-up water which conserves water and reduces treatment costs.
- Sanosil increases production uptime and reduces maintenance downtime by reducing corrosion, scale and risk of facility breakdown and premature aging.
- Sanosil increases heat exchanger efficiency, and therefore reduces energy costs.
- Sanosil reduces the need to manually clean biofilm, therefore reducing man hours and downtime.

- Sanosil decomposes into water, oxygen and non-toxic silver complexes
- Sanosil reduces occupational and environmental exposure to toxins
- Using Sanosil reduces regulatory fines for discharges and safety violations

SANOSIL IS MORE THAN HYDROGEN PEROXIDE

Hydrogen peroxide has long been used as an antimicrobial agent.

The Sanosil formula contains hydrogen peroxide which, in conjunction with other proprietary raw materials, is converted into an entirely new material. So, while basic hydrogen peroxide has limited killing mechanisms, efficacy and stability, Sanosil is a multi-mechanistic, extremely stable, broad-spectrum product.

Dynamic
Synergistic
Formula

Sanosil

H₂O₂

Basic
Commodity

3x MORE

Multiple Mechanisms of Killing Action

Sanosil disinfects by means of oxidation, oligodynamics and the synergistic effect of all its ingredients. It attacks the cell membrane, DNA and enzymes resulting in effective killing with no risk of resistance.

One-Dimensional Killing Mechanism

Basic oxidizer with selective killing ability. Allows for bacterial resistance to occur. (catalyse)

3x MORE

Thermally Stable

At 100°C, Sanosil releases approximately three times less O₂ than hydrogen peroxide. Non-flammable and non-combustible.

Inherently Unstable at High Temperatures

Hydrogen peroxide is highly reactive due to the instability of the peroxide O-O bond. Its transformation to water and oxygen increases exponentially as its temperature rises.

5x MORE

Exceptional Stability and Efficacy

Sanosil maintains its effectiveness in heavily contaminated water. It also provides a long-term residual antimicrobial effect. Studies show that Sanosil replaces hydrogen peroxide at a 1:5 ratio.

Rapidly Decomposes

In the presence of organic matter, proteins, dust, carbonates, etc. hydrogen peroxide breaks down rapidly without leaving any residual. It will not maintain microbiological control unless large amounts are used to flood the system.

TRUSTED IN COOLING TOWERS WORLDWIDE AT:

- Power Plants
- Petroleum Refineries
- Petrochemical Plants
- Other Industrial Facilities



SANOSIL C IS SIGNIFICANTLY LESS CORROSIVE THAN SODIUM HYPOCHLORITE, BROMINE AND OTHER BIOCIDES

Oxidizing biocides have a known tendency to contribute to corrosion and equipment damage.

The consequences of corrosion can be costly:

- Expensive remediation costs for partial to complete replacement of steel pipes and heat exchanger tubes
- Pitting of equipment
- Corrosion build-up and by-products on heat exchangers reduces system efficiency
- Increased costs - requires excessive use of inhibitors and other chemicals
- Reduced lifecycle of system
- Need for expensive metallurgy



Corrosion studies and field trials have shown lower rates of corrosion for Sanosil C with the added advantage of compatibility with inhibitors, dispersing agents and other non-oxidizing biocides. Due to the longer activity and decreased corrosion rates, Sanosil C has potential for use in many different states of cooling tower operation including dormancy.

Mild Steel 12 Hours After Submersion in Sodium Hypochlorite



Sanosil



13% Sodium Hypochlorite

Accelerated tests using concentrated formulas

Mild Steel 48 Hours After Submersion in Stabilized Bromine



Sanosil

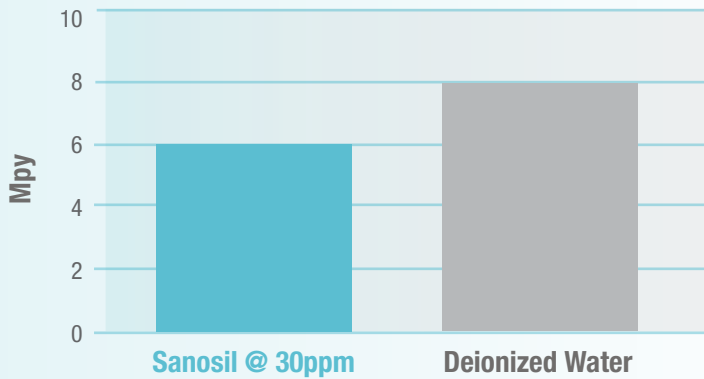


13% Bromine

Corrosion of Carbon Steel

Controlled field studies have shown that Sanosil generates lower corrosion rates than bleach and even plain water!

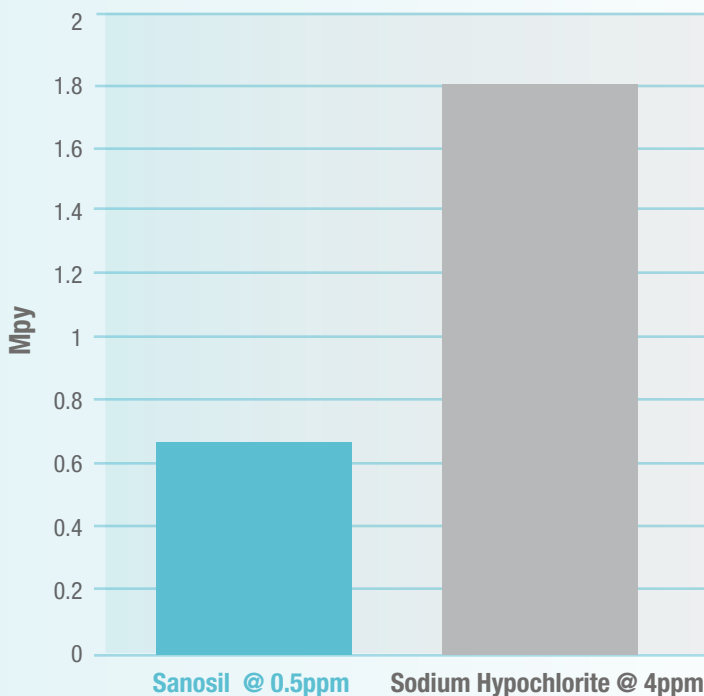
Sanosil C compared to Water



By ASTM G31 Standards, Sanosil at in-use dilution has equal to or lesser corrosive effects compared to plain, uninhibited water. Lab test based on Sanosil at 30ppm and deionized water; both with no corrosive inhibitors.

Source: Corrosive Testing Laboratories, USA, 2009

Sanosil C compared to Bleach



This chart shows the corrosion rates of Sanosil C and bleach (12%) in a Minimal Inhibitory Concentration (MIC) study utilizing cooling make-up water of a refinery. The dose rate reflects the amount of product needed to maintain microbiological control in real life conditions.

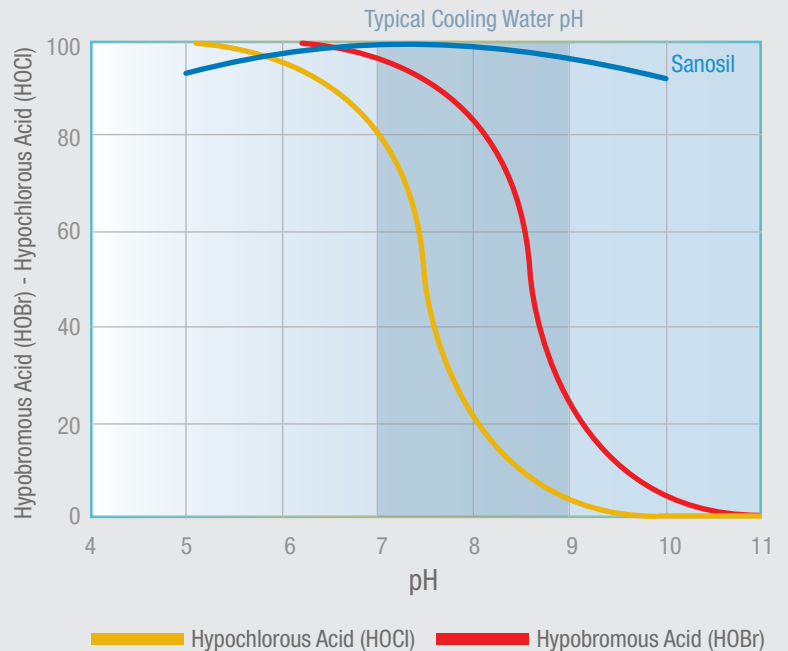
Source: Microbiological Laboratory Evaluations of Sanosil vs Sodium Hypochlorite. Laboratory C&T TECHNOLOGY SA, 2010.

SANOSIL IS EFFECTIVE ACROSS A WIDE RANGE OF pH LEVELS.

When chlorine or bromine based products are dissolved in water they form hypochlorous (HOCl) and hypobromous acid (HOBr) respectively, which are the active biocides. As pH increases, the percentage of hypochlorous (HOCl) and hypobromous (HOBr) decreases, as shown in the chart below. As temperature increases, the amount of HOCl and HOBr at a given pH decreases. Therefore, chlorine and bromine based products are less effective in typical cooling tower conditions running at alkaline pH >7.

Sanosil C will retain its efficacy over a pH range of 2-9.


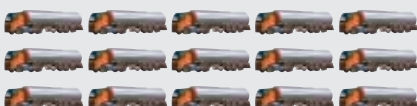
Dissociation of HOCl and HOBr at Different pHs



— Hypochlorous Acid (HOCl) — Hypobromous Acid (HOBr)

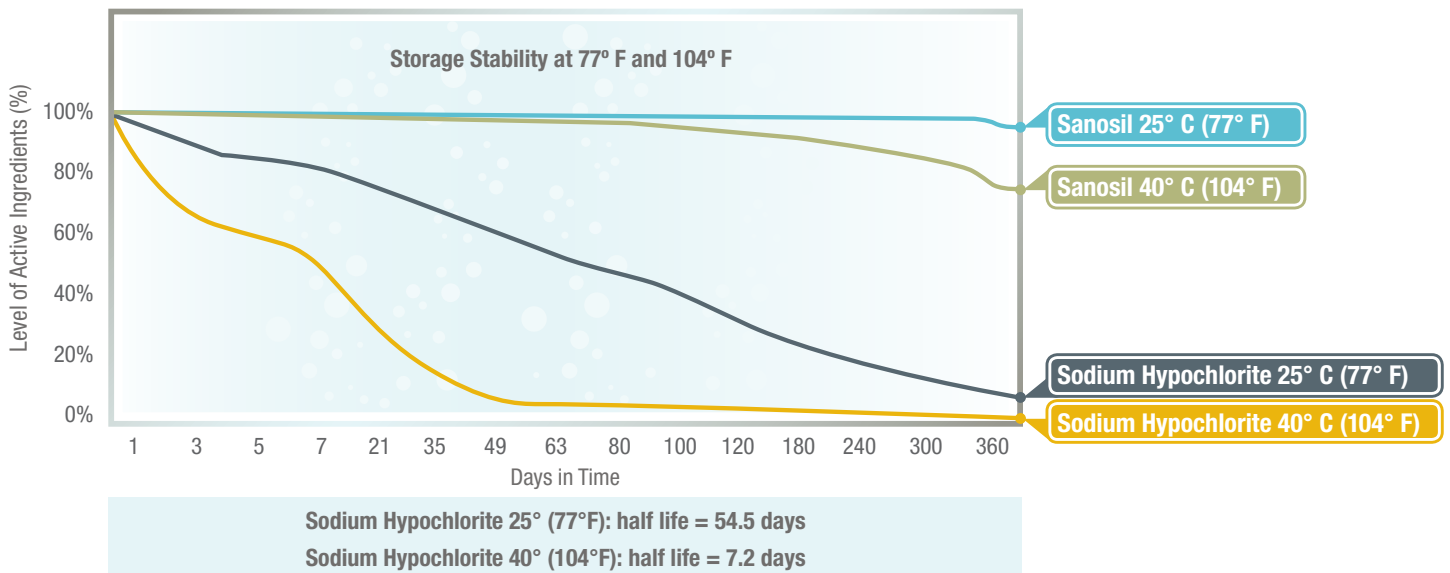
Between pH levels 8-9 HOCl and HOBr decompose rapidly.

SANOSIL OUTPERFORMS CHLORINE BLEACH (SODIUM HYPOCHLORITE)

	Sanosil	Chlorine Bleach
Activity Mechanism	Three: Oxidation, Oligodynamic, and Synergistic effects	One: Oxidizing only
Shelf life: days to lose 50% of activity @ 104° F (40° C)	> 1 year	7 days
Decomposition Products	Oxygen, water, non-toxic silver complexes	Chlorates, Chlorites, Chloroamines, Trihalomethanes (THM)
Volume Requirements		
Effective pH Operating Range	2 - 9	5.5 - 7.5
Impact on pH	None	Acid addition required to adjust
Impact on Conductivity	None	Yes
Potential microbial resistance	None	Yes

SANOSIL IS MORE STABLE

Sanosil remains stable over a wide range of temperatures, while Sodium Hypochlorite (Bleach) rapidly decomposes.



SANOSIL MAINTAINS SUPERIOR MICROBIOLOGICAL CONTROL

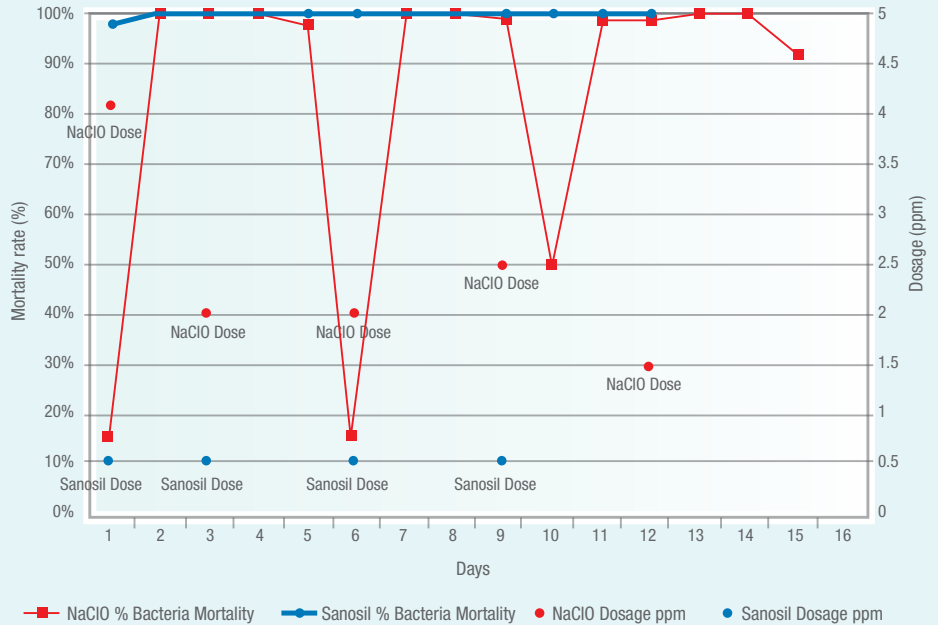
Even in the Presence of Contamination

Sanosil shows higher broad-spectrum efficacy than chlorine bleach, even in the most challenging applications.

In a dirty system, such as a system contaminated with glycol or hydrocarbons, considerably lower doses of Sanosil are required to treat compared to chlorine bleach. Chlorine bleach is unable to control algae or bacteria growth in the presence of glycol.

Sanosil provides remarkable persistence making it the clear choice for bacteria and algae control.*

Bacterial Control Comparing Sodium Hypochlorite (NaClO) and Sanosil in Make-up Water + 1000ppm Glycol



BEFORE



AFTER

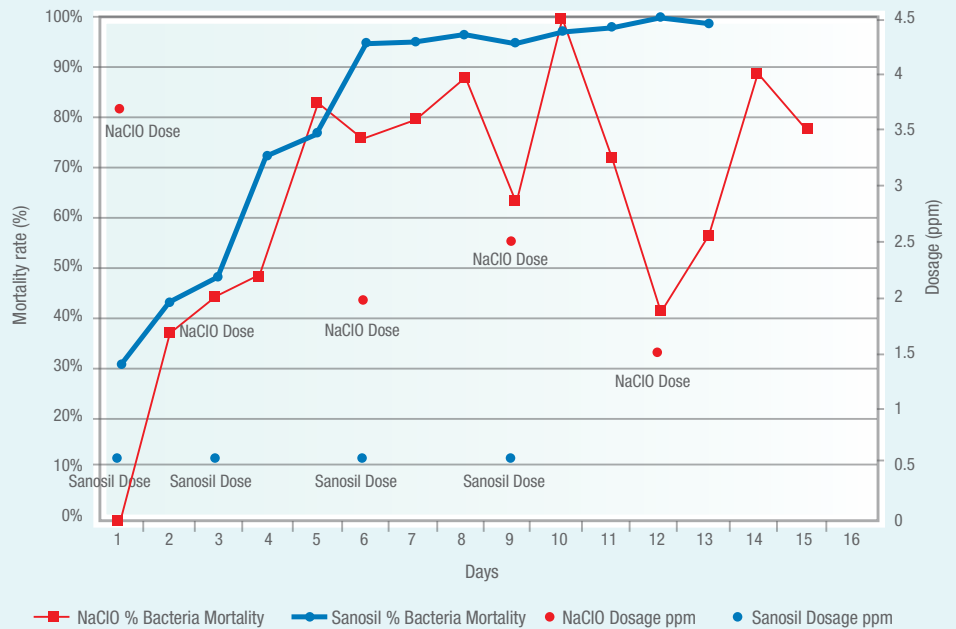


BEFORE



AFTER

Algae Control Comparing Sodium Hypochlorite (NaClO) and Sanosil in Make-up Water +1000ppm Glycol



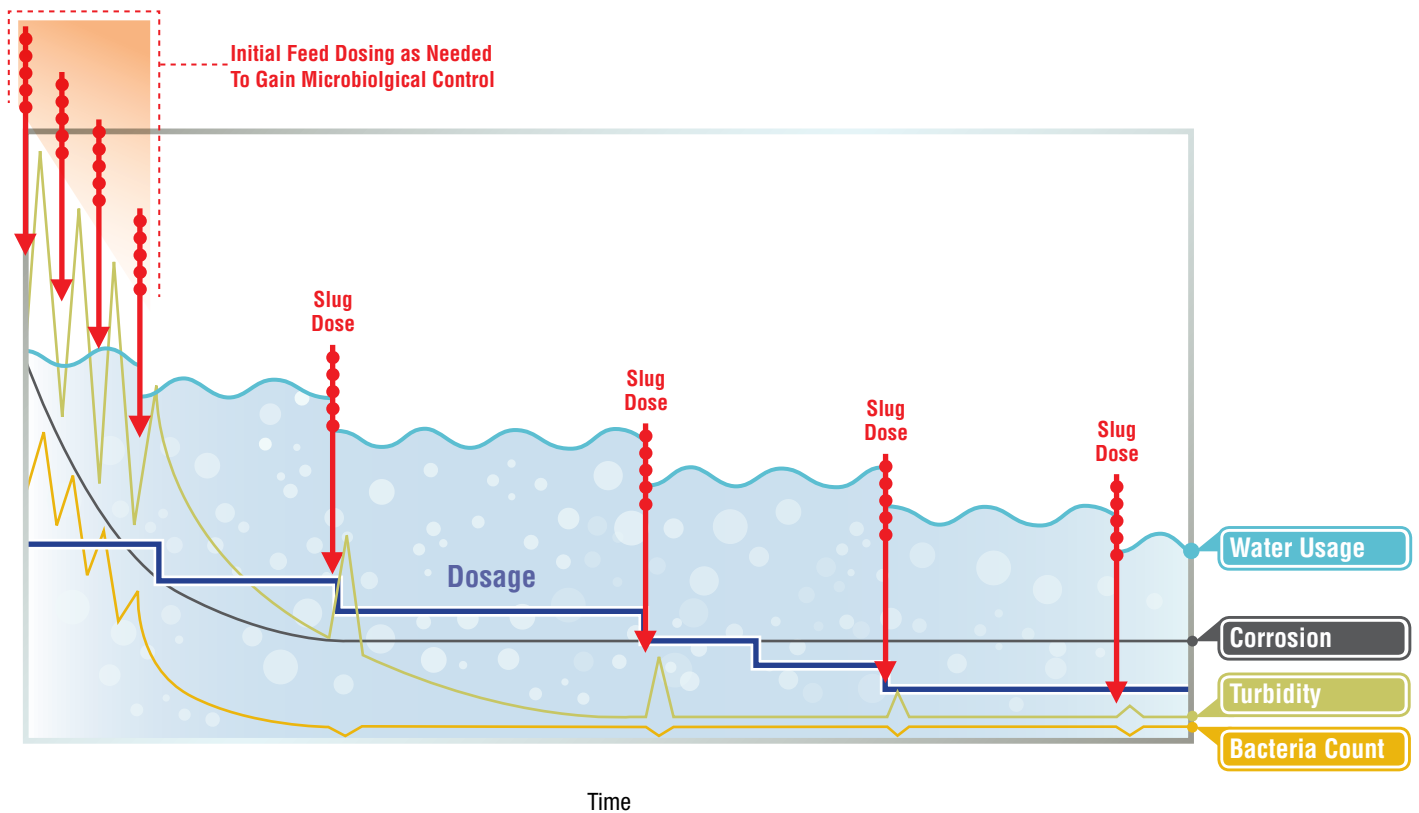
* Source: "Microbiological Laboratory Evaluation of Sanosil vs. Sodium Hypochlorite". Laboratory C&T TECHNOLOGY SA, 2010.

SANOSIL FOUR STEP PROCESS

Sanosil International is committed to helping customers achieve optimal biological control of cooling water systems. We work hand-in-hand with water treatment service providers to prescribe the best dosing procedure for each unique system.

Our experience enables us to reasonably predict the stages of the Sanosil treatment process. By sharing this process upfront, customers can better understand what to expect from using our product and we can ensure that the Sanosil program will help achieve optimal performance in the system.

FOR SUPERIOR WATER TREATMENT IN HEAVILY FOULED SYSTEMS*



Initial Stabilization Period	Secondary Stabilization	Optimization Period	Maintenance Period
<ul style="list-style-type: none"> Eradicate gross microbiological contamination Reverse corrosion trend Dislodge biofilm, reduce algae and bacteria counts 	<ul style="list-style-type: none"> Consume organic matter Continue to clean and stabilize system 	<ul style="list-style-type: none"> Complete elimination of biofilm Dosage optimization Overall chemical treatment reduction 	<ul style="list-style-type: none"> Maintain low bacteria levels Ongoing efforts in cost reduction and water management

* Conceptual depiction. Every Cooling Tower is different.





A PLAN FOR THE FUTURE

Sanosil C is a cutting edge microbial water treatment alternative to traditional biocides being used by the industry today. Many of these microbiocides cause high chemical risk to people, equipment, and the environment. And we predict that these treatment methods will be deemed unacceptable in the near future. Sanosil maintains multiple patents for eco-friendly treatment formulas, along with EPA and EU regulatory approvals, while continually researching and developing new products. Sanosil is ideal for cooling towers. Its advanced benefits include lower treatment costs, reduced water and energy needs, reduced exposure to harmful toxins, reduced corrosion of piping and equipment, and the elimination of biofilms and Legionella.

Planning for the future begins now. Take steps to protect your investment in your workers and facilities while killing microorganisms and their breeding conditions. Reduce the introduction of unsafe toxins and their by-products into your treatment operations. Sanosil is safe for humans, wildlife and the environment and is the safe alternative for water treatment today and in the future.

WITH POWER COMES RESPONSIBILITY™

We are caretakers of environmental integrity, health and safety. By avoiding the use of harmful carcinogens and mutagens, we are able to meet the needs of today without compromising the resources of the future.

SANOSIL PROVIDES WORLDWIDE SUPPORT

Committed to 100% Customer Satisfaction

- Sanosil provides a complete microbiological treatment plan
- Sanosil offers full technical support for customers and service providers
- Sanosil provides 24/7 troubleshooting support





Disinfectants with a Clean Agenda™

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