

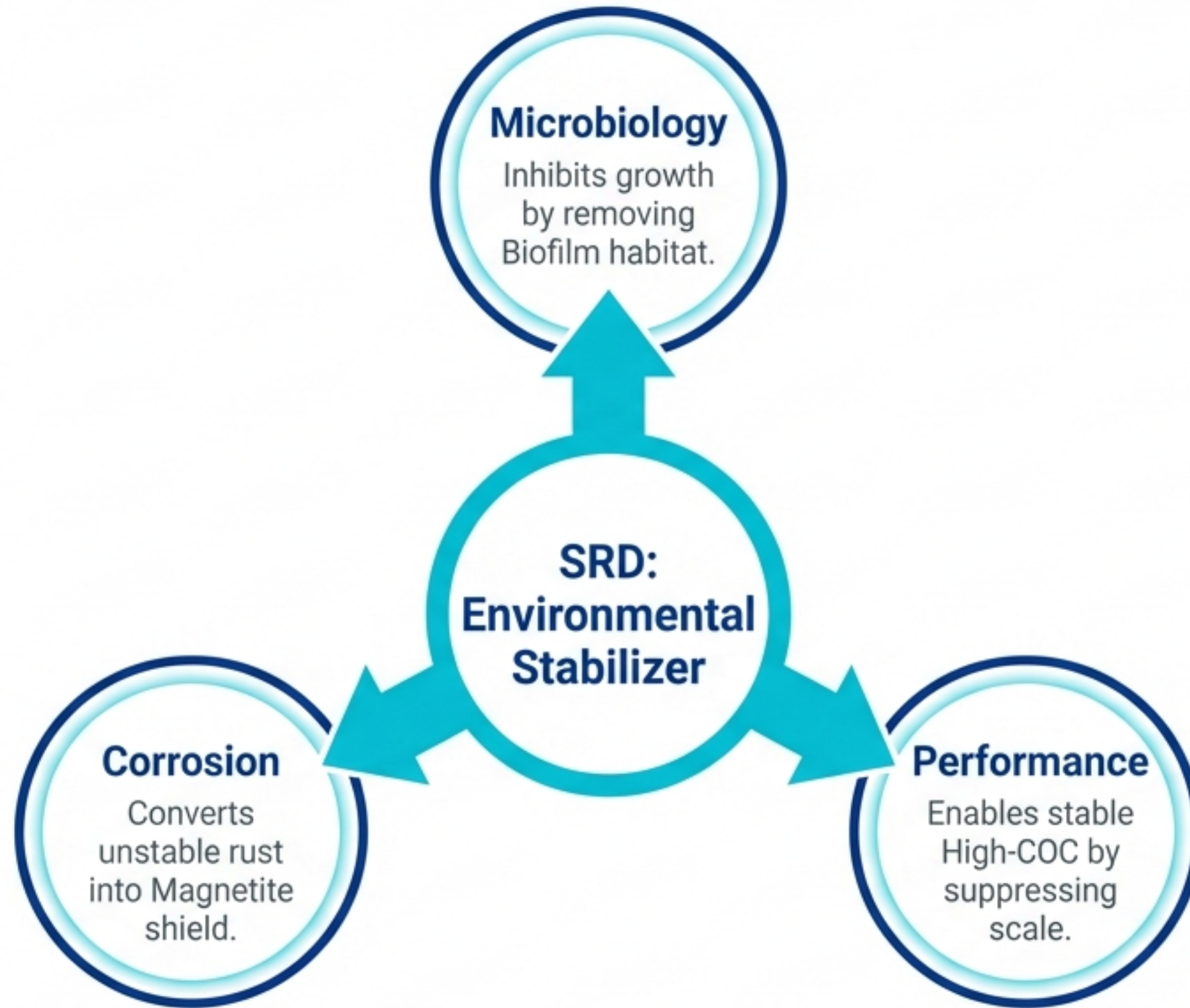
SRD Technical Impact Analysis: Microbiology, Performance, & Corrosion Control

Mechanism of Action & Operational
Benefits for HVAC Systems

Prepared for Technical Engineering Inquiry
regarding Microbial Control, Cycles of
Concentration (COC), and Material Compatibility.



Moving from Symptom Removal to Environmental Stabilization



The Paradigm Shift: SRD is not a **'Removal'** device (Biocide/Cleaner). It is a **'Stabilization'** device. It creates an environment where problems cannot thrive.

Microbial Control: The “Habitat Deprivation” Strategy

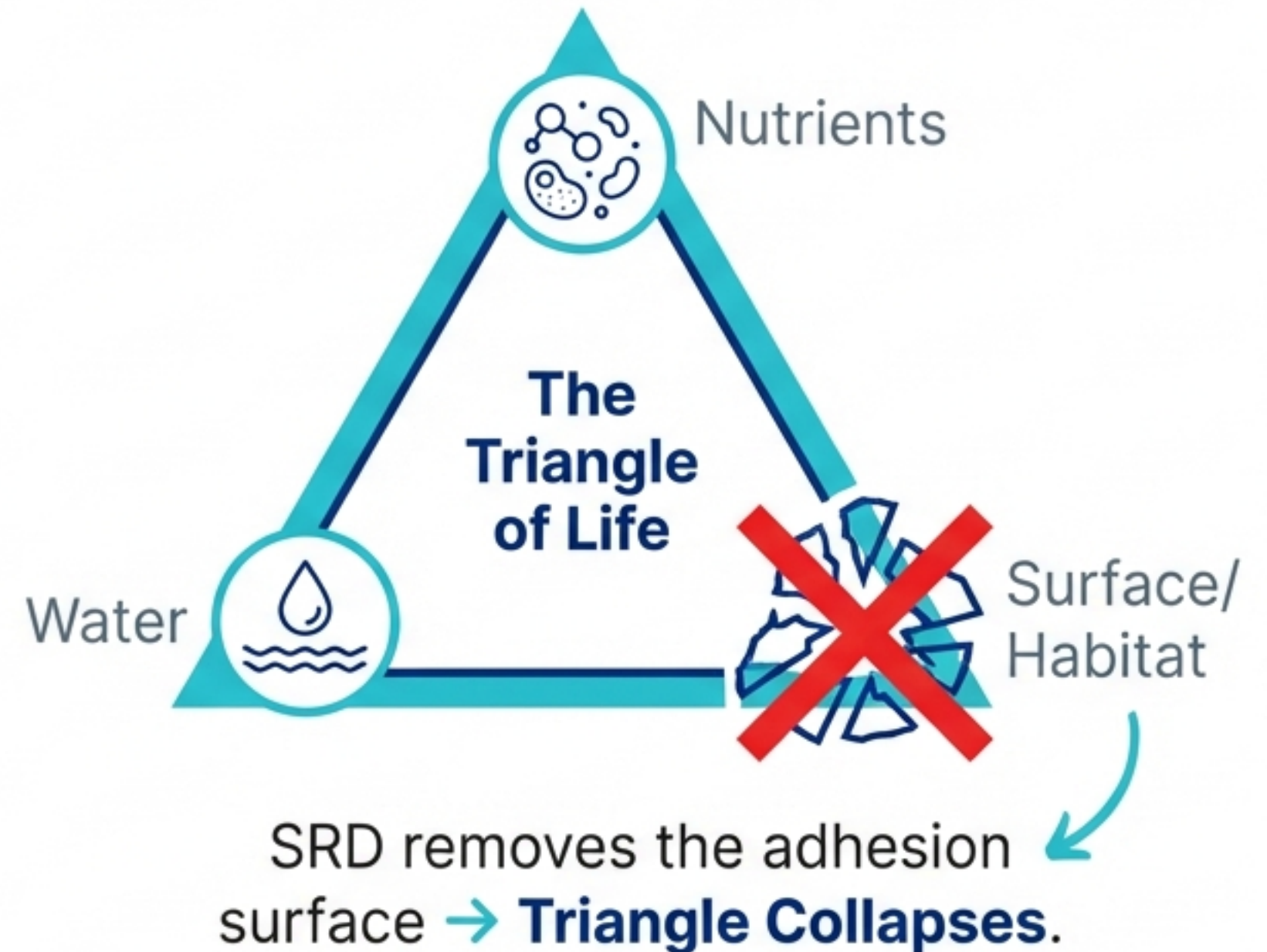
Addressing Question 1: Can SRD prevent microbial activity?

The Direct Answer:

SRD does not directly sterilize (it is not a poison). Instead, it dismantles the Biofilm Foundation.

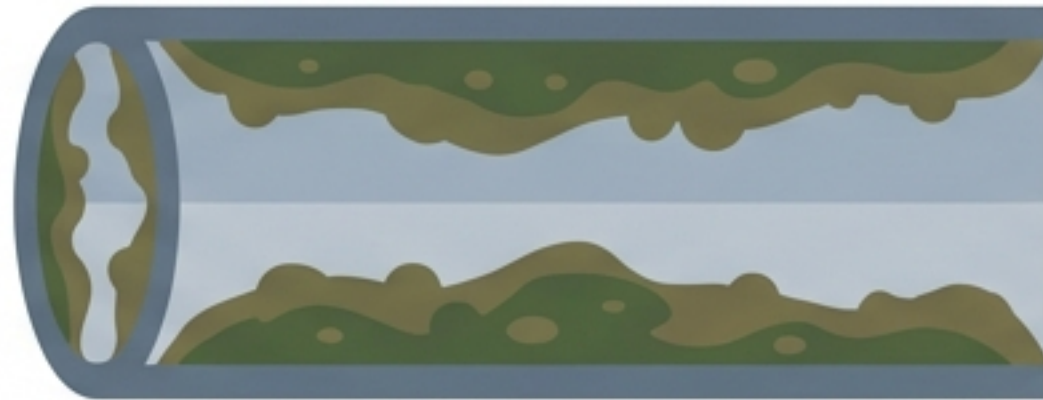
Mechanism:

- Microbes require specific conditions to proliferate:
- Scale surfaces for adhesion
- Sediment, and “Dead Zones”.
- SRD removes scale-forming ions (Ca^{2+} , Mg^{2+}), eliminating the rough surface required for biofilm attachment.



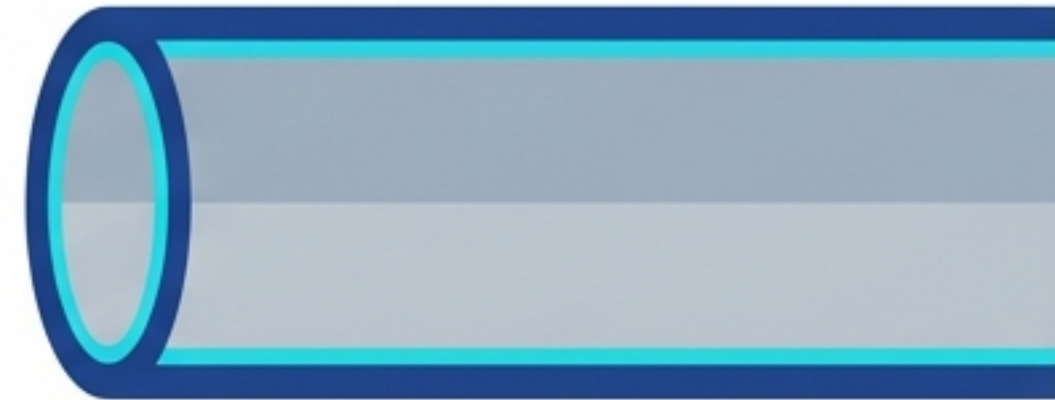
Result: Long-term Bio-Stability and Reduced Slime

Standard System



High Biofilm Adhesion.
Frequent Chemical Dosing Required.

SRD System

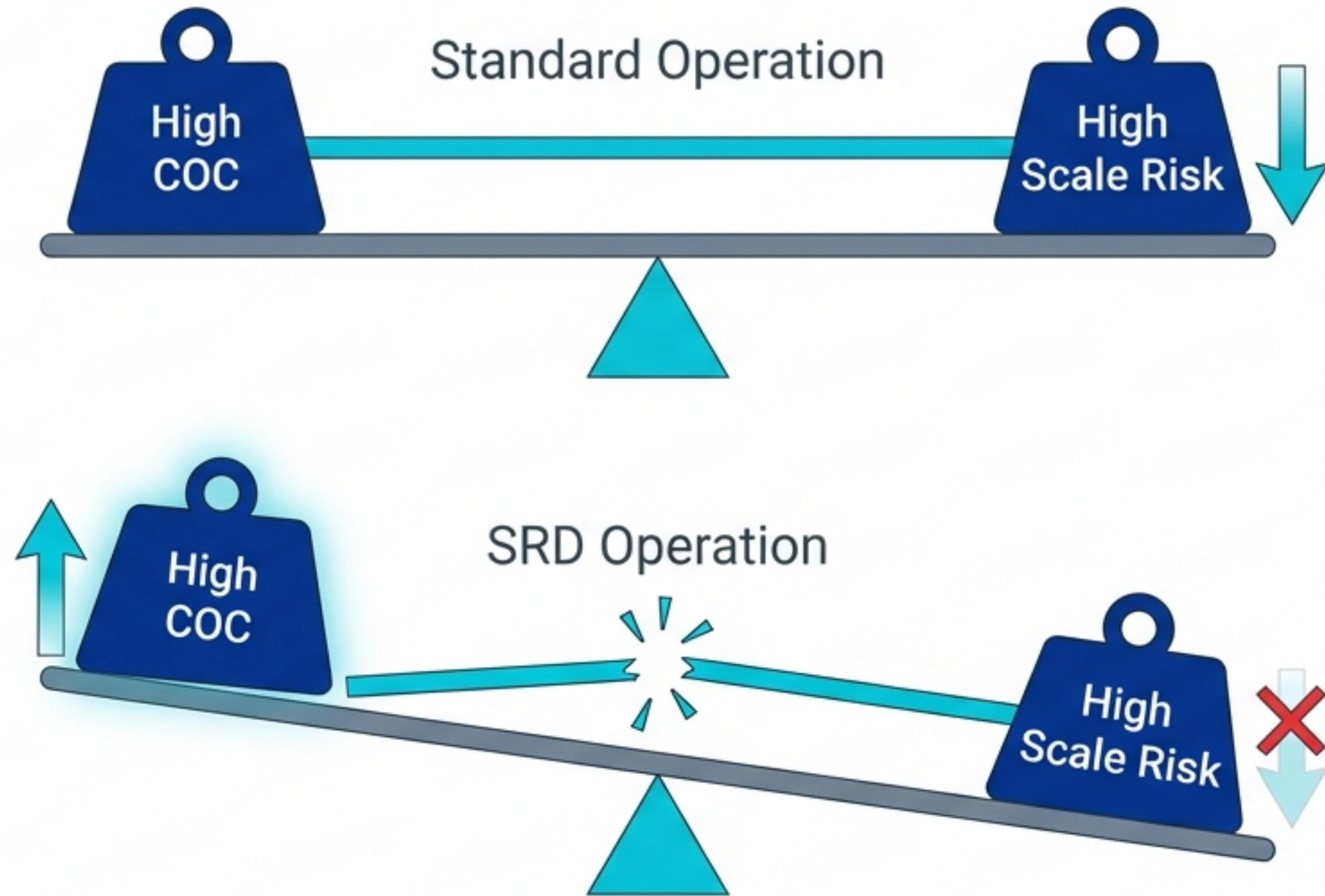


Reduced Slime Formation.
Extended Biocide Intervals.

Key Insight: SRD does not kill microbes, but it removes the conditions where microbes grow.

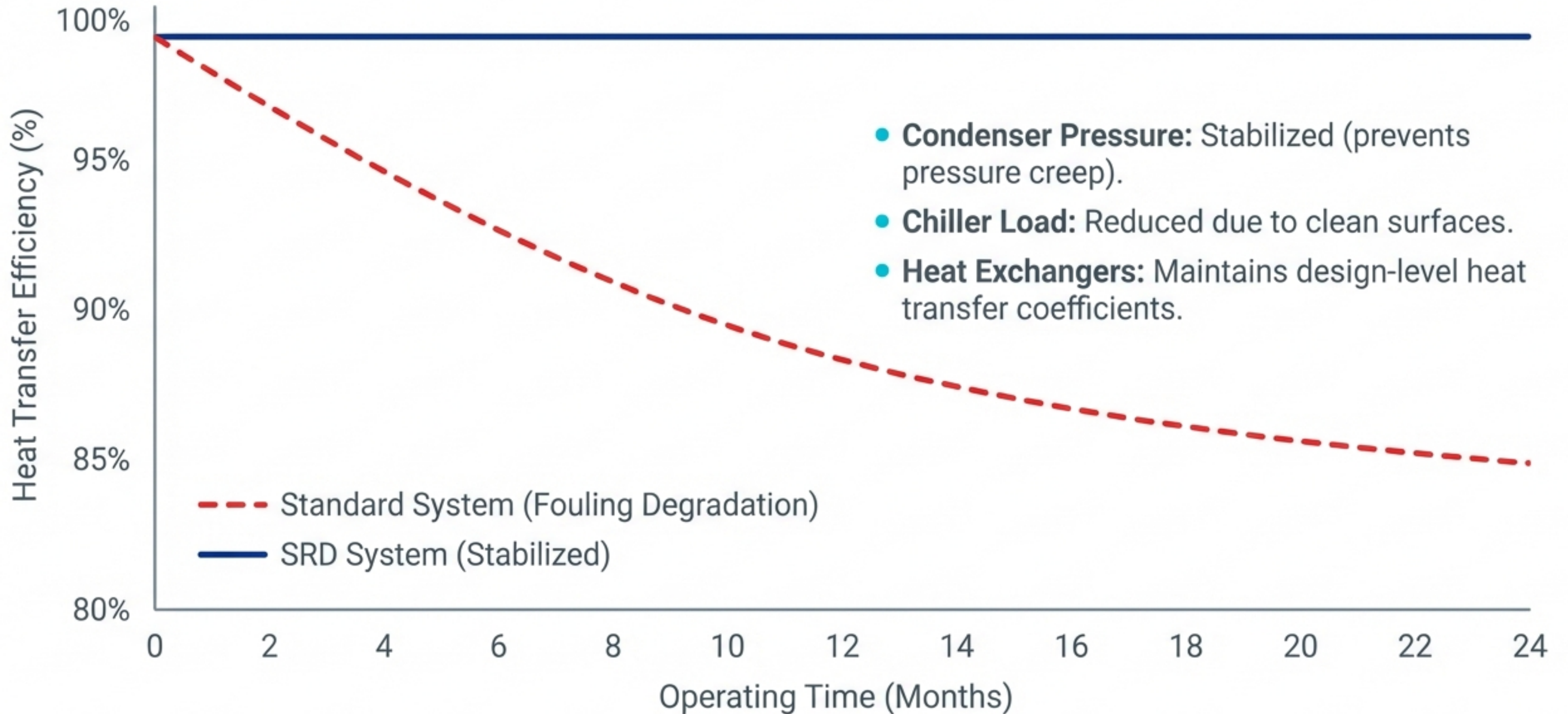
Cycles of Concentration (COC): The Safety Enabler

Addressing Question 2: Cooling tower effectiveness and COC metrics.



SRD breaks the link between Concentration and Scale. It enables High-COC without the associated Scaling penalty, reducing Blowdown frequency safely.

Quantifiable Efficiency Gains for Chillers and Cooling Towers

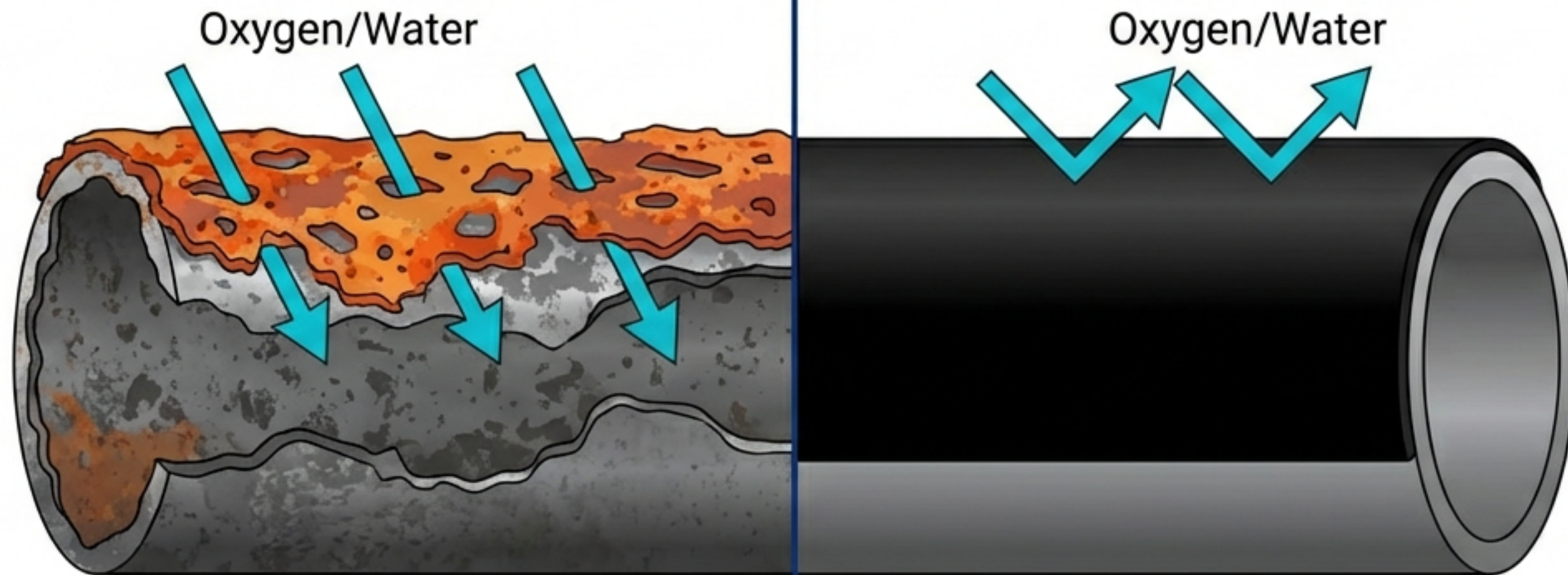


Corrosion Control: The Magnetite Transformation

Addressing Question 3: How the electrode prevents corrosion.

Before (Red Rust / FeOOH)

After (Magnetite / Fe_3O_4)

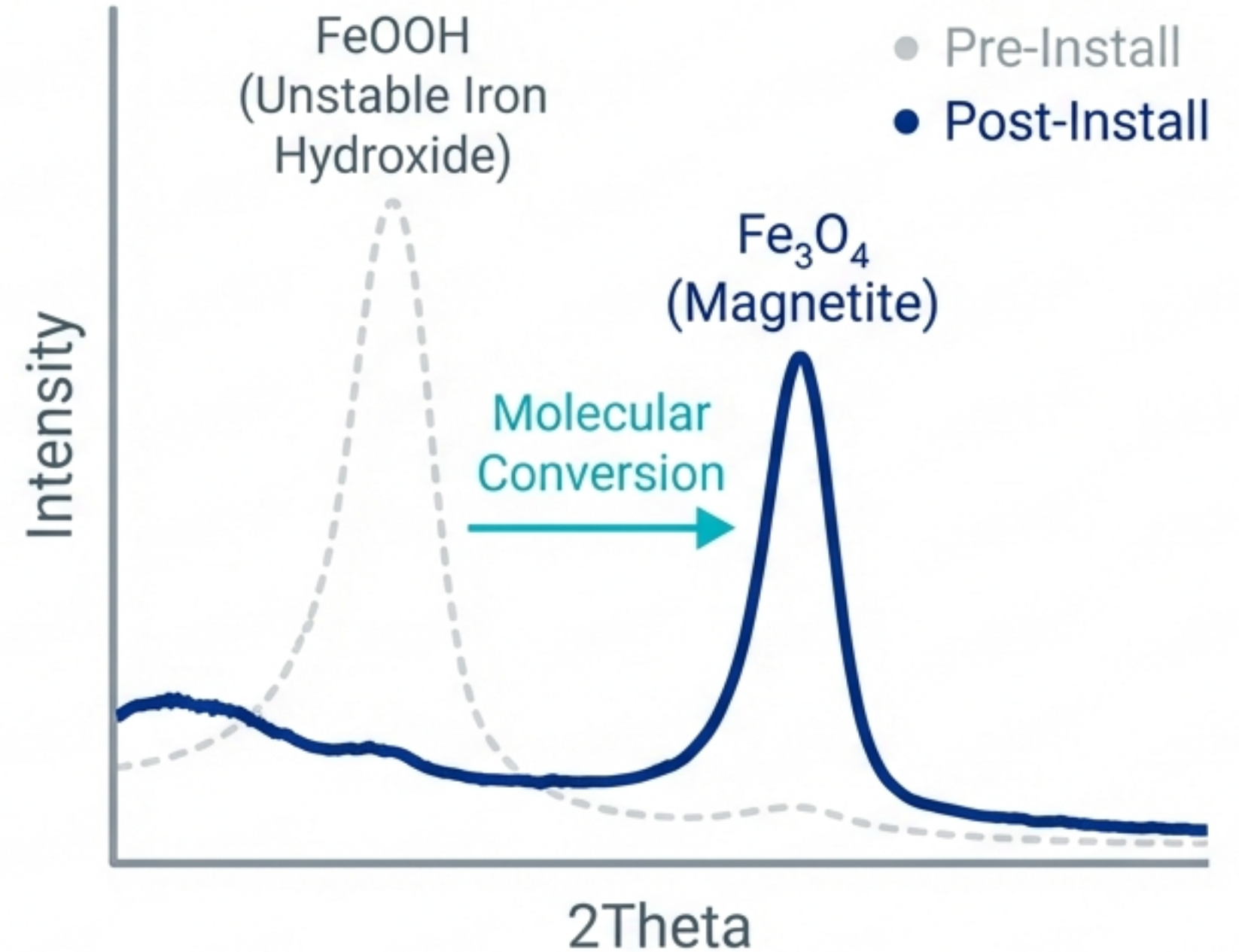


Crucial Distinction: SRD does not 'remove' corrosion (thinning the pipe).
It converts unstable Red Rust into a stable Magnetite Shield.

The Evidence: XRD Analysis Verification

Methodology: X-Ray Diffraction Analysis (Standard KS M 0043).

Significance: Confirms chemical change at the molecular crystal structure level. Forms a passive layer layer similar to stainless steel.



Material Compatibility and Safety Profile



Carbon Steel



Stainless Steel



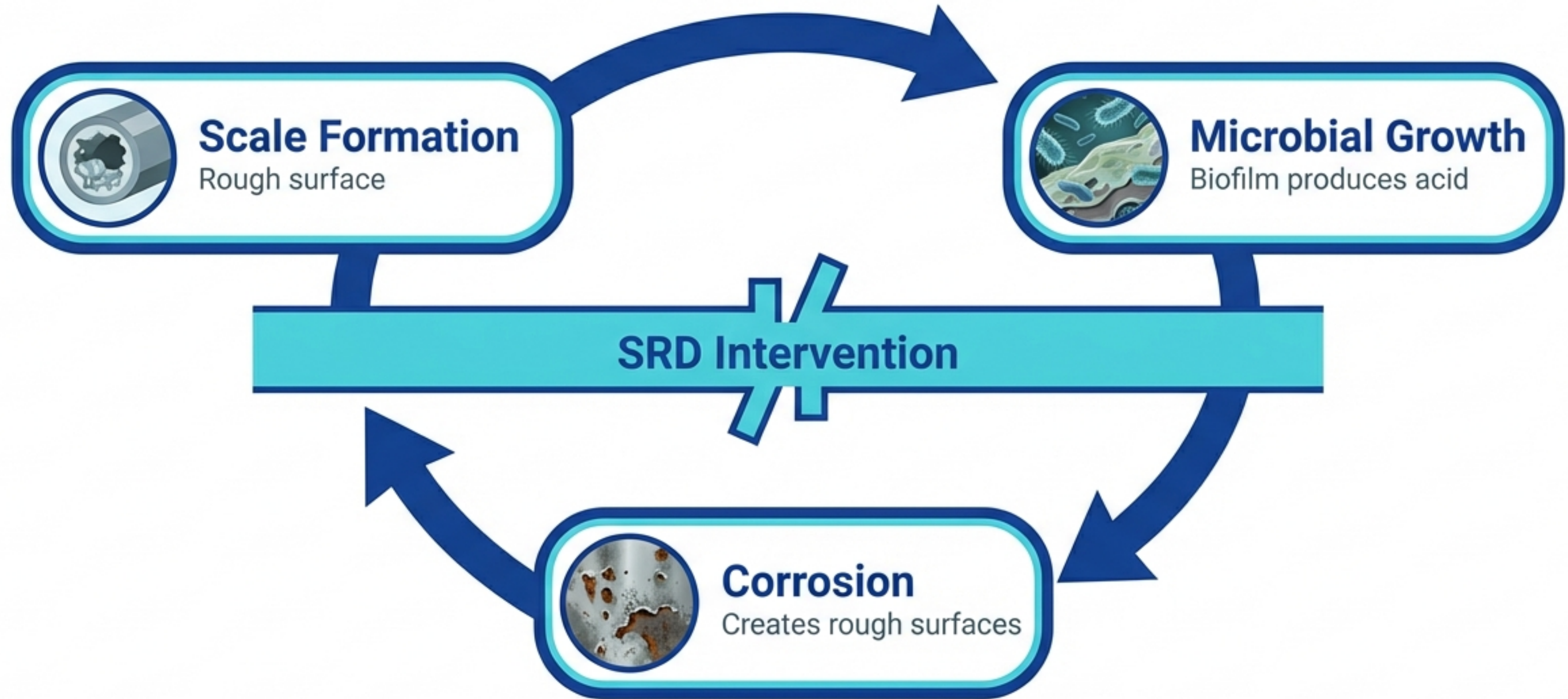
Copper Alloys



Safety Profile:







Unlike acid cleaning, SRD does not cause drastic fluctuations in pH or Chloride levels. Significantly lower risk of pitting or material degradation compared to chemical agents.

Breaking the “Vicious Cycle” of Water Quality



SRD disrupts the cycle by stopping Scale and converting Corrosion, creating a Virtuous Cycle of stability.

Comparative Analysis: Why SRD?

Criteria	Chemical Treatment	SRD System
Mechanism	Treats Symptoms (Poison/Acid) 	Treats Root Cause (Stabilization) 
Safety	Hazardous Handling / Consumables 	Non-Chemical / Permanent 
Corrosion	Risk of Acid Attack 	Magnetite Shield Formation 

Executive Takeaways for Facility Management

1. MICROBES: SRD does not disinfect, but it removes the environment where microbes grow.

2. PERFORMANCE: SRD stabilizes cooling performance and enables safer high-cycle operation.

3. CORROSION: SRD converts unstable iron oxides into magnetite, suppressing further corrosion.

SRD: Engineering Water Stability

A holistic solution for **Microbiology,**
Performance, and **Corrosion control.**

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