



Solid and Adaptive
Solutions
for a **Sustainable** and **Resilient** future



Using Bio Organic Catalysts to reduce fouling in industrial cooling systems

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SOLID SOLUTIONS IN A FLUID WORLD

Introduction to Nijhuis industries

- **Nijhuis Industries vision and mission**
 - **Provide solid solutions in a fluid world**
 - **Turning waste water into profit**
 - **Sustainable water use and resource recovery**

Introduction to Nijhuis Deba

- **In September 2019 Nijhuis acquired Deba UK Ltd**
 - **To enhance the service offering for managing process water**
 - **Offer full environmental and legislative compliance**
 - **Offer a complete solution for the circular economy**

Challenges in cooling water in the UK

- **Water costs are increasing £2.30/M³**
- **UK has increasing legislative framework ACOP L8, HSG 274 part 1**
- **Increasing discharge costs and volume restrictions**
- **Process efficiency challenges and capacity changes**
- **Challenges to minimize plant maintenance downtime**

Some possible solutions

Disinfection strategies for legionella control

Ozone

Chlorine dioxide

Electrochemical

Traditional bromine/chlorine

Ionisation

The solution must fit the capex/opex and process requirements

Some possible solutions

Removal of suspended solids/contamination

Membrane filtration

Screen or bag filtration

Centrifugal filtration

Case study: Fouling in food factory cooling towers- The challenges

- **Process contamination from the canning/bottling process**
- **Increase in organic solids/COD**
- **Build up of sludge in the settlement tanks**
- **Biofilms formed on waterside surfaces**
- **Increased levels of Bromine dosing to keep bacterial control**
- **Excessive purging water from the system to control COD**
- **Extensive down time for cleaning and maintenance**

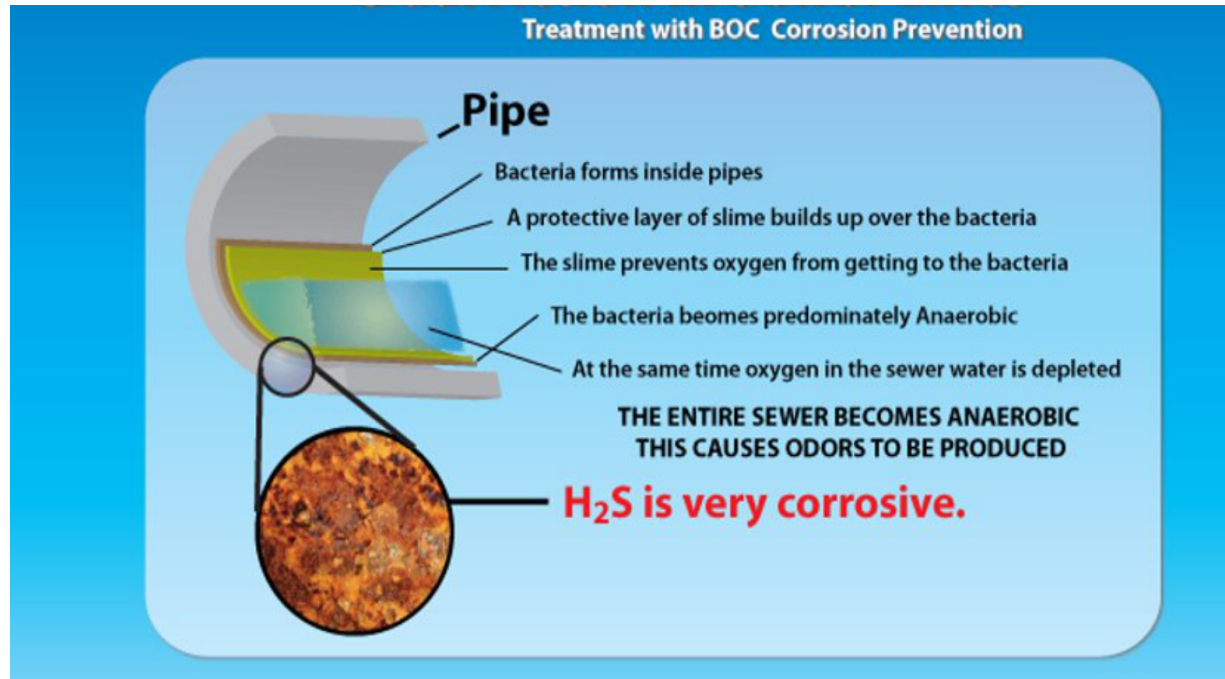
The choice of solution

Limited Capex

- **Restricted investment into filtration**
- **Restricted any change to disinfection choices**

External audit demanded a quick solution

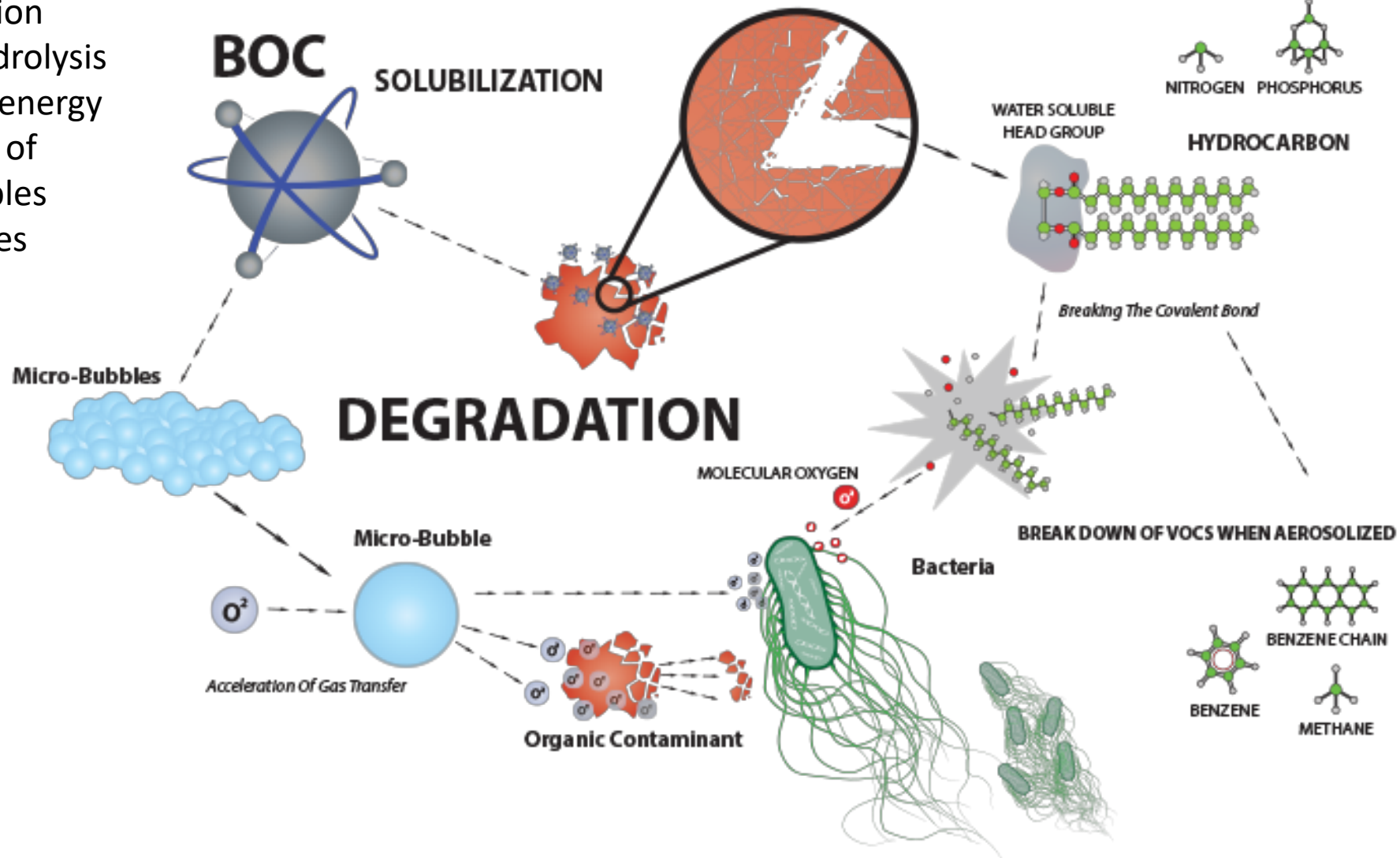
Bio Organic Catalyst



- Patented liquid solution
- Easily applied with simple dosing pump
- Non-toxic and safe for operators
- Biodegradable
- Cost effective due to low dose and persistency

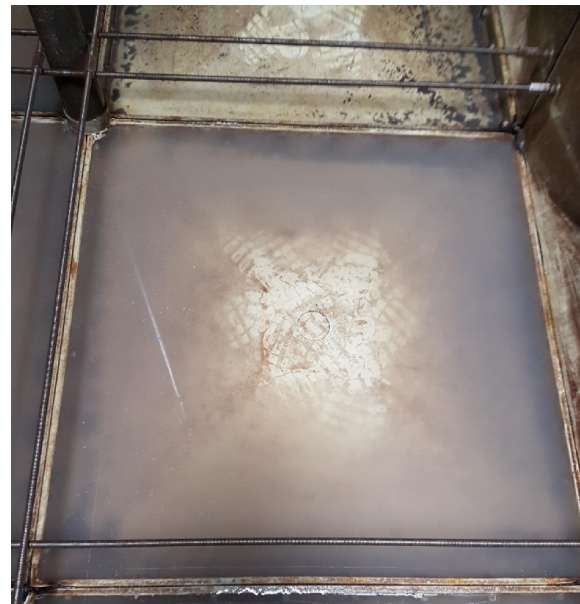
How does it work?

- Solubilisation
- Lowers hydrolysis activation energy
- Formation of microbubbles
- Regenerates

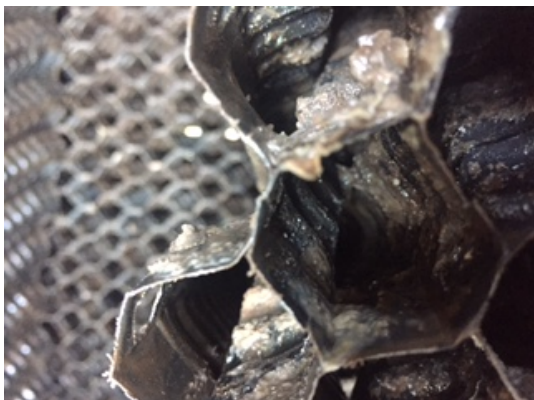




Typical Process buffer tank
debris before treatment



Process buffer tank debris
after BOC treatment



Slime and organic debris
within the cooling tower
pack



Endoscope photo of
pack after BOC
treatment



Typical lime and organic debris within the cooling tower sump



Sump after BOC treatment

Results over a 3 month inspection cycle

- Application operational in 1 day at a cost of approx. £1000
 - 95% reduction in organic solids/sludge accumulation
 - Enabled lowering of disinfection chemical levels (reduced corrosion potential)
 - Reduced the water consumption from additional purging (reduced suspended solids) 40%
 - Reduced offline maintenance time by 50% (easier to clean)
 - Better Legionella control from better system hygiene (piece of mind/less corporate risk)
-
- Annualised ROI= 4.3:1

Annual Cost of BOC	£1
Annual Maintenance saving	£3
Annual Water saving	£1.30

Conclusions

- Consider all system objectives
 - Legislative (Legionella)
 - Process (temperature, flow, pH)
 - Capacity (reduction in costs or increase in production)
 - Environmental (water and energy-possibility for recycling)
- There are solutions available today to achieve the objectives to have a large impact on the business bottom line



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