

Effects of Ozone on Water Quality

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OXYGUARD

Innovation since 1987



Probes



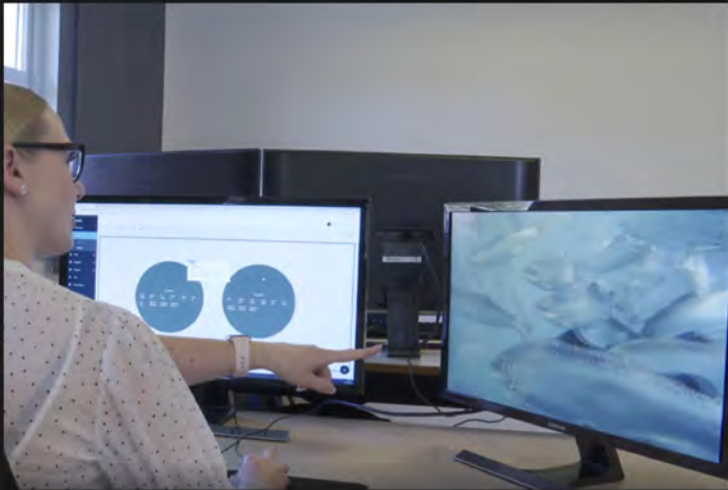
Hand-held instruments



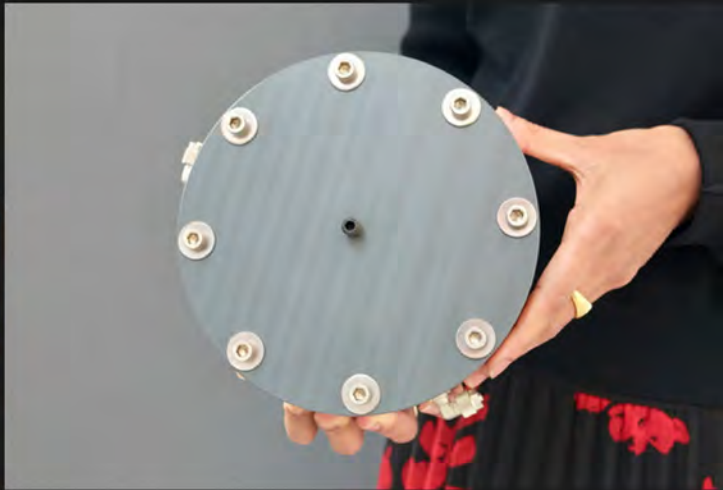
Complete monitoring and control systems

COBÁLIA

WATER



Cloud-based management systems



Ozone



UV

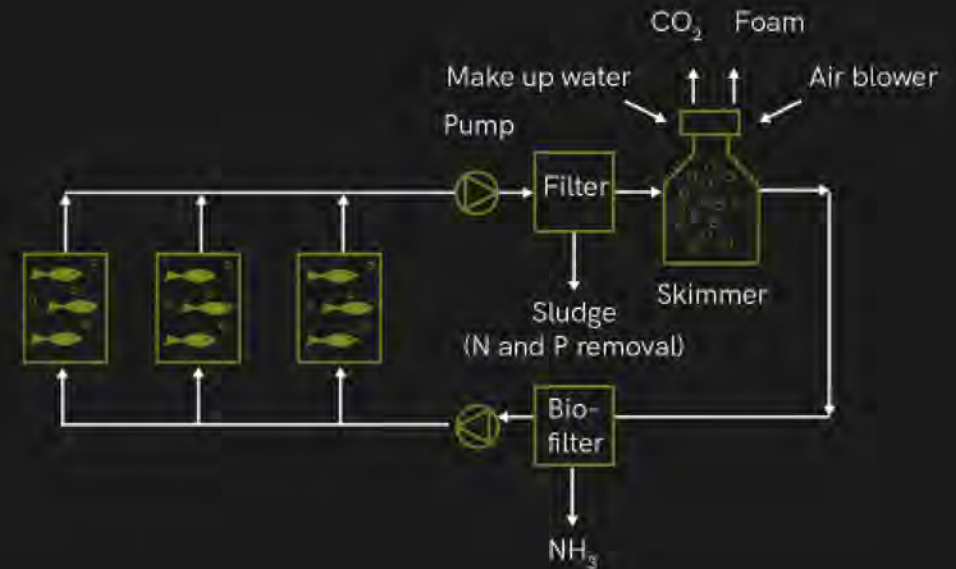
R&D



RAS

Recirculating Aquaculture System

- Control of environmental parameters
- Optimum fish health and growth
- Enhanced biosecurity
- Minimal use of water resources
- Flexibility to locate close to major seafood markets
- Low environmental impact
- 400 l water for 1 kg fish!



CHALLENGES

- Low water exchange
- High feed loading
- Filtration malfunction

Micro-particles

Dissolved N-compounds (e.g ammonia)

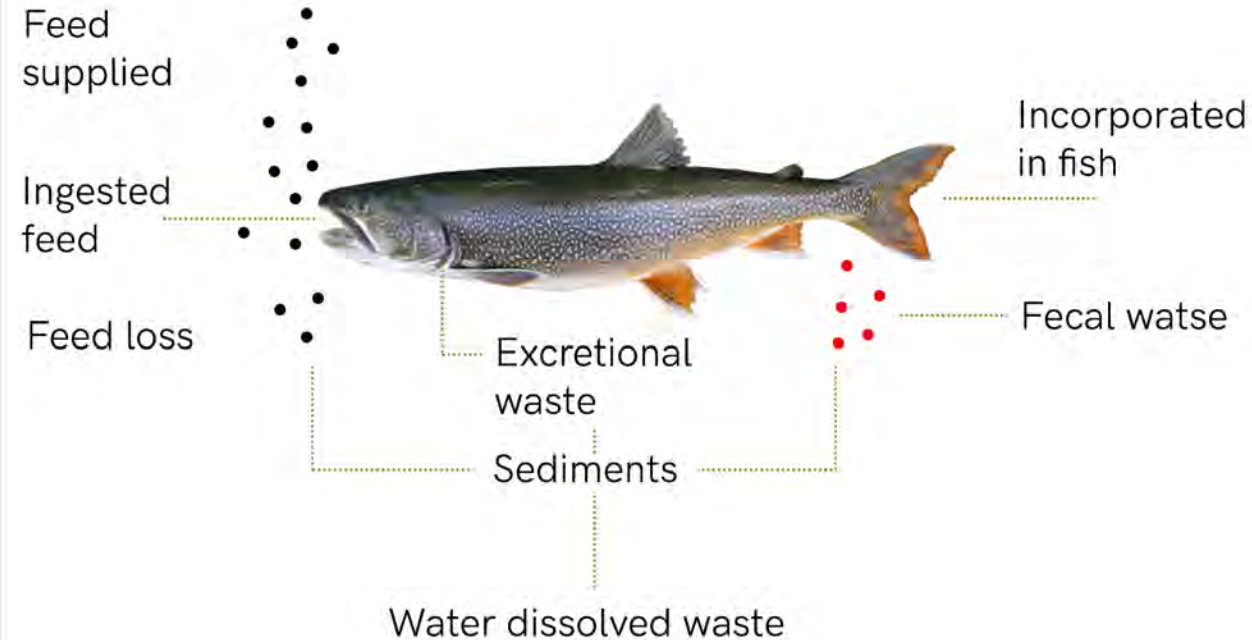
Dissolved organic mater (DOM)

Pathogens blooming

Disease outbreak

Off-flavor compounds

Make fish unmarketable



CURRENT DISINFECTION STRATEGIES



Vaccination



Disinfection

- UV
- Heat treatment, pH
- Chemotherapeutants



Purging

- Time consuming (5-10 days)
- Weight loss (3%-8%)
- Negative impact on environment
- Costly

OZONE AS ALTERNATIVE

OXIDATION

- Strong oxidizing agent
- Rapid reactions
- Improved water clarity

DISINFECTION

- Viruses
- Bacteria
- Parasites

HYDROXIL RADICAL FORMATION

- Efficient against
- Geosmin
- MIB

OZONE AS ALTERNATIVE

OZONE

Unstable in water-short lifetime

Fast reactions

Inorganic compounds

Fast and complete oxidation

Organic compounds

Highly selective and partial oxidation

Disinfection and Oxidation

HYDROXYL RADICALS

The strongest oxidant in water

Highly reactive

Non-selective

Short lifetime

Fast reactions

O_3 -resistant compounds

Oxidation



OZONATION CHALLENGES

OZONE OVERDOSE

Significant harm to cultured species

0.01 mg/L - 0.1 mg/L

Side effects

SCEPTICISM

Fish loss

Failure to monitor ozone

Lack of knowledge

Cost

OZONE GENERATOR



- Based on patented technology
- Feed gas: oxygen
- Minimum leakage risk
- Limited use of valves
- Low energy consumption
- Very compact and easy to operate
- Low operation costs
- Liquid cooling

OZONE SENSOR



- New innovative technology
- Partial pressure of ozone is measured directly without: electrolyte, reagents, light or other traditional methods
- No maintenance
- Exceptional stability

UV SYSTEM



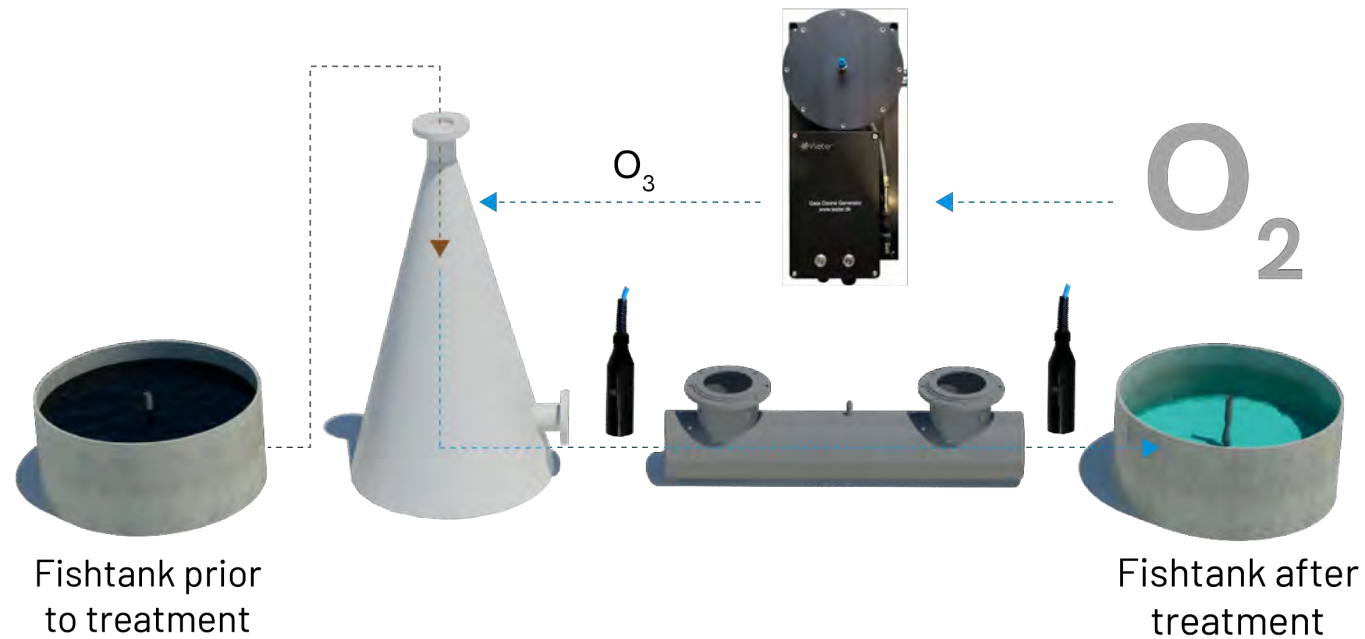
- UV reactors built in either HDPE, steel or titanium
- Low-pressure (LP) UV lamps
- High quality quartz sleeve
- Electronic ballasts to ensure maximum efficiency
- UV sensor
- Temperature sensor

CONTROL UNIT



- Full control of the ozone system
- Simple design, easy to handle
- Reliable measurements

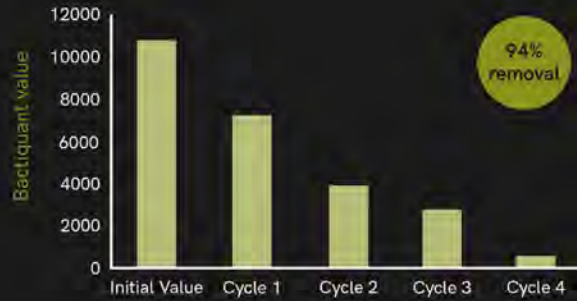
SYSTEM OVERVIEW



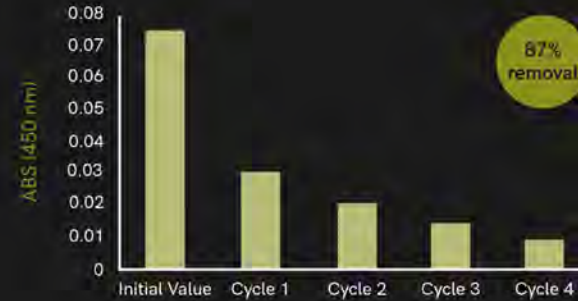


RESULTS

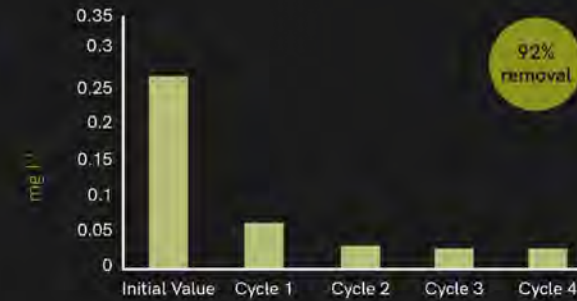
TOTAL BACTERIA IN WATER SAMPLE



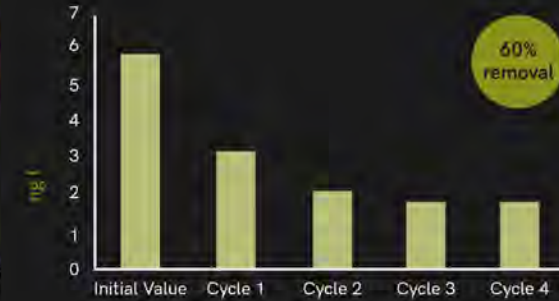
ABSORBANCE (450 NM)



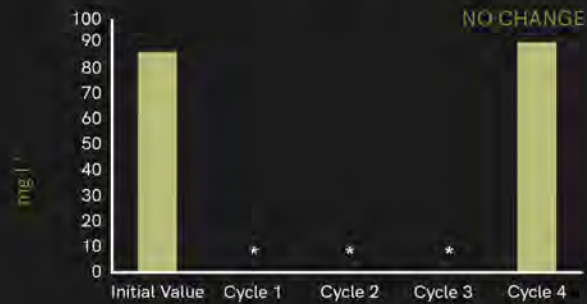
NITRITE (NO_2^-)



GEOSMIN



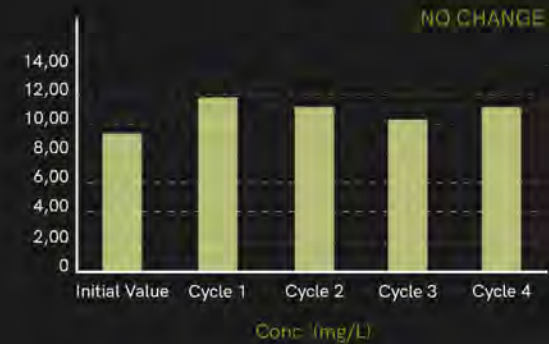
NITRATE (NO_3^- -N)



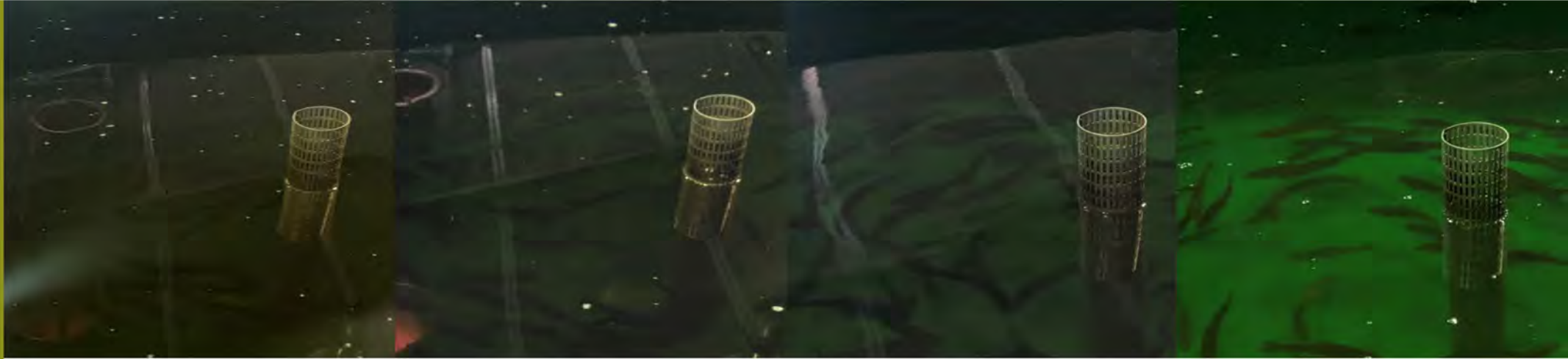
TAN (NH_3)



TOC



RESULTS

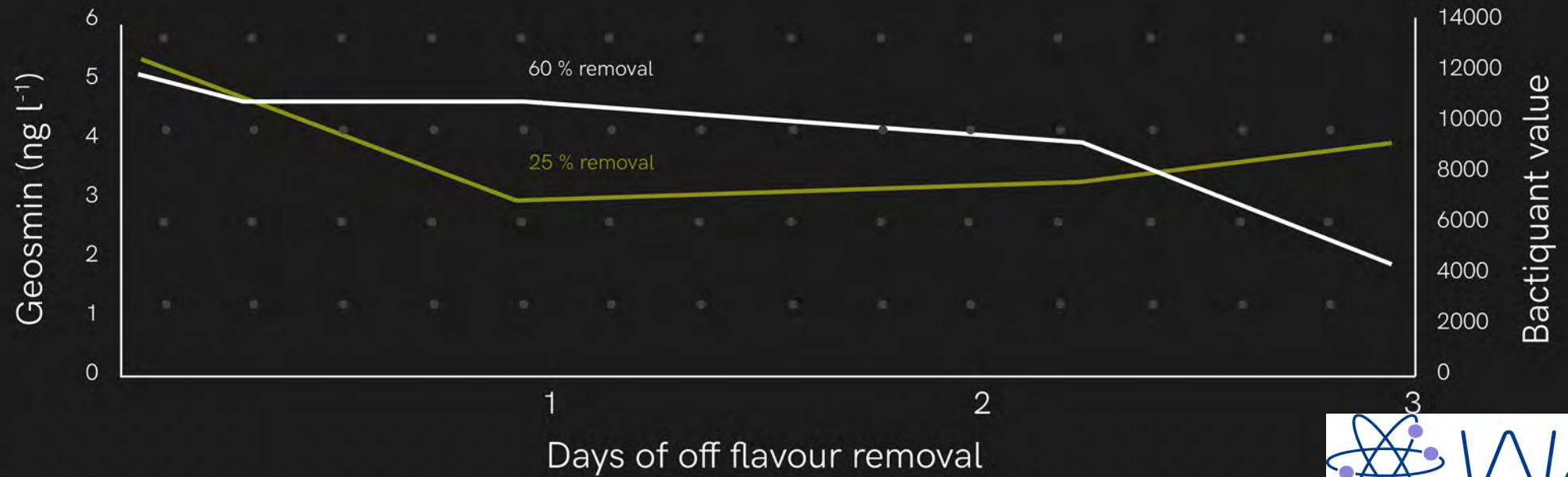


Initial condition

Day 1

Day 2

Day 3



Take home message



Improved the overall
water quality



Reduced amount of
geosmin



Technology can be
applied in the industry

Thank you!

Let's keep in touch:

Visit our **booth Nr. 413**

www.oxyguard.dk
oxyguard@oxyguard.dk

Full project video on **YouTube**



#oxyguard

