OFFSHORE AQUACULTURE WASTEWATER TREATMENT SYSTEM

J. BIASI• G. JORDAN • C. STOESSER • L. WINTEMUTE

AquaTech Solutions

PROBLEM STATEMENT

In open-net fish farming systems, accumulated uneaten feed, feces, and aquachemicals are constantly being discharged into surrounding water bodies.

These loads are detrimental to the surrounding environment and aquatic life. This presents a necessity for a design that mitigates these effects while still allowing the industry to function and grow.
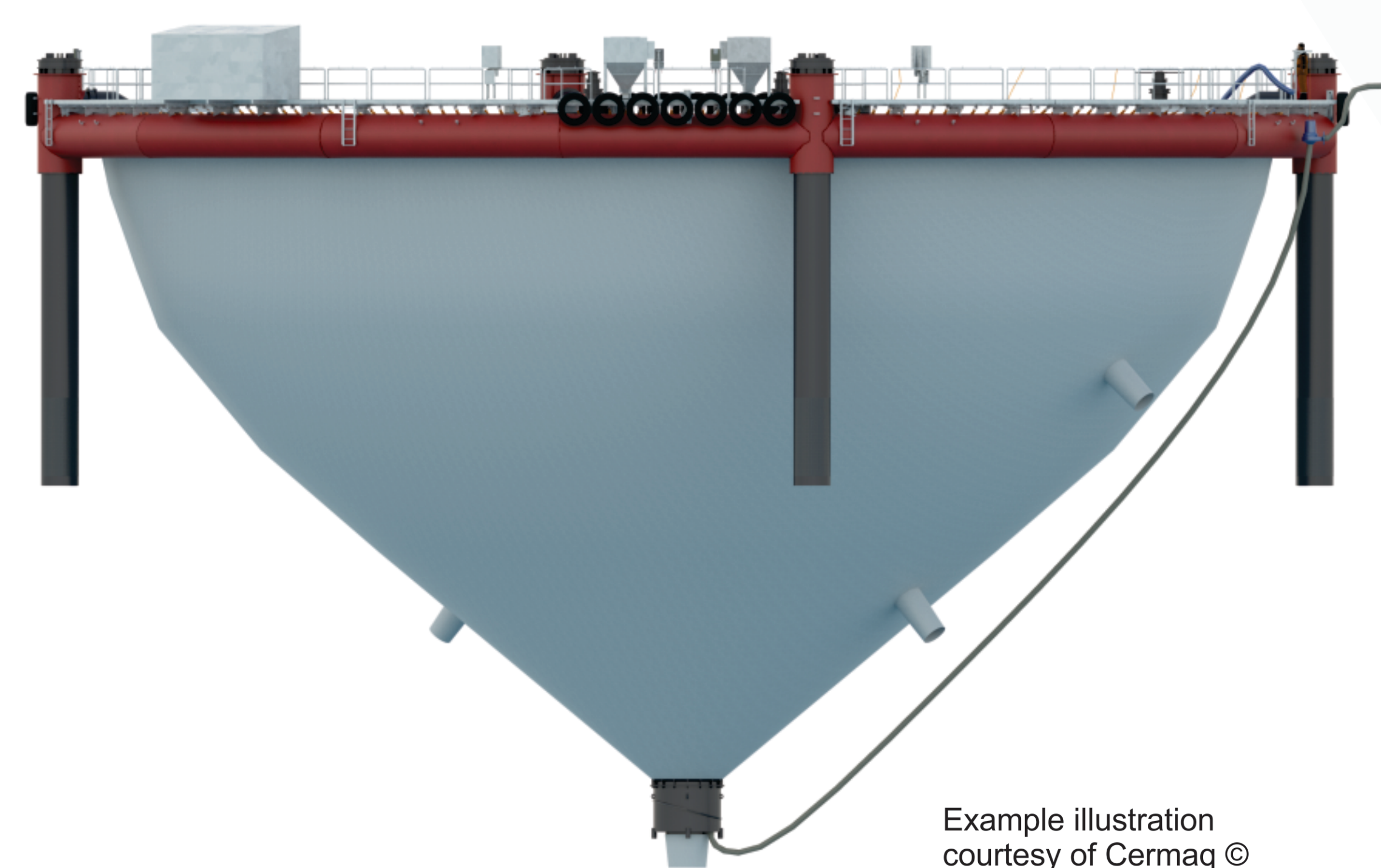
DESIGN OBJECTIVES

Improve effluent water quality by removing pollutant and pathogenic loads entering waters derived from offshore aquaculture systems.
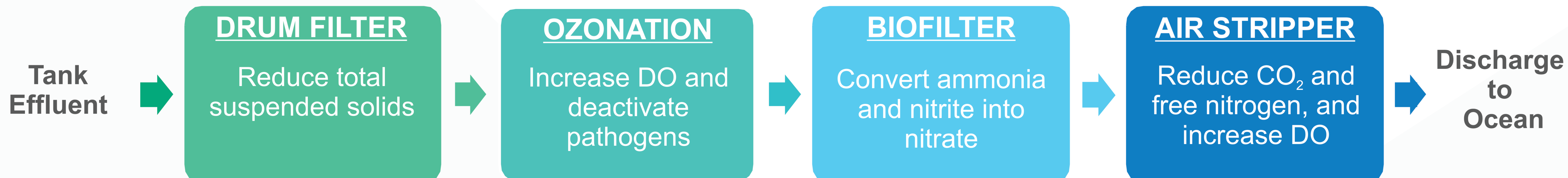
Water Quality Requirements:
- TAN   < 1 mg/L
- Nitrite   < 1mg/L
- Nitrate   < 100 mg/L
- TSS   < 80 mg/L
- CO_2 < 20 mg/L
- Pathogens 99% Removal

DESIGN DESCRIPTION

- Ocean water is pumped into a semi-enclosed tank comprised of flexible composite walls
- Tank velocity profiles are controlled to concentrate waste into an effluent stream to be pumped through a centre drain at the bottom of the tank
- Waste stream is pumped through an adjacent wastewater treatment system connected via floating barge
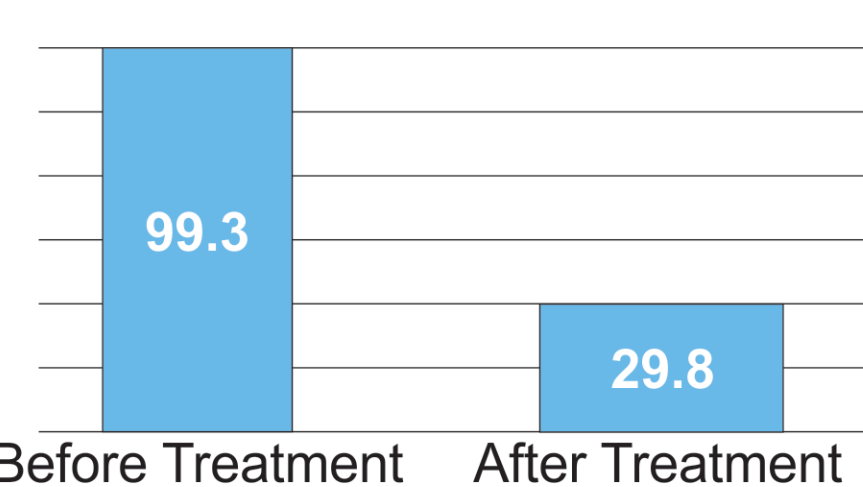- Treated water is returned to surrounding oceanic environment

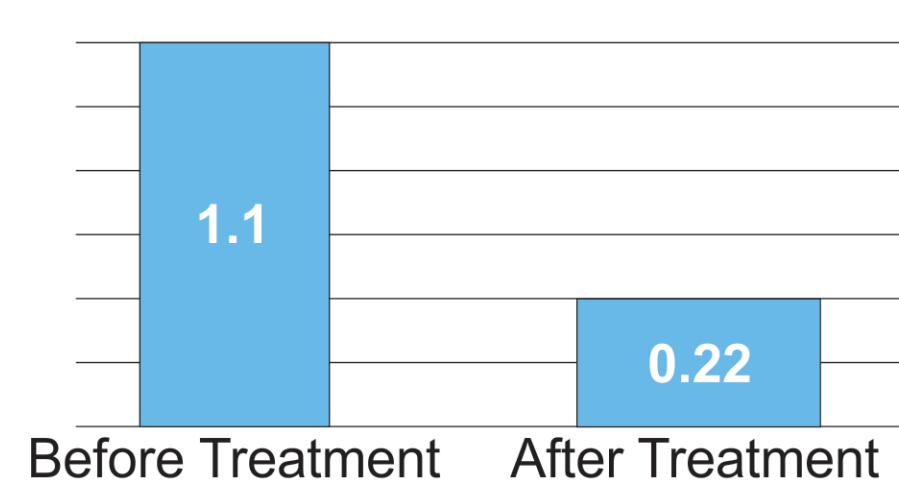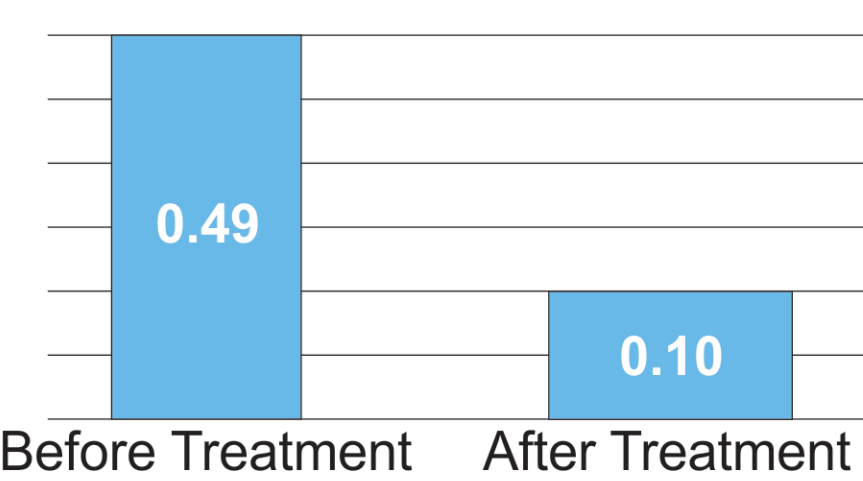Example illustration courtesy of Cermaq ©

Tank Effluent →

DRUM FILTER	OZONATION	BIOFILTER	AIR STRIPPER
Reduce total suspended solids	Increase DO and deactivate pathogens	Convert ammonia and nitrite into nitrate	Reduce CO_2 and free nitrogen, and increase DO

→ **Discharge to Ocean**

RESULTS

Total Suspended Solids Concentration (mg/L)

Before Treatment	After Treatment
99.3	29.8

TAN Concentration (mg/L)

Before Treatment	After Treatment
1.1	0.22

Nitrite Concentration (mg/L)

Before Treatment	After Treatment
0.49	0.10

Ozone Residual

CT = 5.18 mg-min/L

(Ozone Residual (mg/L) vs Time (min))
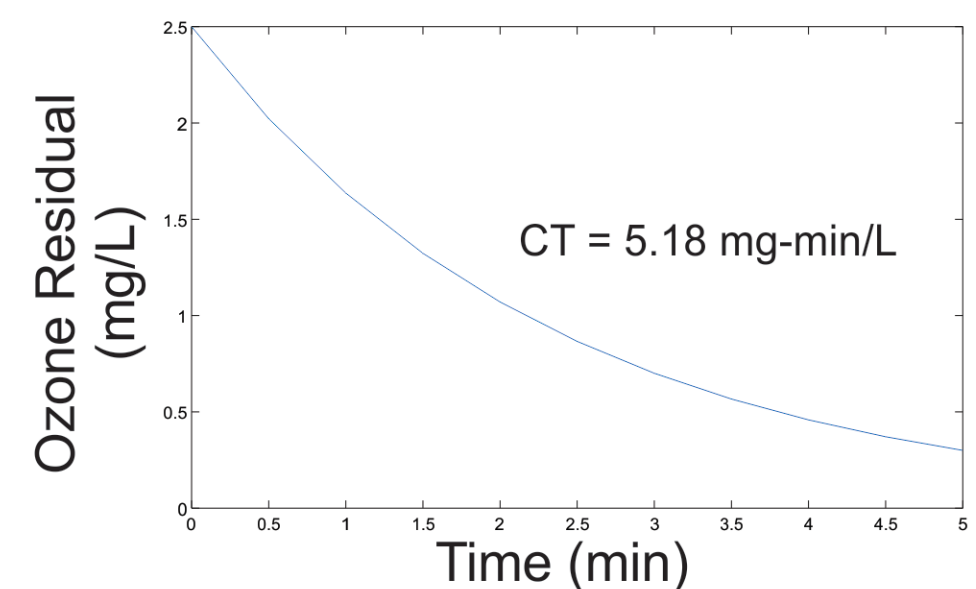
CONCLUSION

This system achieves:
- 70% TSS removal
- 80% TAN removal
- 80% Nitrite removal
- 90% CO_2 removal
- 99.9% Virus and *Giardia* removal

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