

WASTEWATER TREATMENT FOR CG CUTTERS

1/c Trevor Auth, 1/c Holly Madden, 1/c Devin Quinn, 1/c Katie Schumacher

Advisors: Dr. Sharon Zelmanowitz and Dr. William Clarkson



PROBLEM STATEMENT

The Coast Guard currently lacks the resources and equipment to meet and surpass the existing and future standards for overboard wastewater discharge, which is hindering operational readiness.



OBJECTIVES:

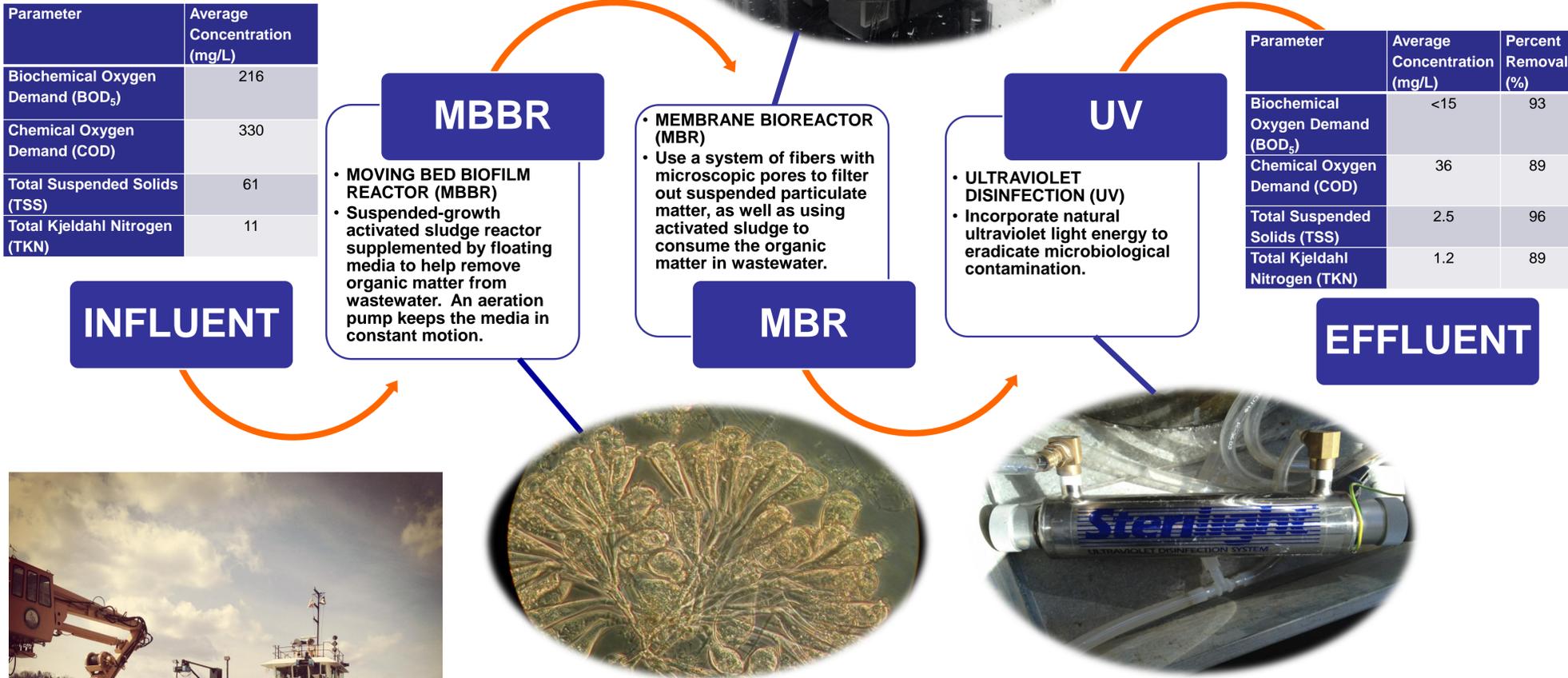
- Determine type of wastewater to be treated
- Choose treatment method with potential to meet current and impending discharge standards
- Use an operational unit as a test platform for the new treatment system
- Promote environmental stewardship in Coast Guard operations



FINAL REACTOR DESIGN:

Parameter	Average Concentration (mg/L)
Biochemical Oxygen Demand (BOD ₅)	216
Chemical Oxygen Demand (COD)	330
Total Suspended Solids (TSS)	61
Total Kjeldahl Nitrogen (TKN)	11

Parameter	Average Concentration (mg/L)	Percent Removal (%)
Biochemical Oxygen Demand (BOD ₅)	<15	93
Chemical Oxygen Demand (COD)	36	89
Total Suspended Solids (TSS)	2.5	96
Total Kjeldahl Nitrogen (TKN)	1.2	89



Total Prototype Cost:
\$15,000
 (Reactor, equipment, testing)

SUMMARY OF RESULTS:

Biological Treatment

Microorganisms biologically digest the organic material within wastewater. By altering the aeration period, total nitrogen removal up to 96% was demonstrated in the prototype system.

System Meets EPA National Secondary Treatment Standards

At least 85% of the influent BOD₅ and TSS must be removed and discharge may not exceed 30 mg/L. The prototype system consistently exceeded both of these standards.

USCGC OSAGE (WLR 65505)

- No current gray water storage capacity – direct overboard discharge.
- Must acquire permit through District Commander
- Scaled reactor designed for installation onboard to treat gray water before it is directed overboard
- Total Scale-Up Cost Estimate: \$130,000