



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

AquaMB Process[®]

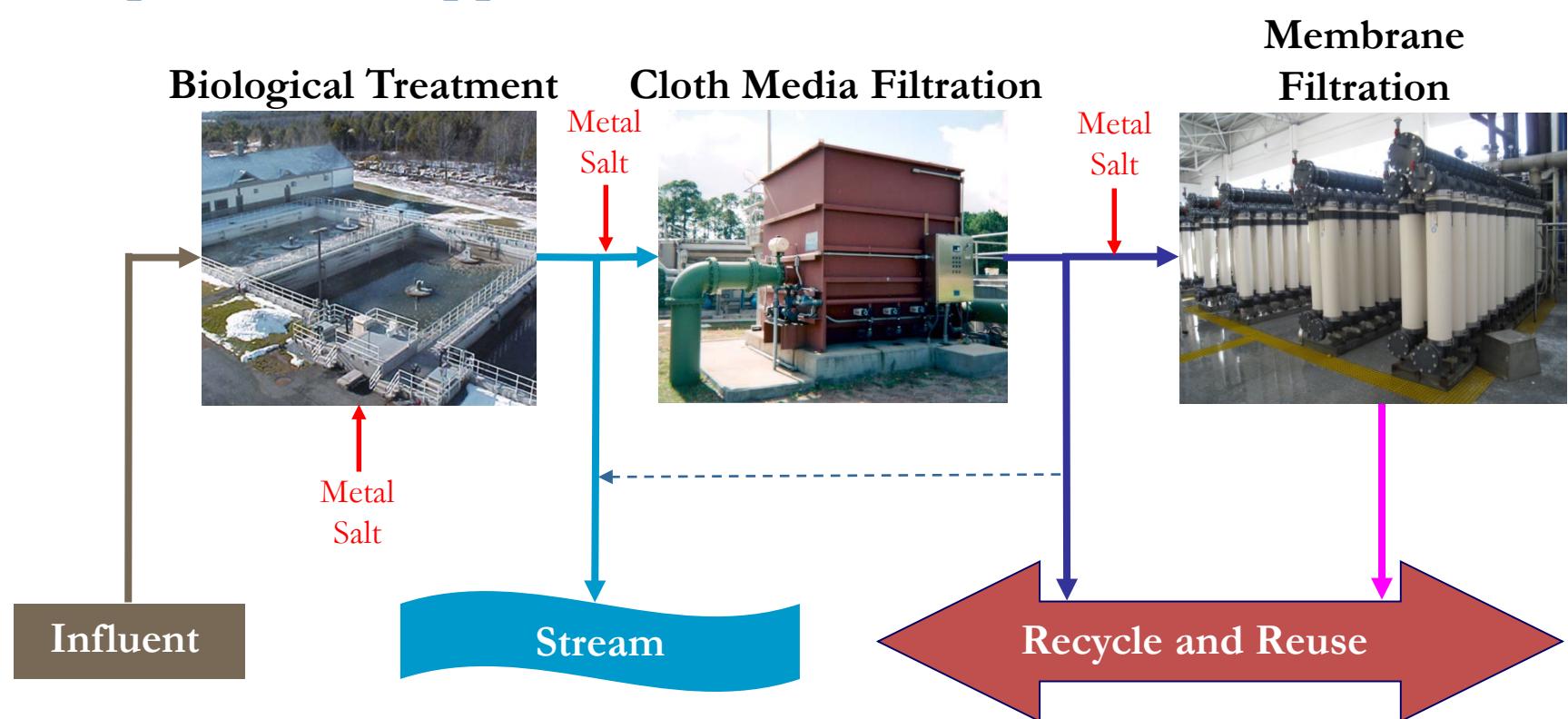
Multiple Barrier Membrane System

AquaMB Process®

Multiple Barrier Approach



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BOD 250
TSS 250
TN 40
TP 8

BOD <10.0
TSS <10.0
TN < 3.0
TP < 0.6

BOD < 5.0
TSS < 5.0
TN < 3.0
TP 0.1- 0.3

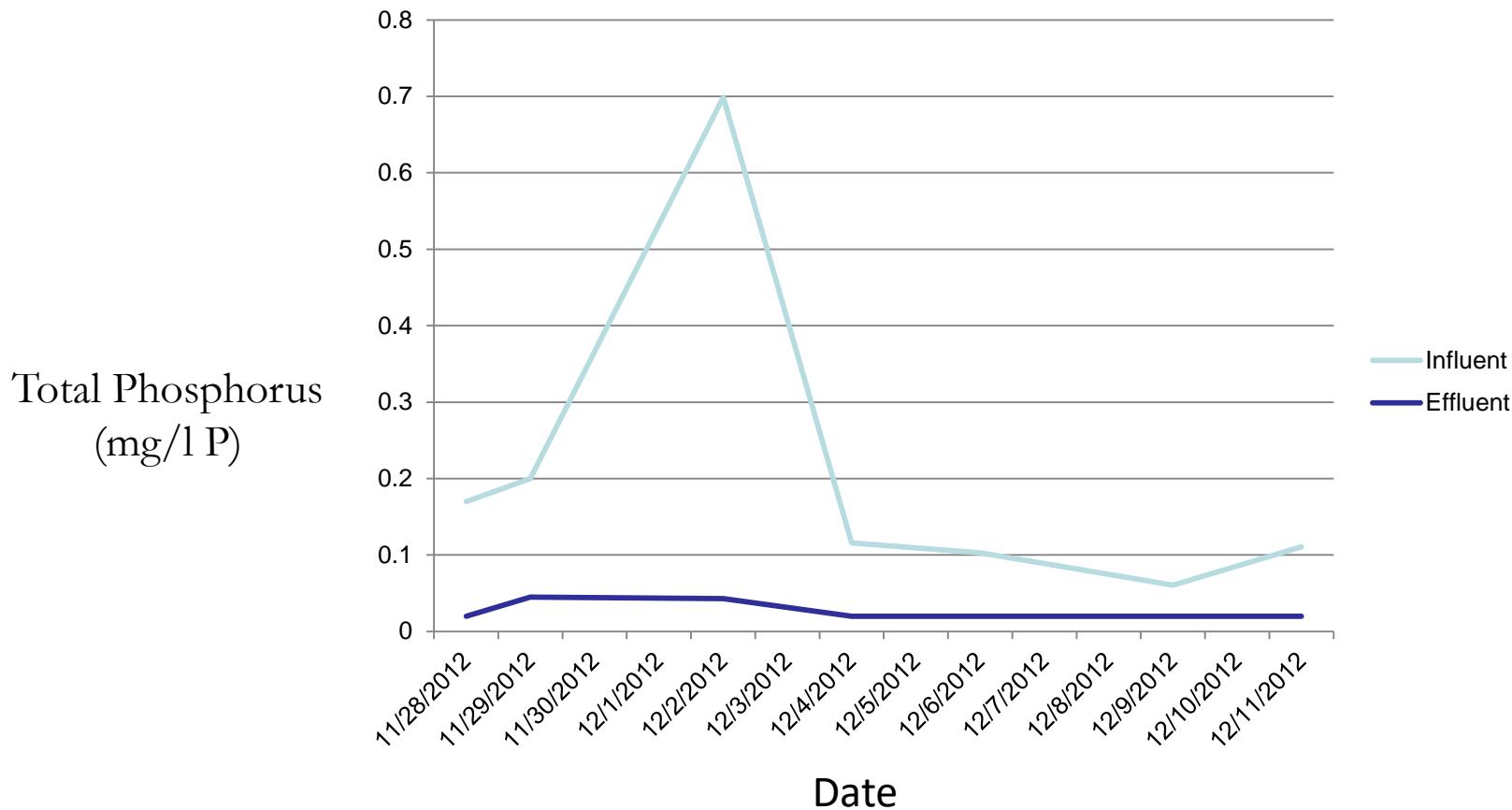
BOD < 2.0
TSS ND
TN < 3.0
TP to ND

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Low Effluent Phosphorus Levels



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Average Effluent TP was 0.023 mg/L

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Advantages Over MBRs



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Feature	Benefits
Multiple discharge points	UF sized only for membrane-quality flow needed;
Filter/UF bypass lines	Saves on O&M, redundancy may not be required
Separate subsystems	Adaptable to future needs, varying loads, and seasonal discharge requirements
Metal salt injection points	Very low effluent phosphorus possible
UF treats low-solids water	No fine screen or air scour, less membranes/O&M, less fouling
UF is pressurized system	Easy access, no lifting equipment needed, higher fluxes, can easily be integrity-tested

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Augusta Correctional Center WWTP in Craigsville, VA



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- 0.435 MGD average flow, 0.87 MGD maximum flow
- Competitively bid against (2) other multiple-barrier systems
- Concerned about hepatitis virus discharging to river
- 5-year no-break critical for this owner
- Operational since mid-2015



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Augusta Correctional Center WWTP in Craigsville, VA

Avg. Flow 0.435 MGD

Max. Day Flow 0.87 MGD

Loading	Design Influent (mg/l)	Design Effluent (mg/l)	Actual Effluent (mg/l)
BOD	260	2	<2 cBOD
TSS	185	2	1.4
TKN	31	---	1.1
NH3-N	40	0.22	0.2
Total N	---	3	1.2
Total P	5	0.3	0.03

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RO System for Abbvie Pharmaceutical, Puerto Rico



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- Single-pass, 3-stage
- Up to 85% recovery
- Flow balanced for optimum flux

AquaMB Process® – Abbvie, PR

Projected Performance



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<u>Parameter</u>	<u>Influent / Effluent Concentrations</u>	
	<u>Daily Maximum</u>	<u>Monthly Average</u>
pH	7.7 / 6.3	7.7 / 6.2
Water temperature (°C)	35 / 35	29 / 29
Total hardness (mg/l as CaCO ₃)	142 / 2.1	154 / 1.8 < 5
Total Dissolved Solids (mg/l)	1698 / 60	1536 / 40 < 75
Conductivity (umhos/cm)	3270 / 96	2656 / 64



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Multiple Barrier Membrane System
