AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

2024 Black Belt Presentations: Supplementary Information

Industrial Update, Presented By: Jeff McCormick

MPP ELG Data

1. *WASHINGTON - The federal government tomorrow is scheduled to publish proposed EPA rules that would require pollution reductions from fewer than half of the 3,879 slaughterhouses and meat processing plants that discharge waste to U.S. rivers, lakes, and streams.*

The regulations would cut pollution significantly from the largest plants that pipe their waste directly into waterways, but largely ignore the far more numerous meat processing plants that send their effluent first to municipal sewage treatment plants, which are often overwhelmed and not equipped to treat the industrial waste.

The above paragraphs were taken from a local DC publication and refers to the EPA's preferred Option 1. Options 2 and 3 relate to applying TN and TP and potentially chlorides to Indirect Dischargers and smaller Direct Dischargers.

2. The EPA breaks down the facilities a little further as each of the five types will have some unique concerns.

- Meat First and Poultry First – Care for live animals so manure, urine, food waste, cleaning chemicals as well as blood, fur, and feathers will all pollute the waste streams
- Meat Further and Poultry Further – Receive meat and further package or prepare
    - Marinate
    - Cure
    - Cook
- Rendering

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Table 1-1: Number of Facilities in MPP Industry by Process and Discharge Type

Process	Number of Facilities			
	Direct Dischargers	Indirect Dischargers	Zero Dischargers	Total
Meat First	47	509	270	826
Meat Further	29	2,741	690	3,460
Poultry First	70	168	52	290
Poultry Further	6	169	119	294
Render	19	121	45	185
Total	171	3,708	1,176	5,055

Source: U.S. EPA Analysis, 2023

4.

Table 9-3. Regulatory Options for Direct Dischargers (Level of Control includes BAT and NSPS) for MPP Process Wastewater

Subcategory	Units for Facility Production	Facility Production	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Meat First Processors (Subcategories A through D)	M lbs. LWK/yr.	≥10 and <20	NA	NA	P with Partial N Treatment for Direct Dischargers
		≥20 and ≤50	NA	NA	P with Full N Treatment for Direct Dischargers
		>50	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers
Small Processors (Subcategory E)	M lbs. Finished Product/yr.	All	NA	NA	NA
Meat Further Processors (Subcategories F through I)	M lbs. Finished Product/yr.	≥10 and <20	NA	NA	P with Partial N Treatment for Direct Dischargers
		≥20 and ≤50	NA	NA	P with Full N Treatment for Direct Dischargers
		>50	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers
Renderers (Subcategory J)	M lbs. Raw Material/yr.	≥10 and <20	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	P with Partial N Treatment for Direct Dischargers
		≥20	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers

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Table 9-3. Regulatory Options for Direct Dischargers (Level of Control includes BAT and NSPS) for MPP Process Wastewater

Subcategory	Units for Facility Production	Facility Production	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Poultry First Processors (Subcategory K)	M lbs. LWK/yr.	≥10 and <20	NA	NA	P with Partial N Treatment for Direct Dischargers
		≥20 and ≤100	NA	NA	P with Full N Treatment for Direct Dischargers
		>100	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers
Poultry Further Processor (Subcategory L)	M lbs. Finished Product/yr.	≥7 and <10	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	NA
		≥10 and <20	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	P with Partial N Treatment for Direct Dischargers
		≥20	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers	P with Full N Treatment for Direct Dischargers

Abbreviations: lbs. = pounds, LWK = live weight killed, M = million, NA = not applicable, yr. = year

Table 9-4. Regulatory Options for Indirect Dischargers (Level of Control includes PSES and PSNS) for MPP Process Wastewater

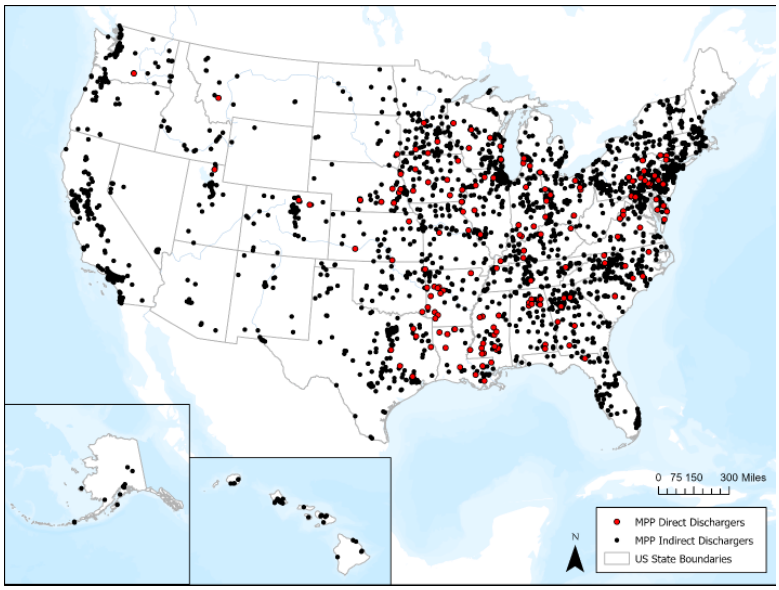
Subcategory	Units for Facility Production	Facility Production	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Meat First Processors (Subcategories A through D)	M lbs. LWK/yr.	>5 and ≤30	NA	NA	BOD, O&G, and TSS Treatment for Indirect Dischargers
		>30 and ≤50	NA	NA	P with Full N Treatment for Indirect Dischargers
		>50 and <200	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers
		≥200	BOD, O&G, and TSS Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers
Small Processors (Subcategory E)	M lbs. Finished Product/yr.	All	NA	NA	NA
Meat Further Processors (Subcategories F through I)	M lbs. Finished Product/yr.	>5 and ≤30	NA	NA	BOD, O&G, and TSS Treatment for Indirect Dischargers
		>30 and ≤50	NA	NA	P with Full N Treatment for Indirect Dischargers
		>50	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers

6.

7. Table 9-4. Regulatory Options for Indirect Dischargers (Level of Control includes PSES and PSNS) for MPP Process Wastewater

Subcategory	Units for Facility Production	Facility Production	Regulatory Option 1	Regulatory Option 2	Regulatory Option 3
Renderers (Subcategory J)	M lbs. Raw Material/yr.	>5 and ≤10	NA	NA	BOD, O&G, and TSS Treatment for Indirect Dischargers
		>10 and ≤30	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers
		>30 and <350	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers
		≥350	BOD, O&G, and TSS Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers
Poultry First Processors (Subcategory K)	M lbs. LWK/yr.	>5 and ≤30	NA	NA	BOD, O&G, and TSS Treatment for Indirect Dischargers
		>30 and ≤100	NA	NA	P with Full N Treatment for Indirect Dischargers
		>100	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers
Poultry Further Processor (Subcategory L)	M lbs. finished product/yr.	>5 and ≤7	NA	NA	BOD, O&G, and TSS Treatment for Indirect Dischargers
		>7 and ≤30	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers
		>30	BOD, O&G, and TSS Treatment for Indirect Dischargers	BOD, O&G, and TSS Treatment for Indirect Dischargers	P with Full N Treatment for Indirect Dischargers

Abbreviations: lbs. = pounds, LWK = live weight killed, M = million, NA = not applicable, yr. = year.

8. 

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Federal Register: [eCFR :: 40 CFR Part 432 -- Meat and Poultry Products Point Source Category]

EPA ELG Website: [Meat and Poultry Products Effluent Guidelines - 2024 Proposed Rule | US EPA]

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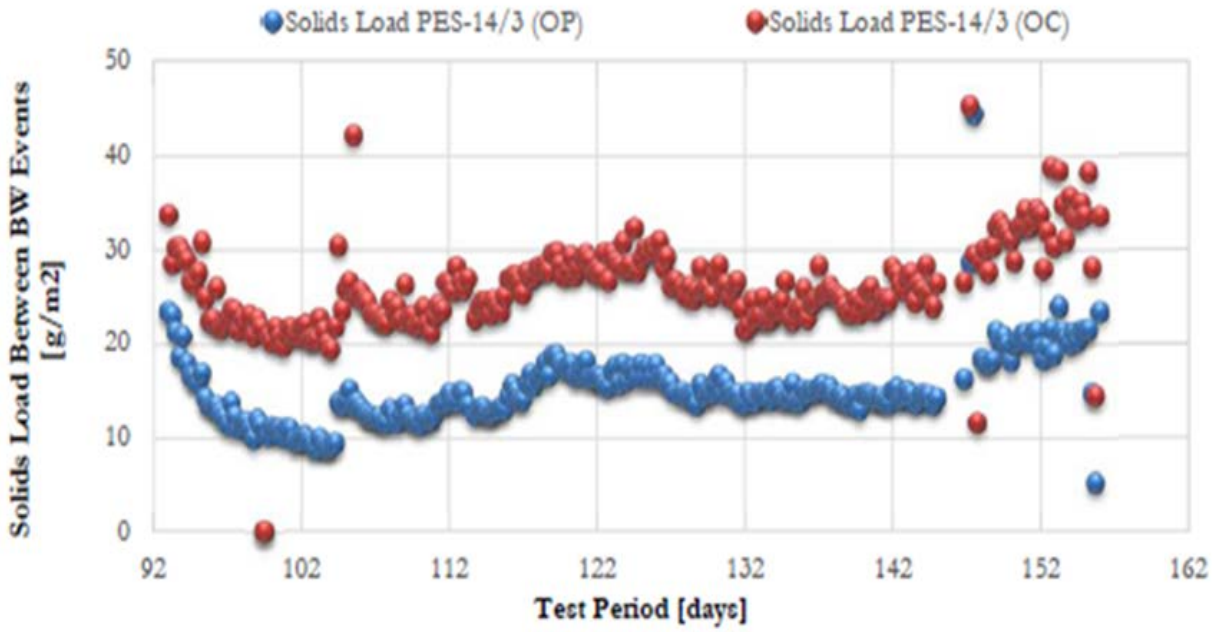
Cloth Media Filtration, Presented By: Kristy Chycota

Cloth Media Filtration Supplemental Data
OptiComb backwash shoe increases solids handling capacity of the cloth media between backwash events.



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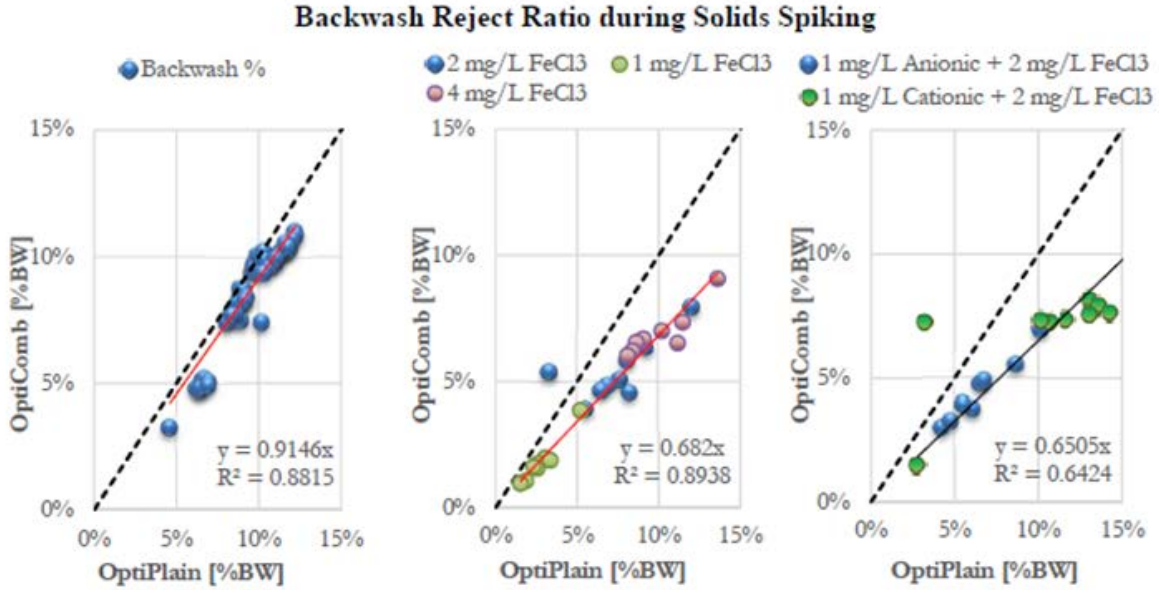
OptiComb® backwash shoe is especially effective at reducing backwash rates when adding coagulant and/or polymer.



Figures 16a, 16b & 16c. Backwash Reject Ratio during Biological Solids Spiking (Left), Coagulant Addition (Center) and Polymer Addition (Right)

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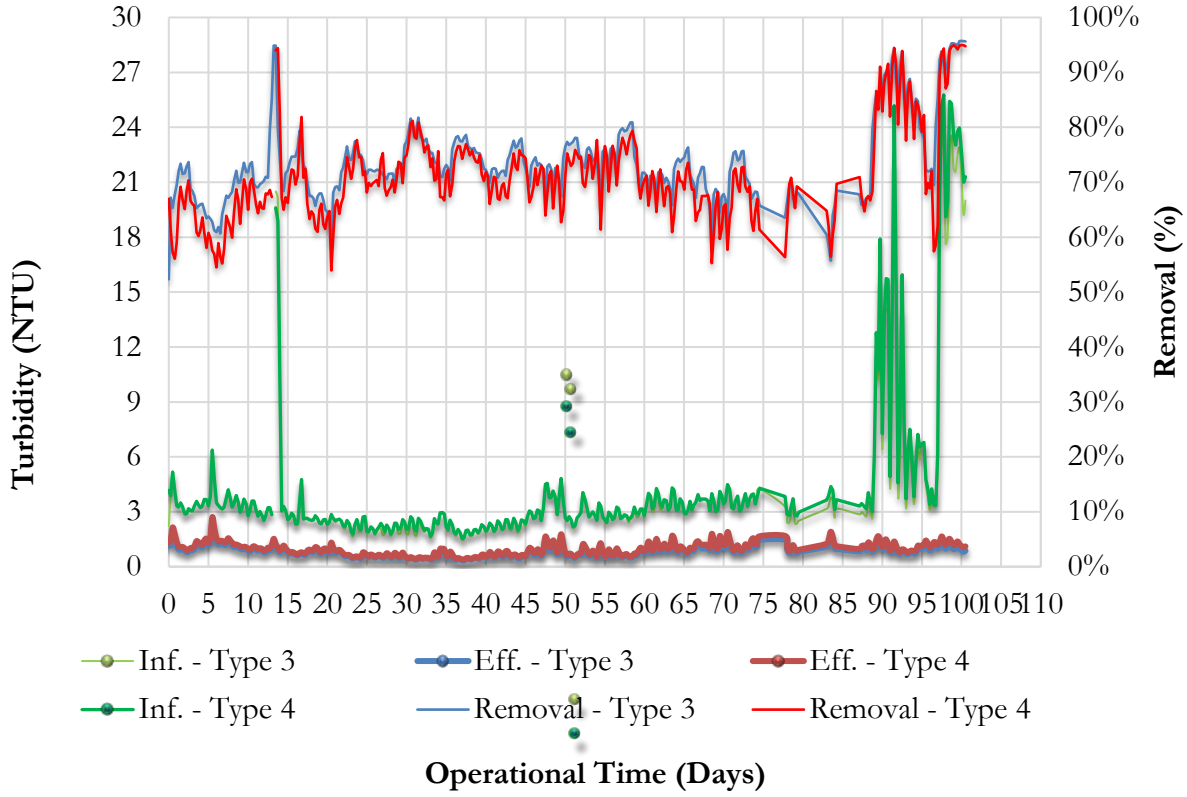
Extensive Testing done on Gen5 Media indicates that effluent quality is maintained while fouling potential is lower.



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AquaPrime®/AquaStorm®, Presented By: John Dyson

AquaStorm® Wet Weather Evaluation vs. Competition

AquaPrime® / AquaStorm®

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Footprint Comparison

Effective Horizontal Hydraulic Loading Rate (EHHLR)

Includes treatment area, ancillary processes & equipment, chemical feed, etc.

Description	Value	Unit
Pile Cloth Media Filter HLR	5	gpm / sf (of filter disk)
Filter Surface Area / Disk	108	Sf / filter disk
No of Filter Disks / Unit	16	#
Total Surface Area / Unit	1,728	sf
Max Flowrate per HLR	8,640	sf
Total Horizontal Area	450	gpm
Additional Horizontal Area(1)	100	sf
EHHLR	15.7	gpm/sf

(1) Includes area for channels, galleries, etc.

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Criteria & Scoring Process

Select Criteria of Importance

Includes treatment area, ancillary processes & equipment, chemical feed, etc.

1

Meet Treatment Performance Requirements

- 1 Point – Meets Performance Criteria
- 0 Points – Doesn't Meet Performance Criteria

2

Degree of Facility Modification Required

- 3 Points – Fits in existing Process Space
- 2 Points – Fits, but requires expansion
- 1 Point – Doesn't Fit

3

Chemical Use & Expendables

- 3 Points – No chemical / ballast
- 2 Points – Chemical **or** ballast required
- 1 Points - Chemicals **and** Ballast Required

4

Dual Use

- 2 Points - Beneficial
- 1 Point – Limited Benefit
- 0 Points – N/A

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Evaluation

Criteria 1

Meet Treatment Performance Requirements

>70% Removal

Except for primary treatment and microscreens, all technologies can achieve the criteria

Technology	Typical Performance Range (% TSS Reduction)	
Traditional Primary Treatment	40 to 60%	☒
Chemically Enhanced Primary Treatment	60 to 90%	☑
Ballasted Clarification	80 to 95%	☑
Pile Cloth Media Filtration	70 to 90%	☑
Compressible Media	70 to 90%	☑
Floating Media	70 to 80%	☑
Microscreens	10 to 50%	☒

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Criteria 2

Degree of Facility Modification Required

(10,000 sf building / 3,500 sf of process space)

Building expansion and modification is a correlated with increased project cost and construction schedule, making this a multi-faceted criterion

Technology	Est. EHHRT (gpm/sf)	Estimated Footprint (sf)	
Traditional Primary Treatment	1	50,000	
Chemically Enhanced Primary Treatment	3.5	14,000	+1
Ballasted Clarification[1]	15	5,500	+2
Pile Cloth Media Filtration	15	3,500	+3
Compressible Media	5	10,000	+1
Floating Media	5	10,000	+1
Microscreens	12	6,200	+2

[1] Ballasted and Microscreens will require ¼" bar screening to provide treatment increasing footprint by 2,000 sf.

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Criteria 3

Chemical Use & Expendables such as ballasts

Chemical and ballast use can increase operation and maintenance costs

Technology	Or Both Neither	
Traditional Primary Treatment	Neither	+3
Chemically Enhanced Primary Treatment	Or	+2
Ballasted Clarification	Both	+1
Pile Cloth Media Filtration	Neither	+3
Compressible Media	Neither	+3
Floating Media	Neither	+3
Microscreens	Neither	+3

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Criteria 4

Dual Use Treatments

The technology can be used for advanced primary treatment (APT) or tertiary treatment (TT)

Technology	Dual Use Application	
Traditional Primary Treatment	None	+1
Chemically Enhanced Primary Treatment	APT	+2
Ballasted Clarification	APT	+2
Pile Cloth Media Filtration	APT or TT	+3
Compressible Media	APT or TT	+3
Floating Media	APT	+2
Microscreens	APT	+2

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Technology	HLR (gpm/sf)	Est. EHHRT (gpm/sf)	Typical Performance Range (% TSS Reduction)
Traditional Primary Treatment	1	1	40 to 60%
Chemically Enhanced Primary Treatment	3.5 to 5	3.5 – 5	60 to 90%
Ballasted Clarification	40 to 60	15 – 20	80 to 95%
Pile Cloth Media Filtration	5 – 6.5	10 – 15	70 to 90%
Compressible Media	4 to 6	3 – 5	70 to 90%
Floating Media	6 to 8	4 – 5	70 to 80%
Microscreens	10 - 20	8 - 14	10 to 50%

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Technology	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Total Score
Traditional Primary Treatment	0	1	3	1	**5**
Chemically Enhanced Primary Treatment	1	1	2	2	**6**
Ballasted Clarification	1	2	1	2	**6**
Pile Cloth Media Filtration	1	3	3	3	**10**
Compressible Media	1	1	3	3	**8**
Floating Media	1	1	3	2	**7**
Microscreens	0	2	3	2	**7**

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