

Performance Testing by Engineering Community



UV Disinfection

9 ft Diameter Outfall to River

ADF Technology Demonstration

Chemical Disinfectants: Chlorine with Dechlorination, Peroxy Acid

Compressed Media Filtration

Water Environment Research Foundation

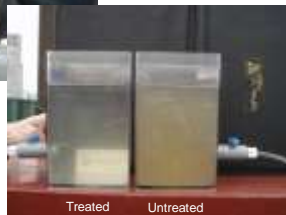
Water

Vortex Separation, Dissolved Air Flotation, Chemical Precipitation, Chemical Disinfection

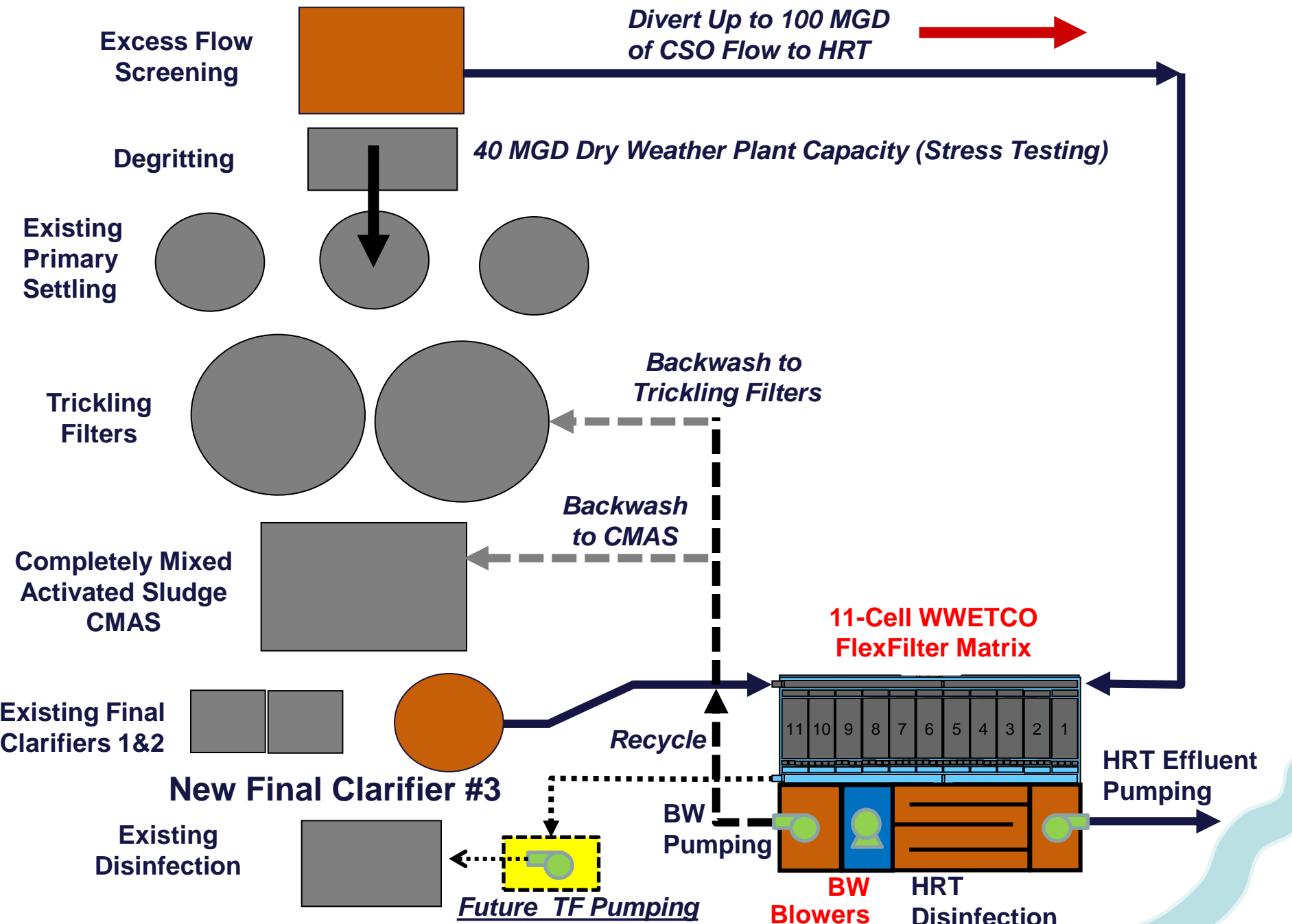
O&M, Cost D

Post Review: Wet Weather Demonstration Project in Columbus, Georgia

Published by: WEF, WQA, WPCF



Springfield WWTP and HRT Process Flow Diagram



**FlexFilter, Disinfection,
Effluent Pumping &
Backwash Storage
& Pumping**

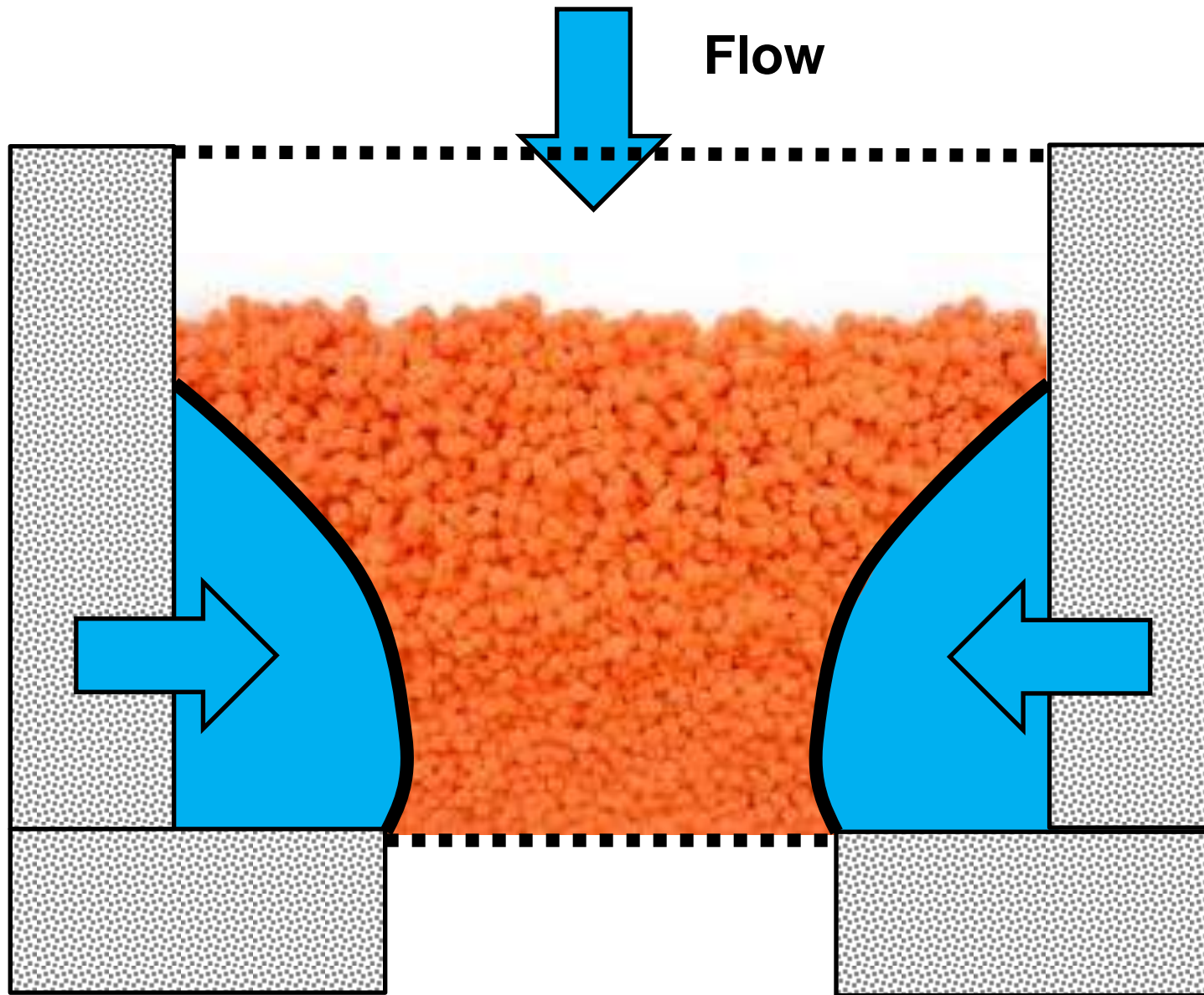


Springfield, OH
100 MGD CSO HRT
At 34 MGD WWTP
Construction by Kokosing, June 2013







WWETCO
Compressible
Media



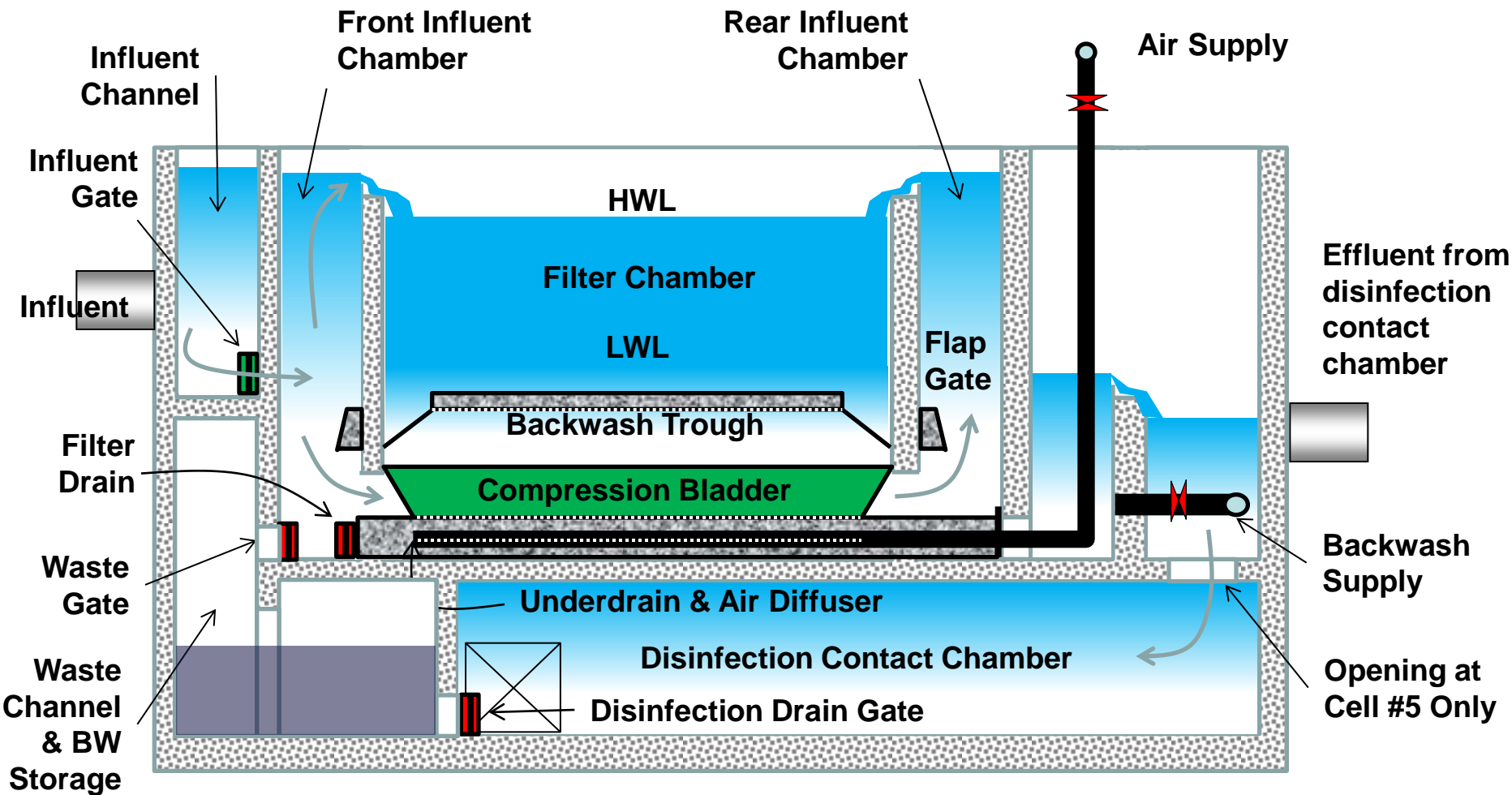
Lateral Compression

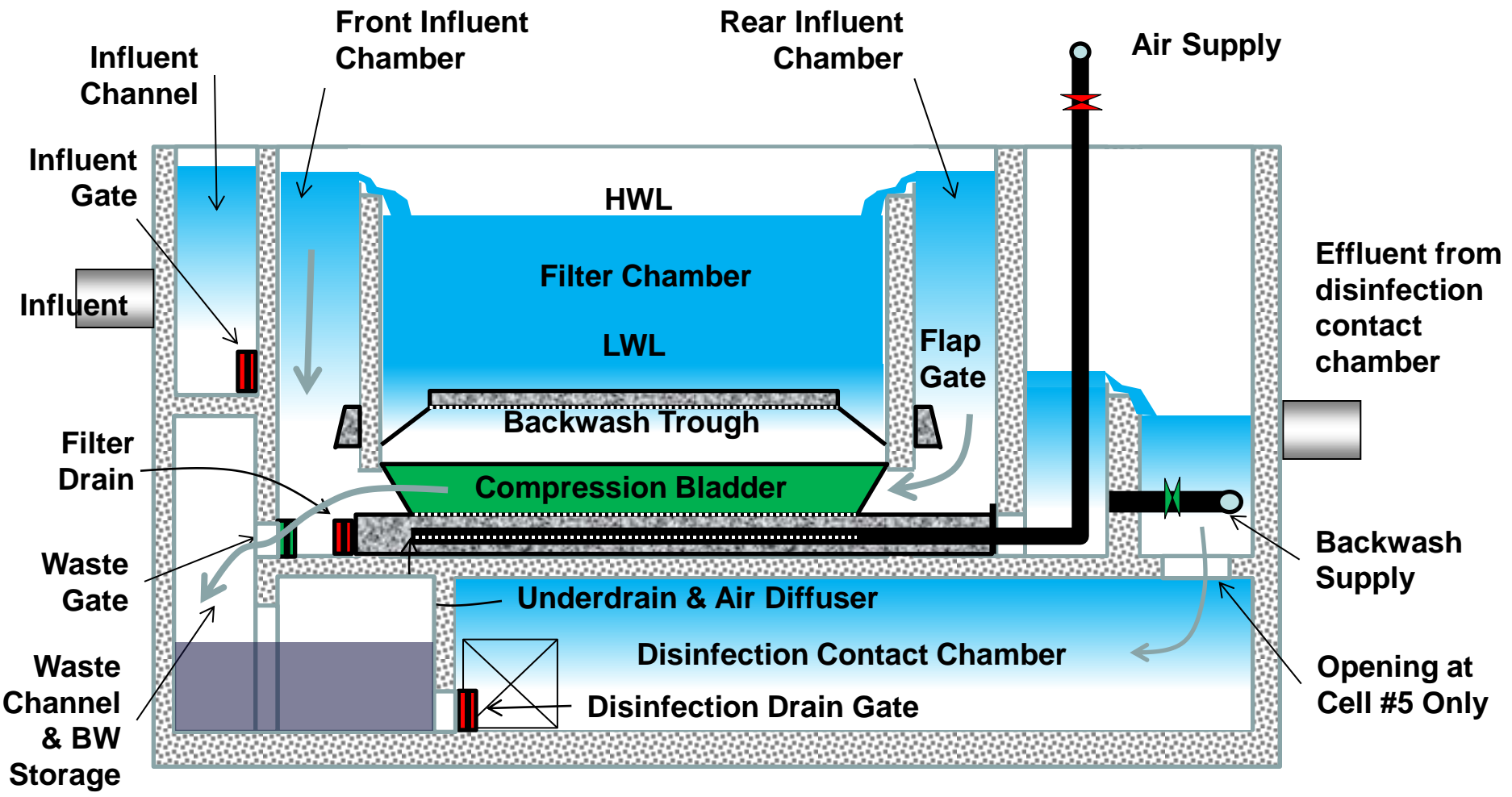
A photograph showing a large, irregular pile of bright orange, porous, uncompressed filter media inside a dark, cylindrical tank. The media is situated above a metal grate structure. The tank walls are dark and metallic, with some rivets visible. The lighting is somewhat dim, highlighting the texture of the media.

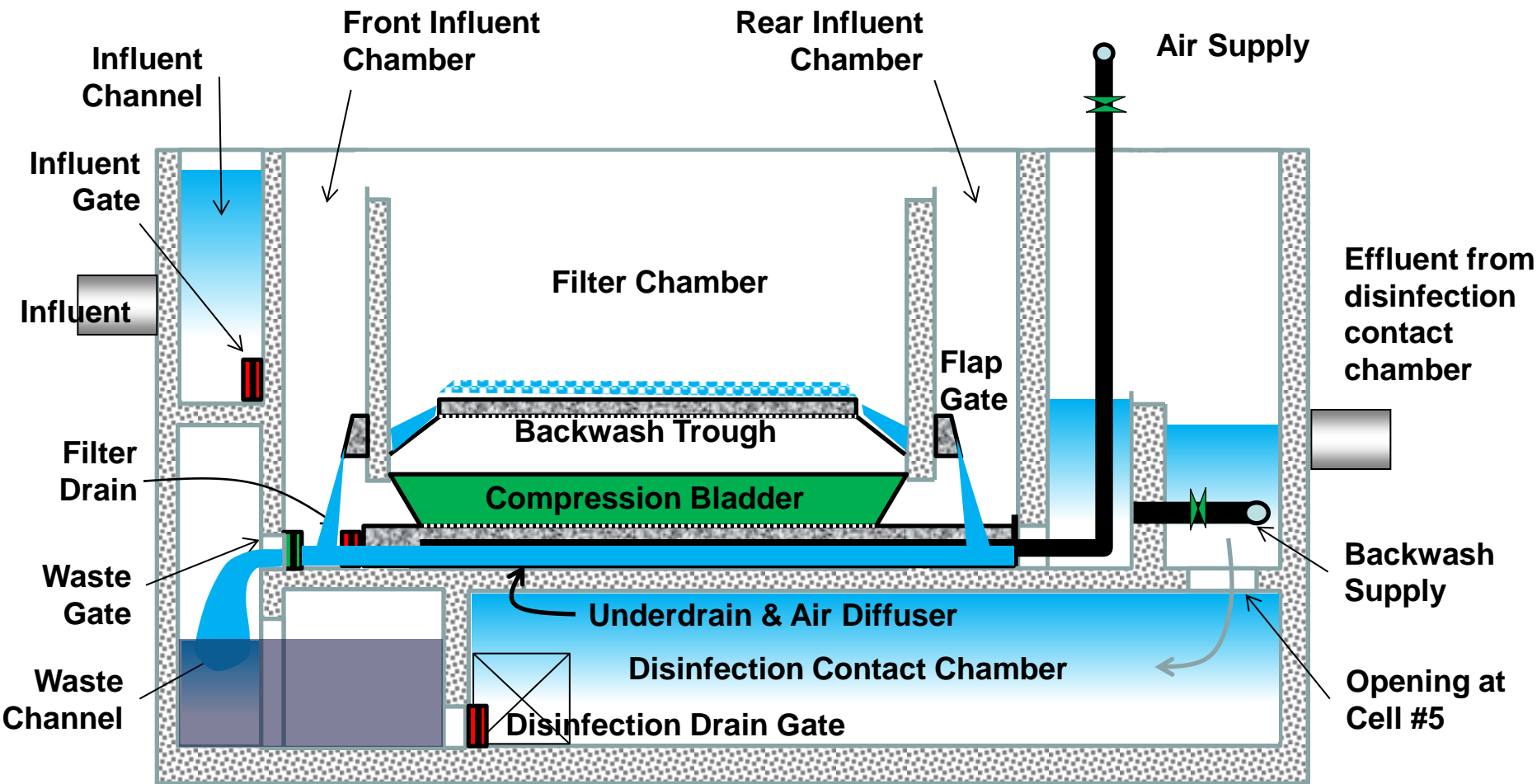
**Uncompressed
Filter Media**

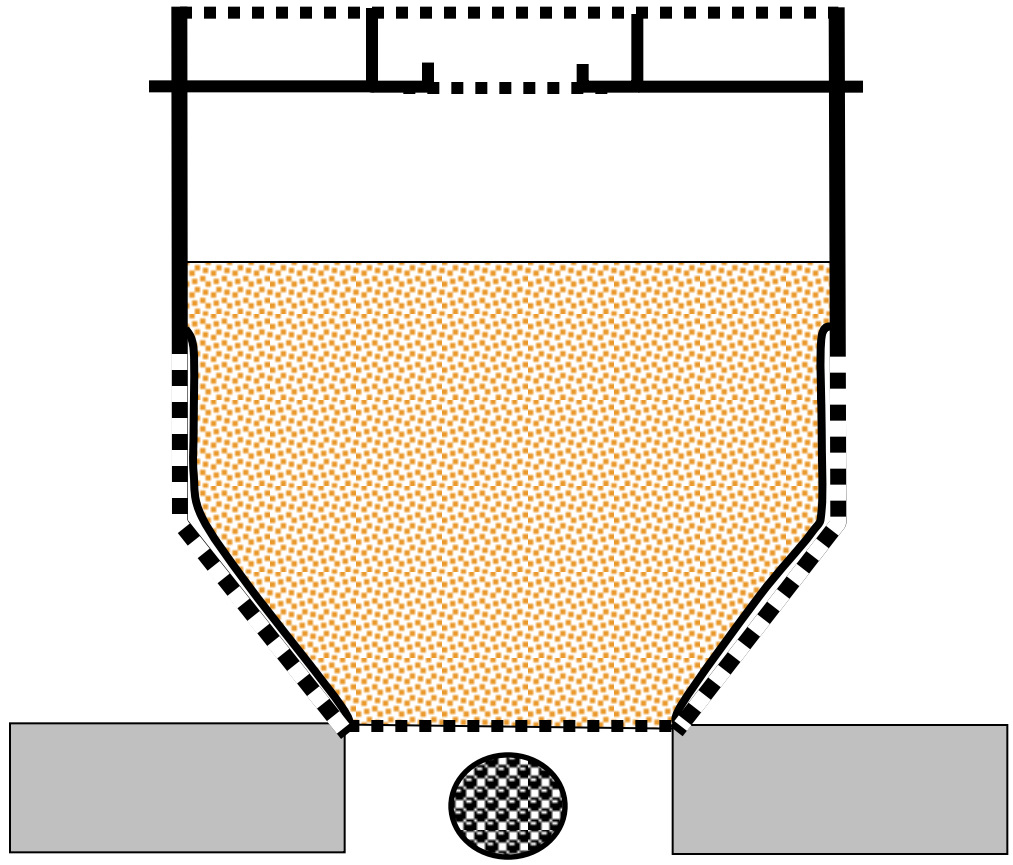


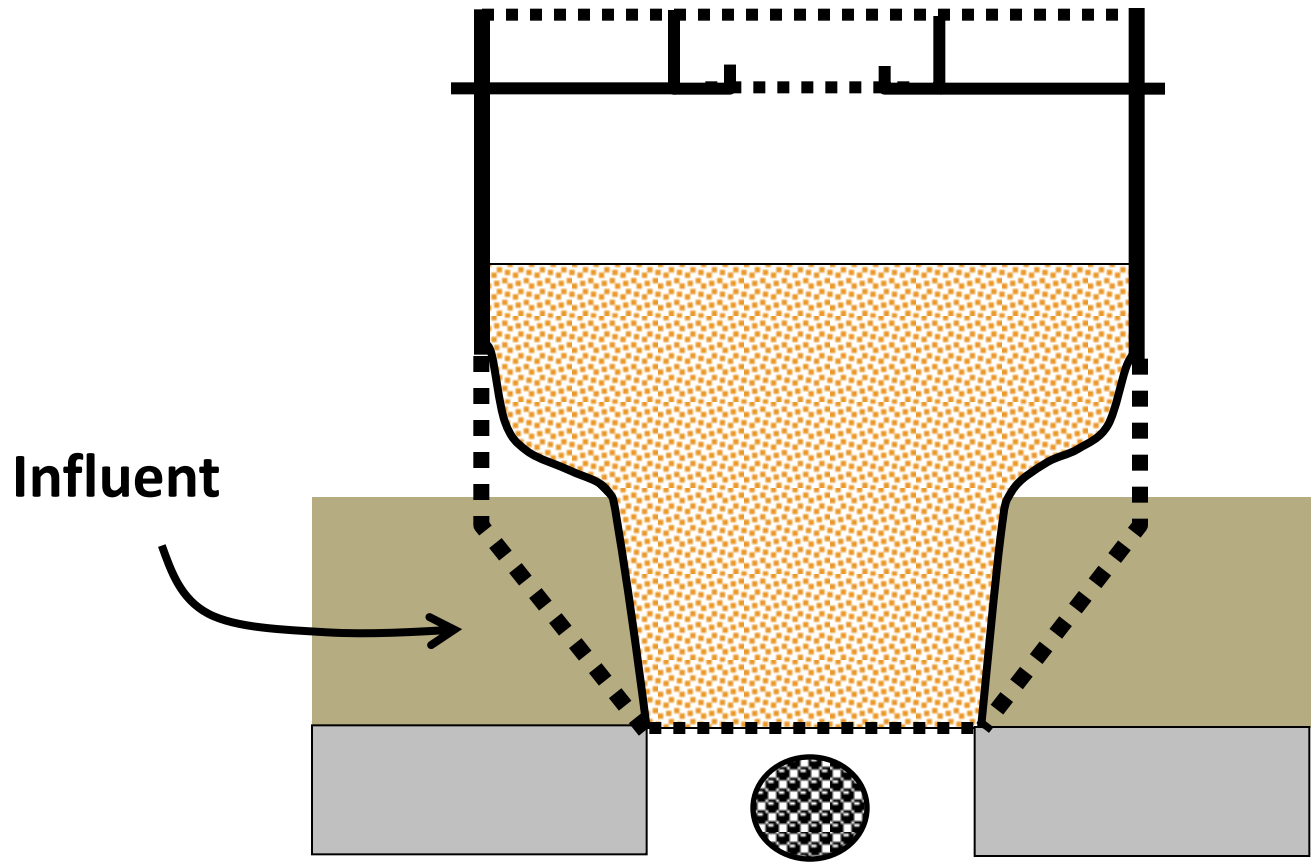
**Compressed
Filter Media**



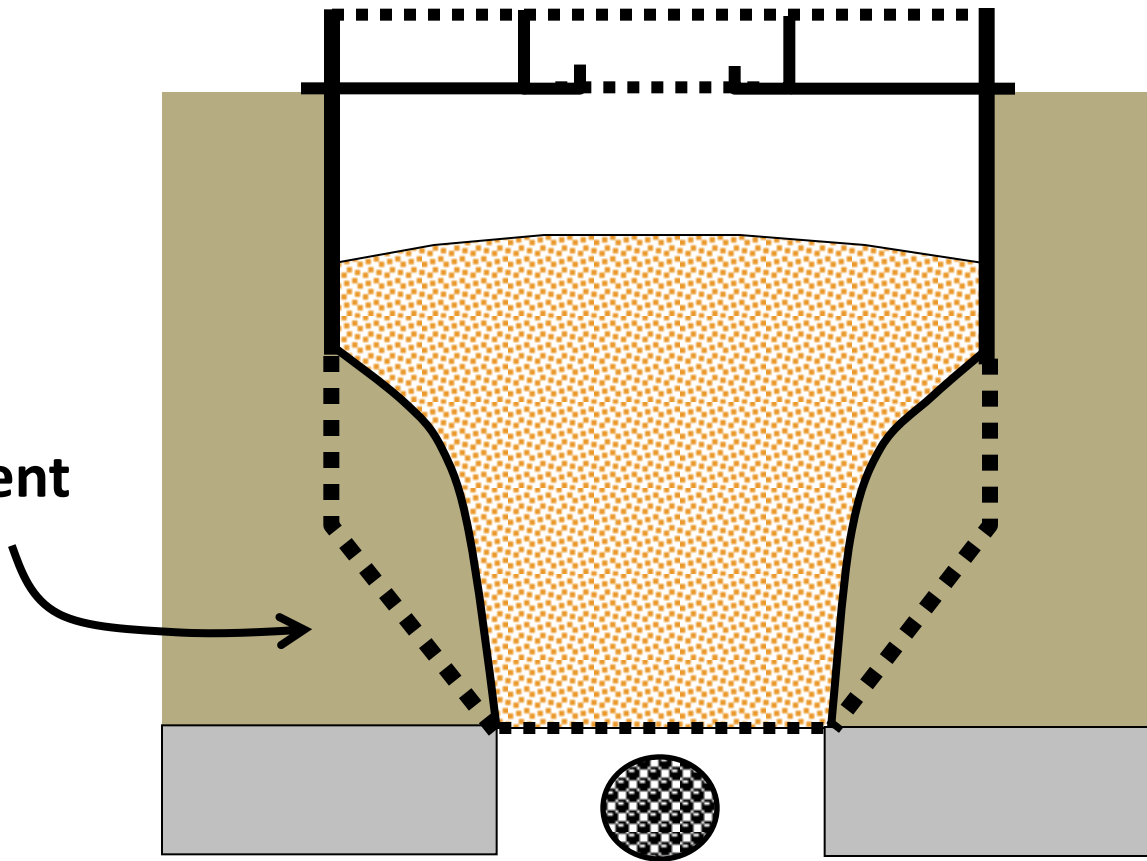


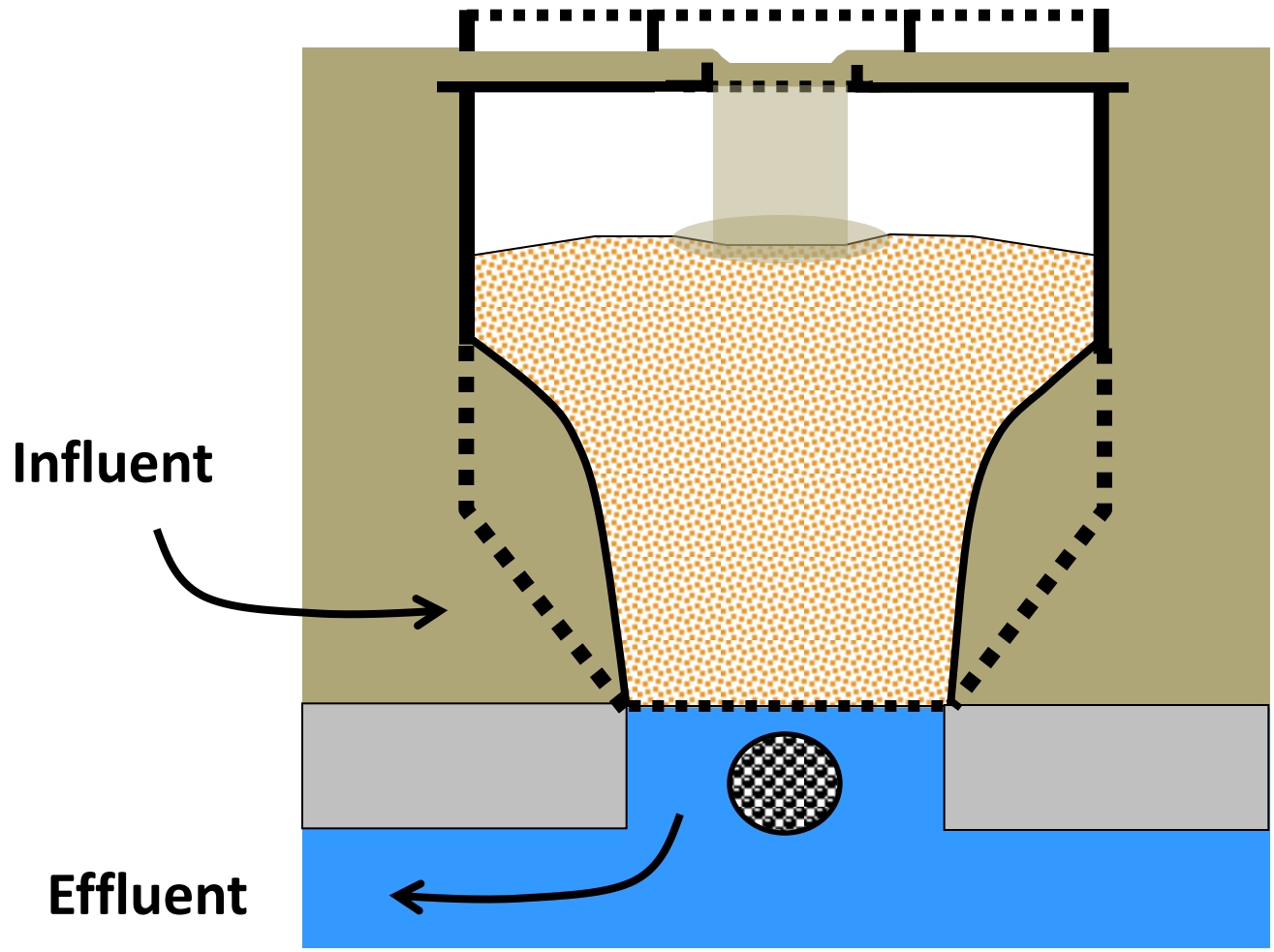


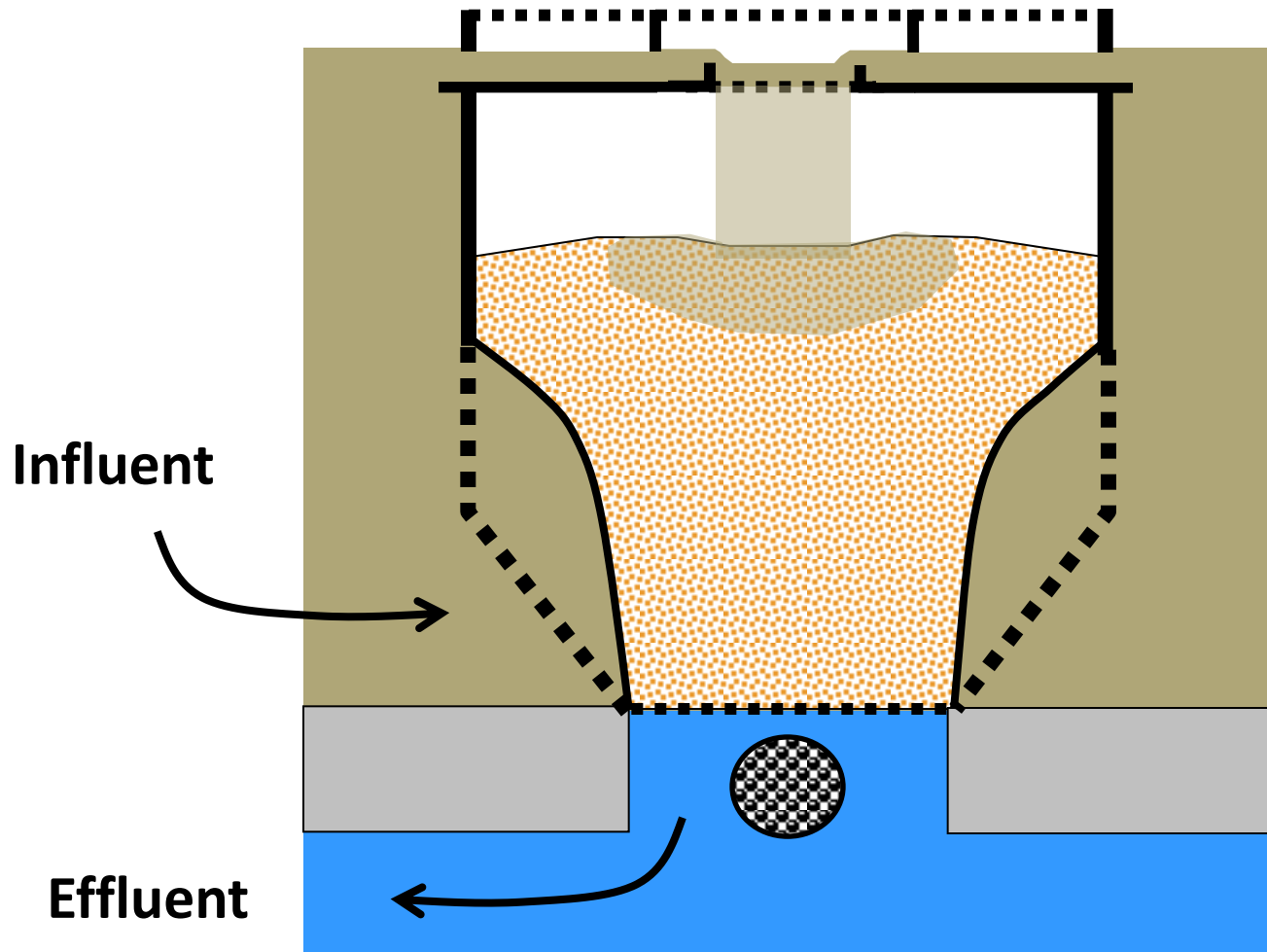


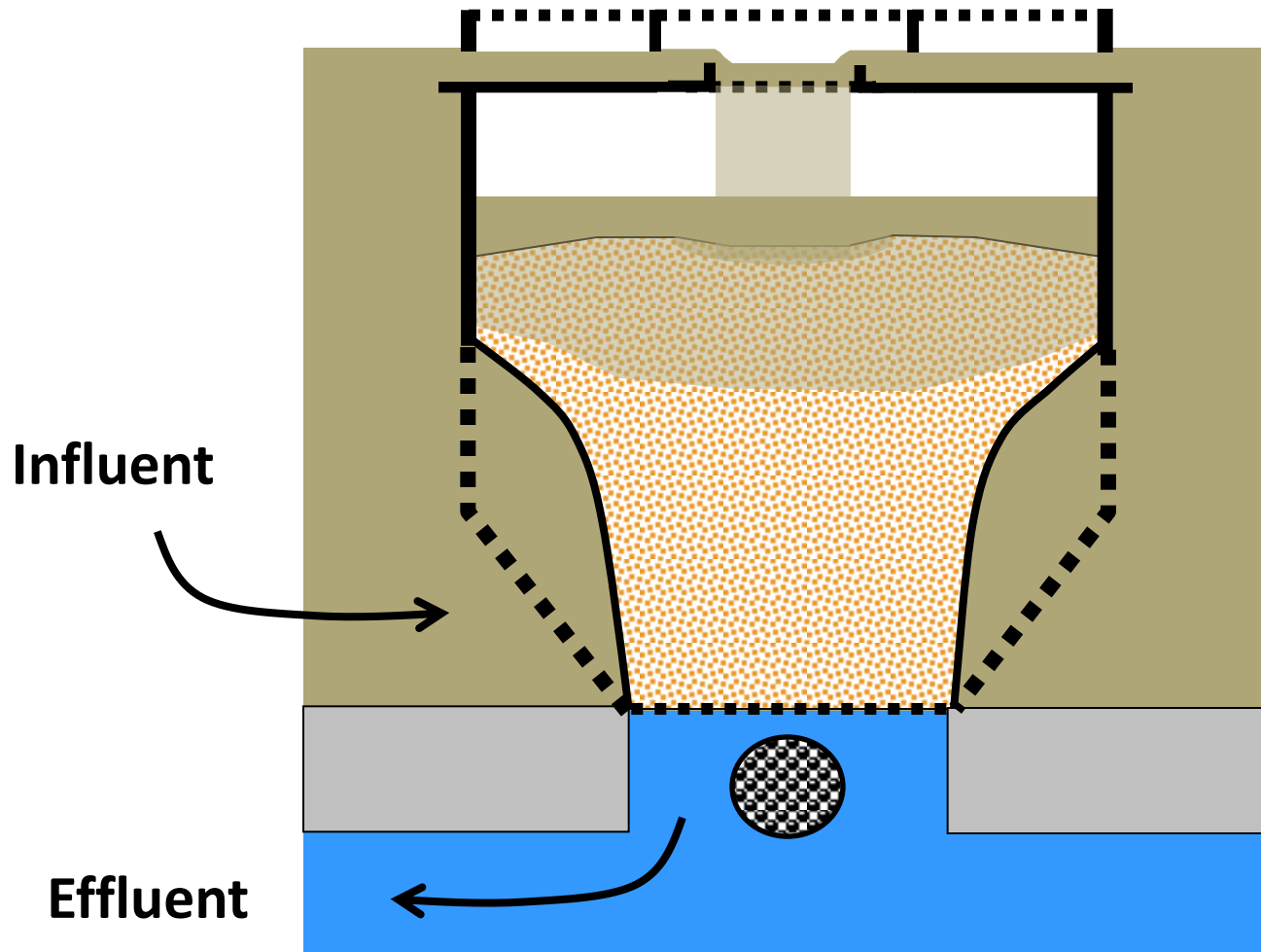


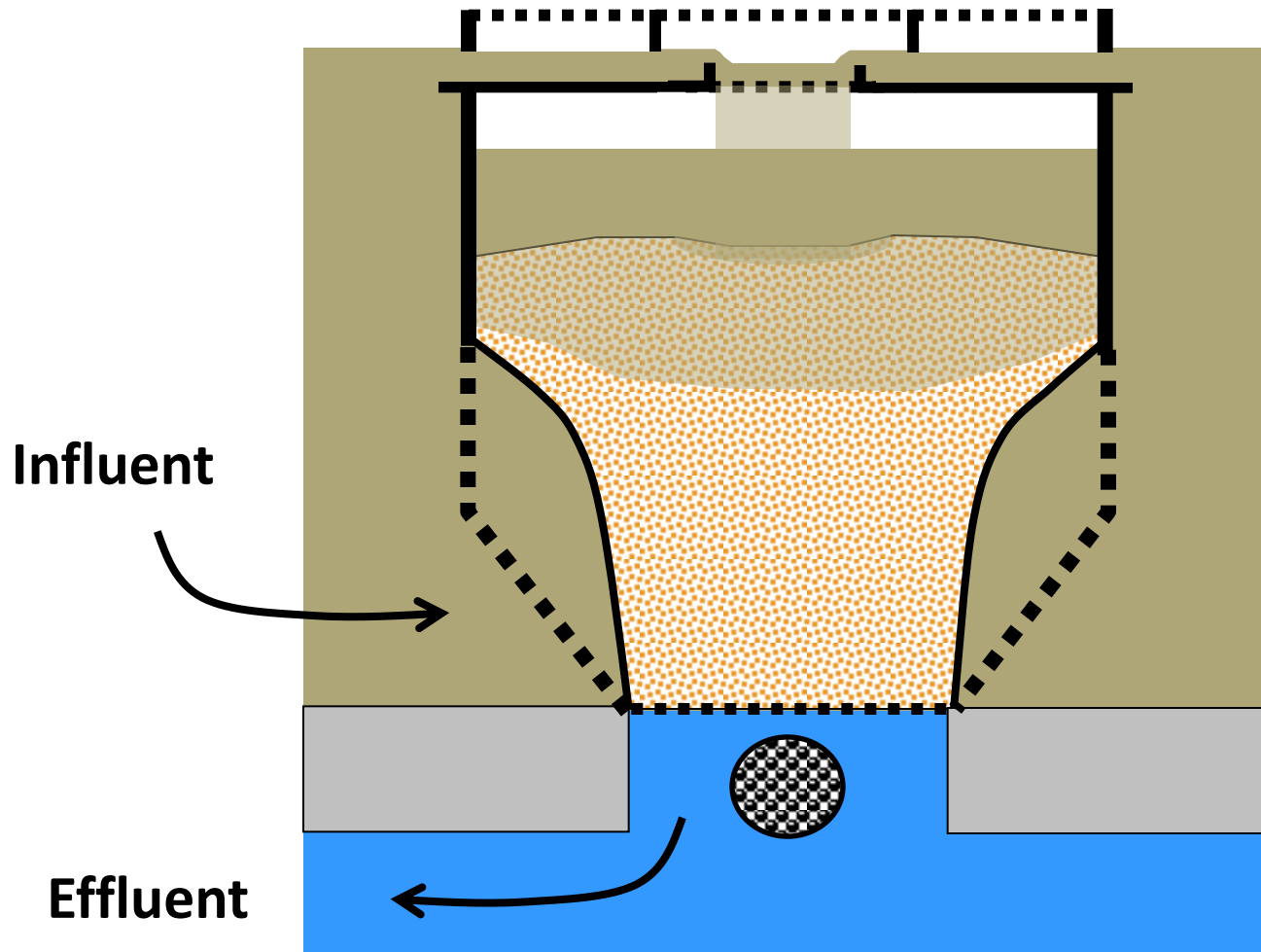
Influent

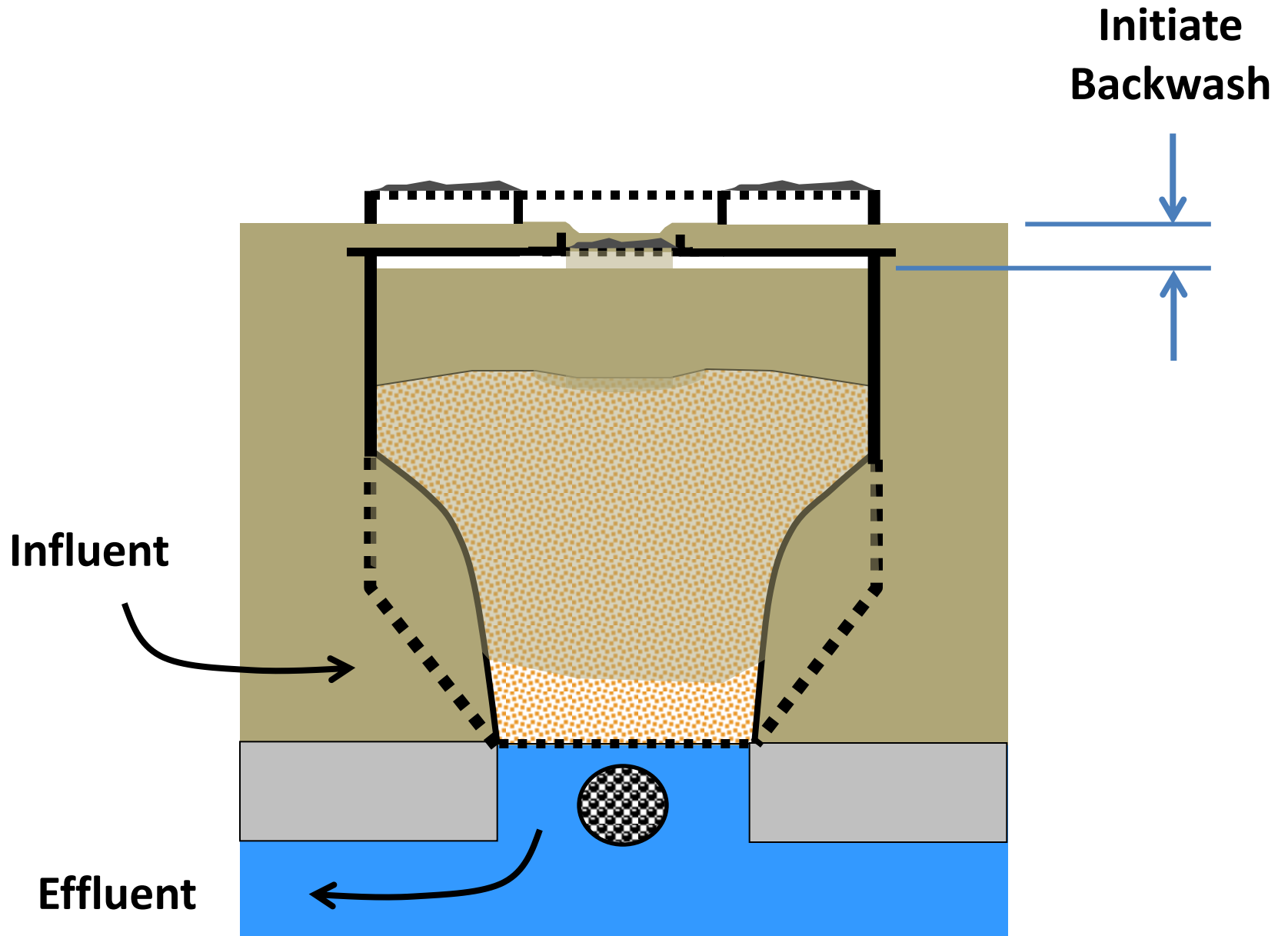


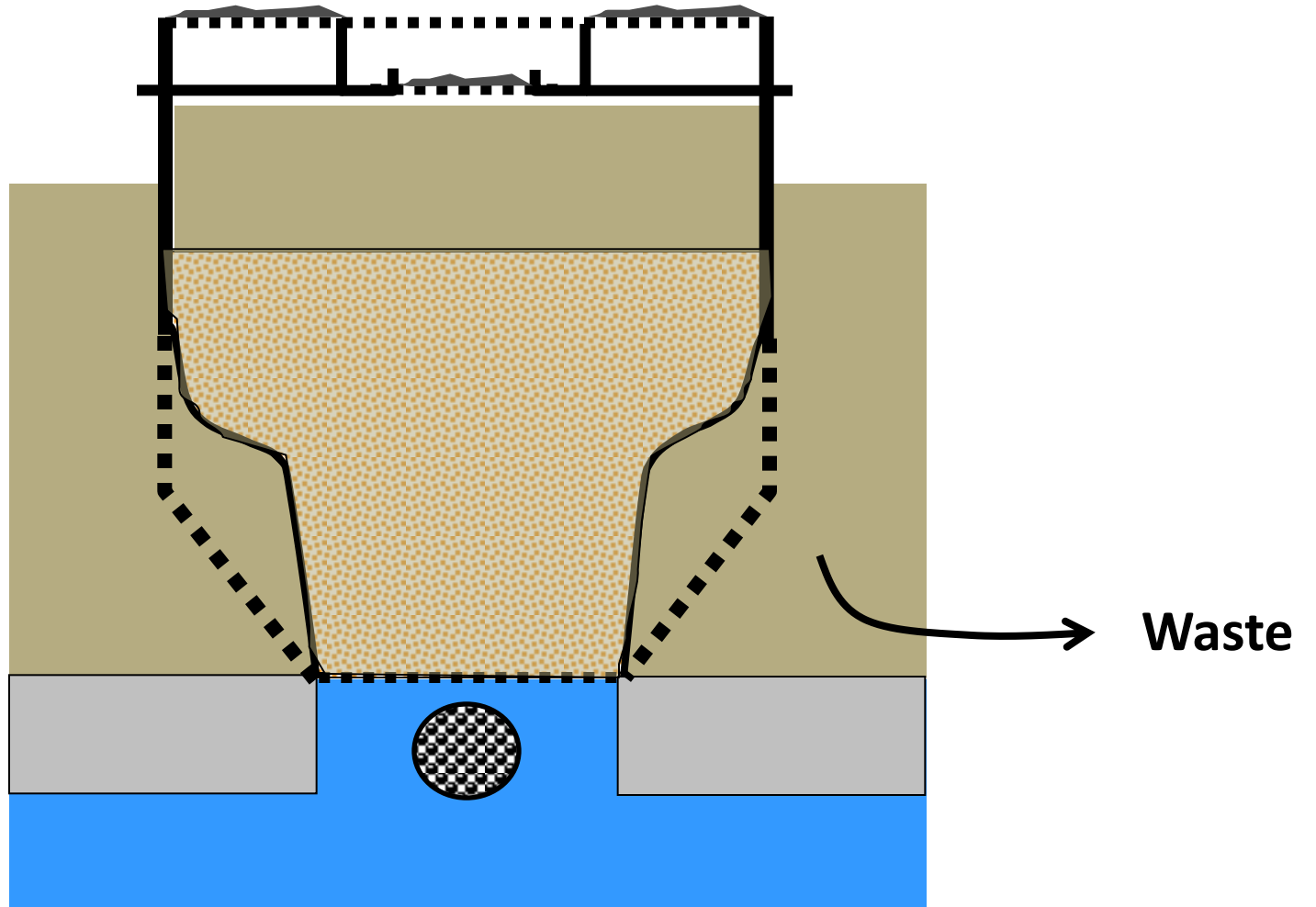


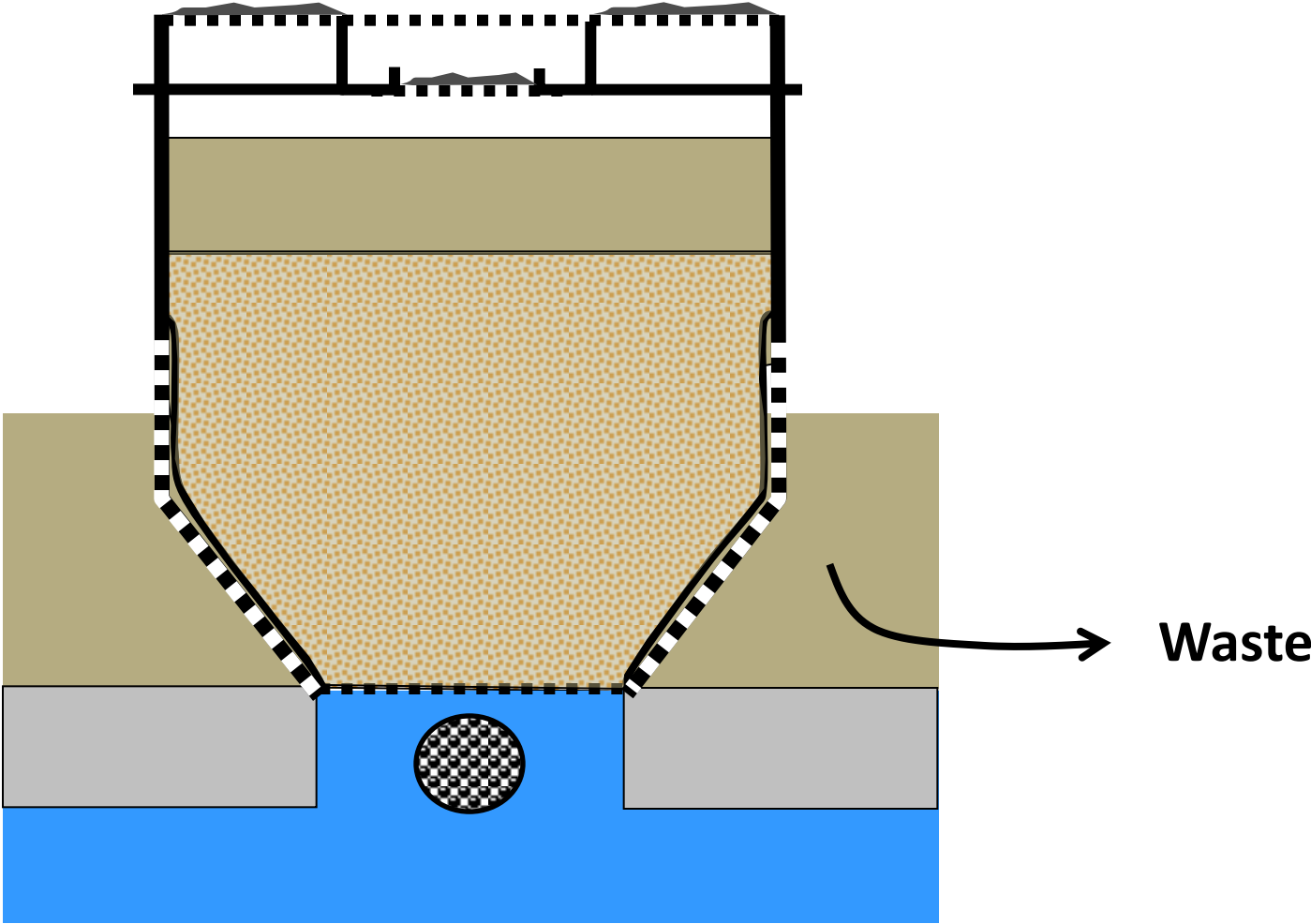


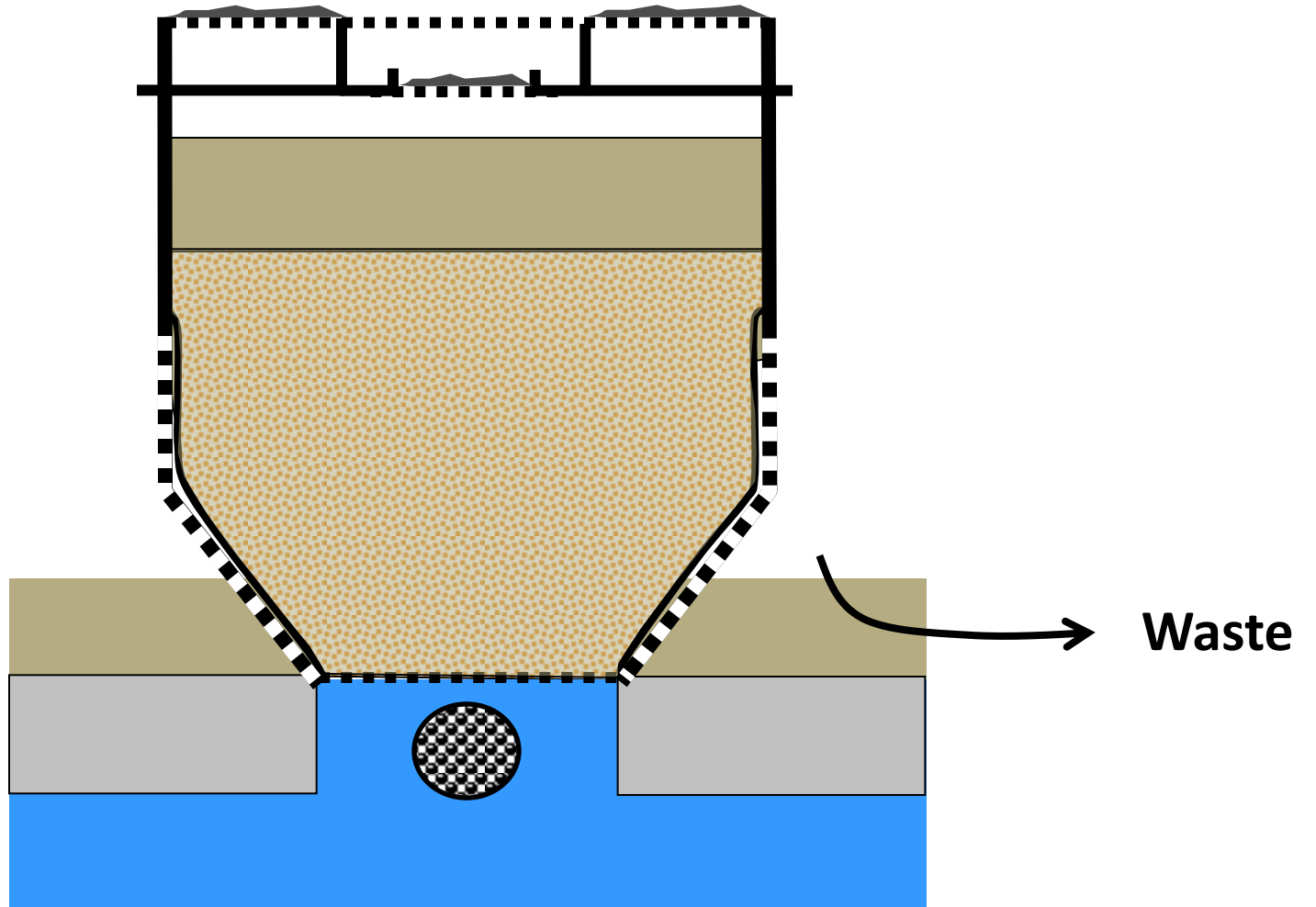


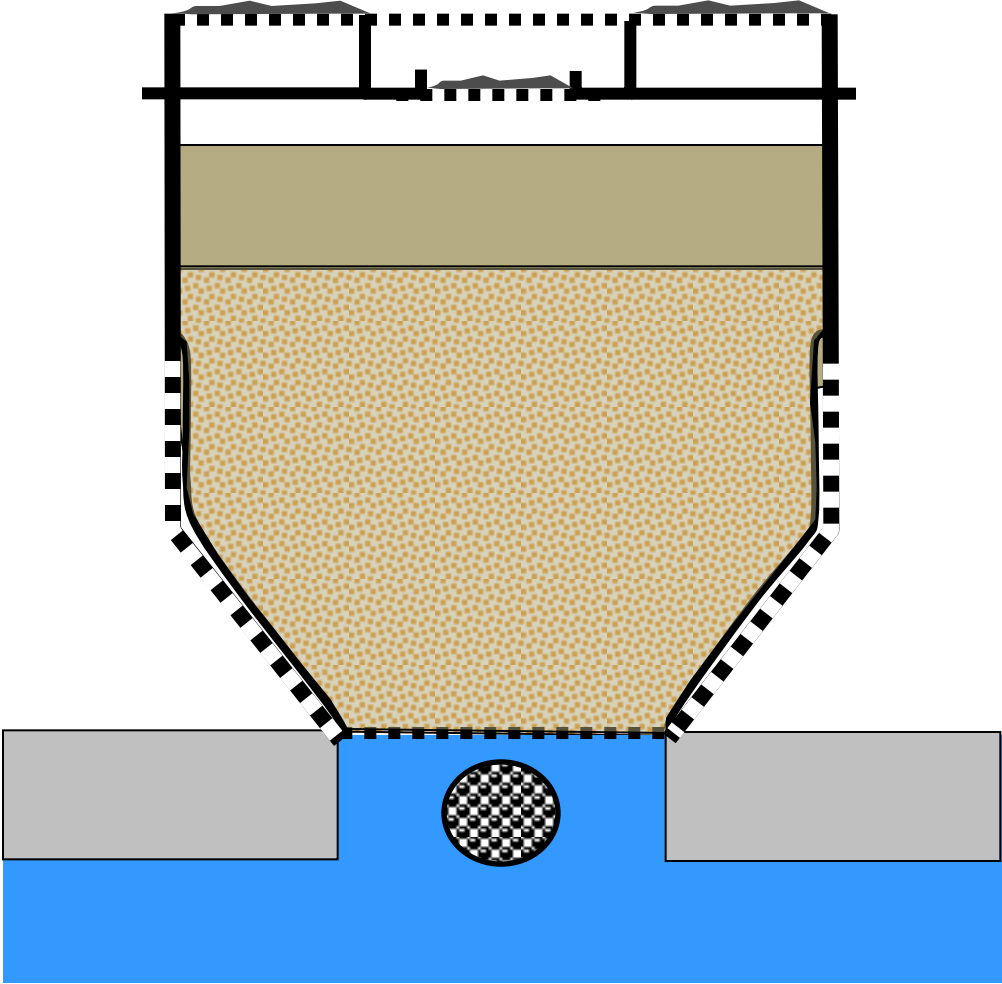


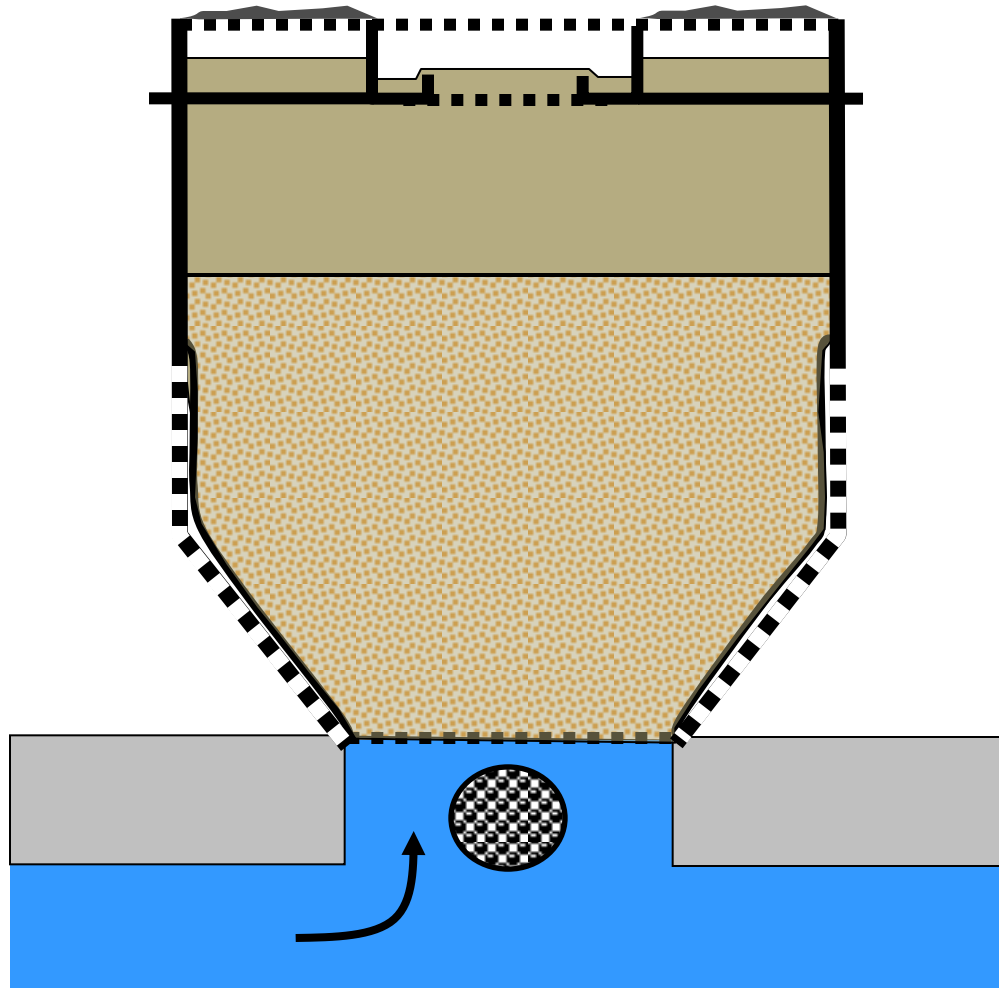






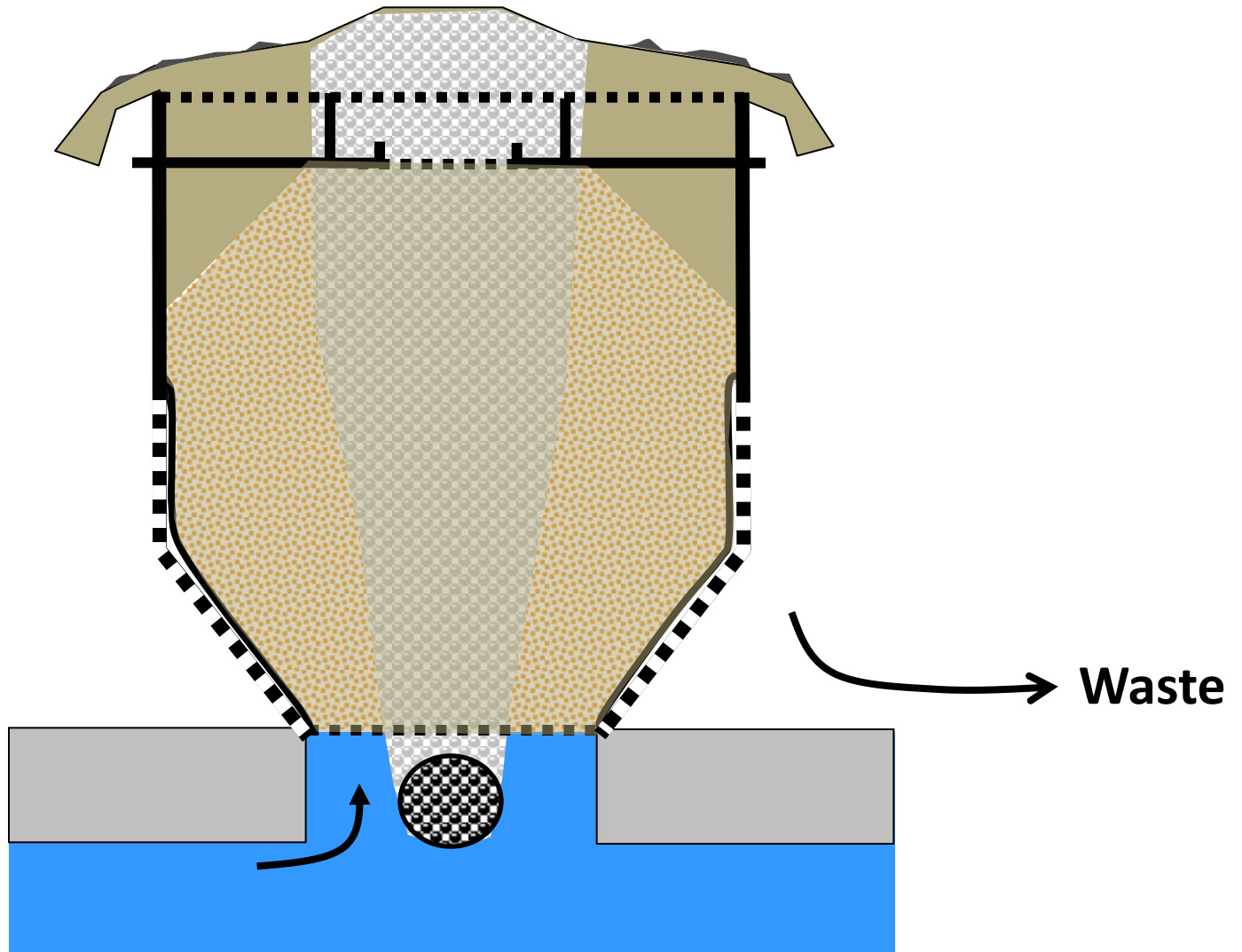




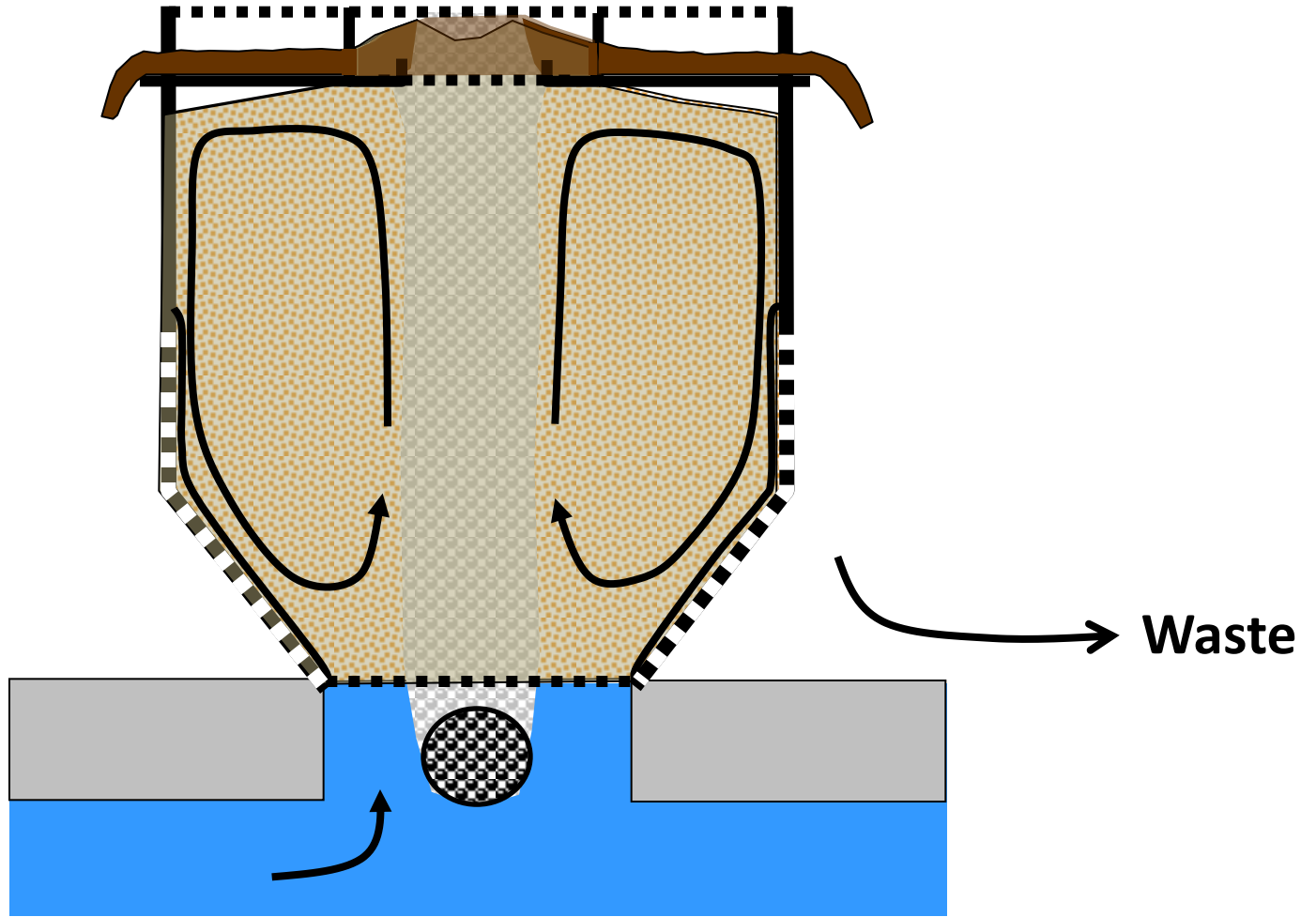


Backwash Supply

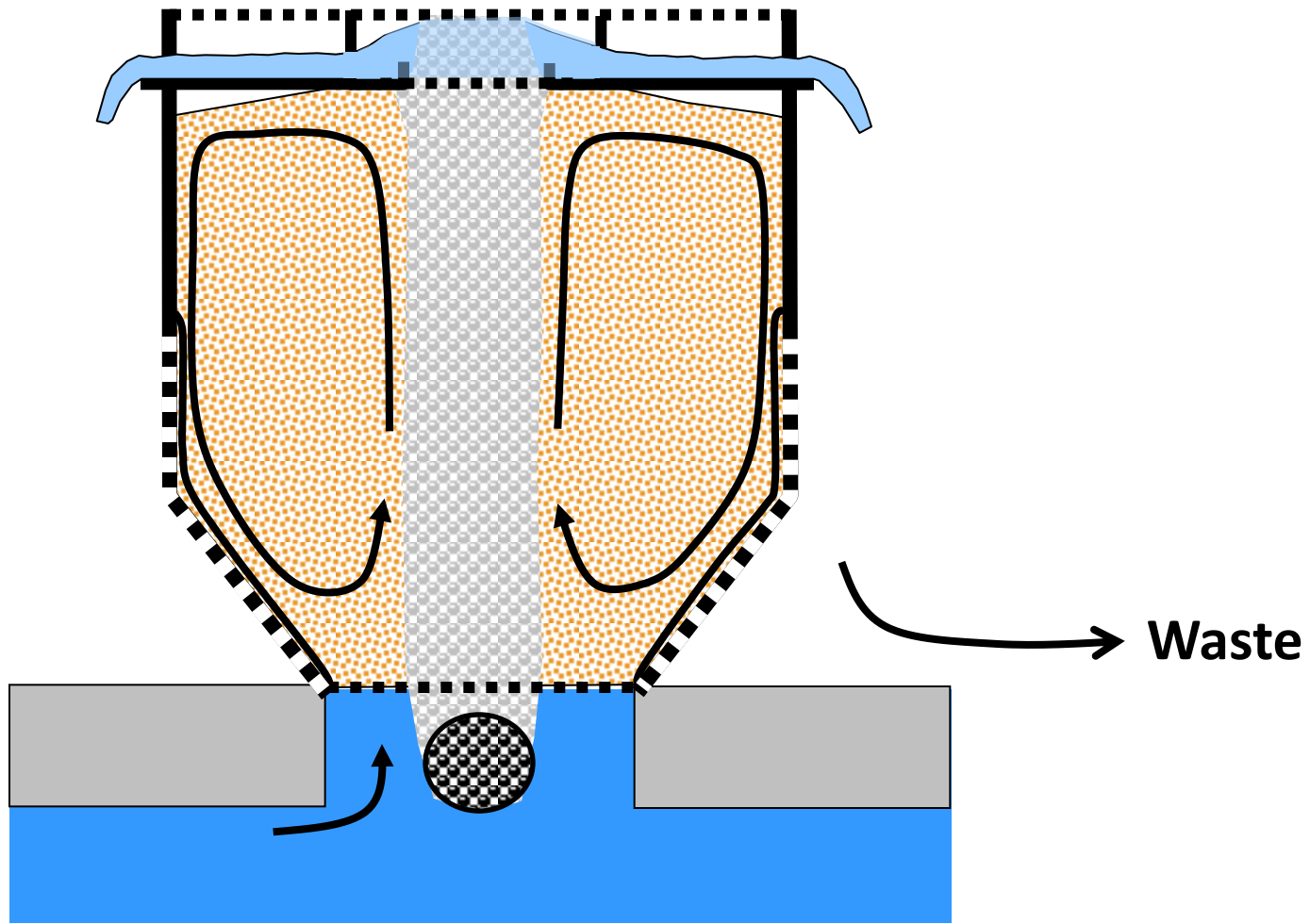
Initial Air Lifts Water Column and Cleans Fine Screens



Backwash Supply

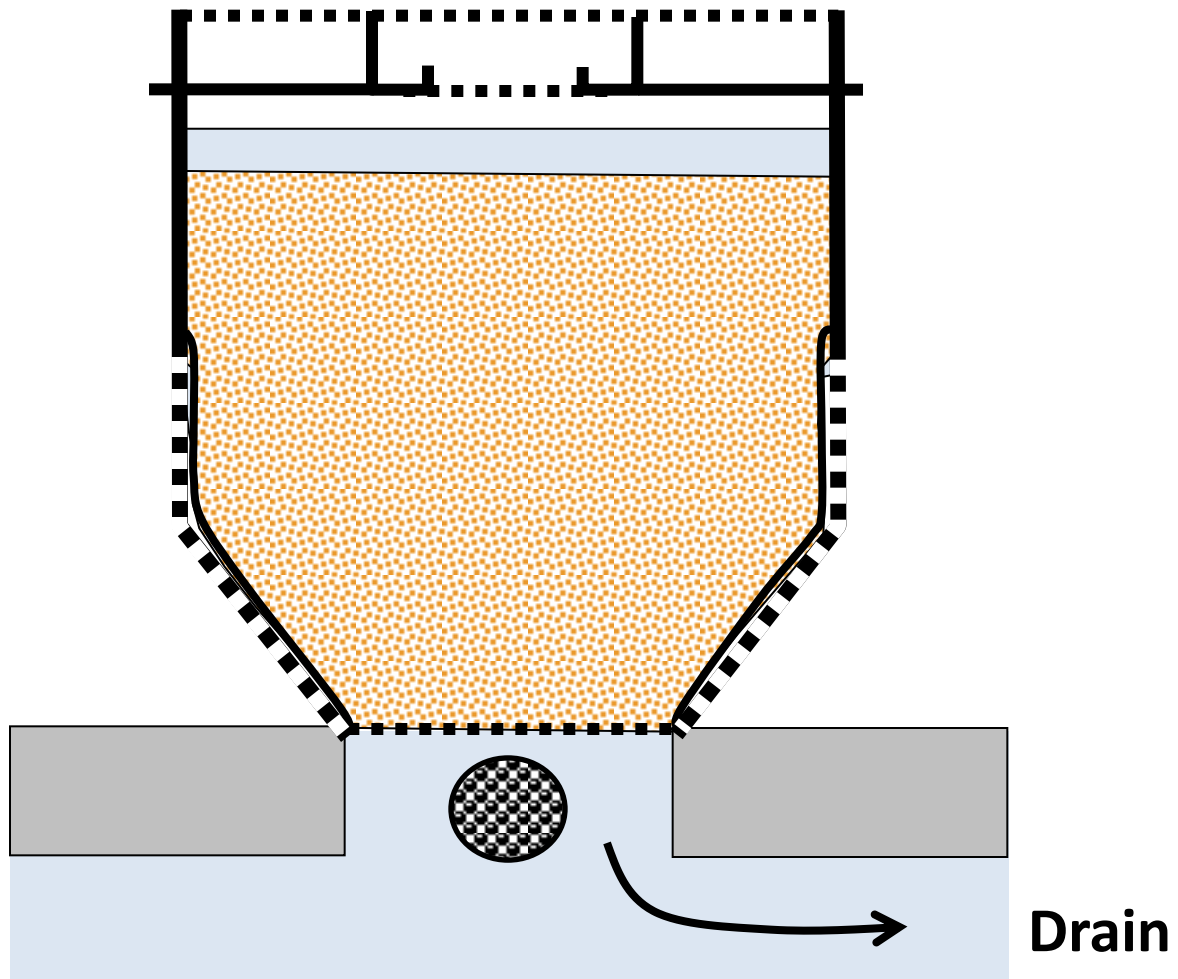


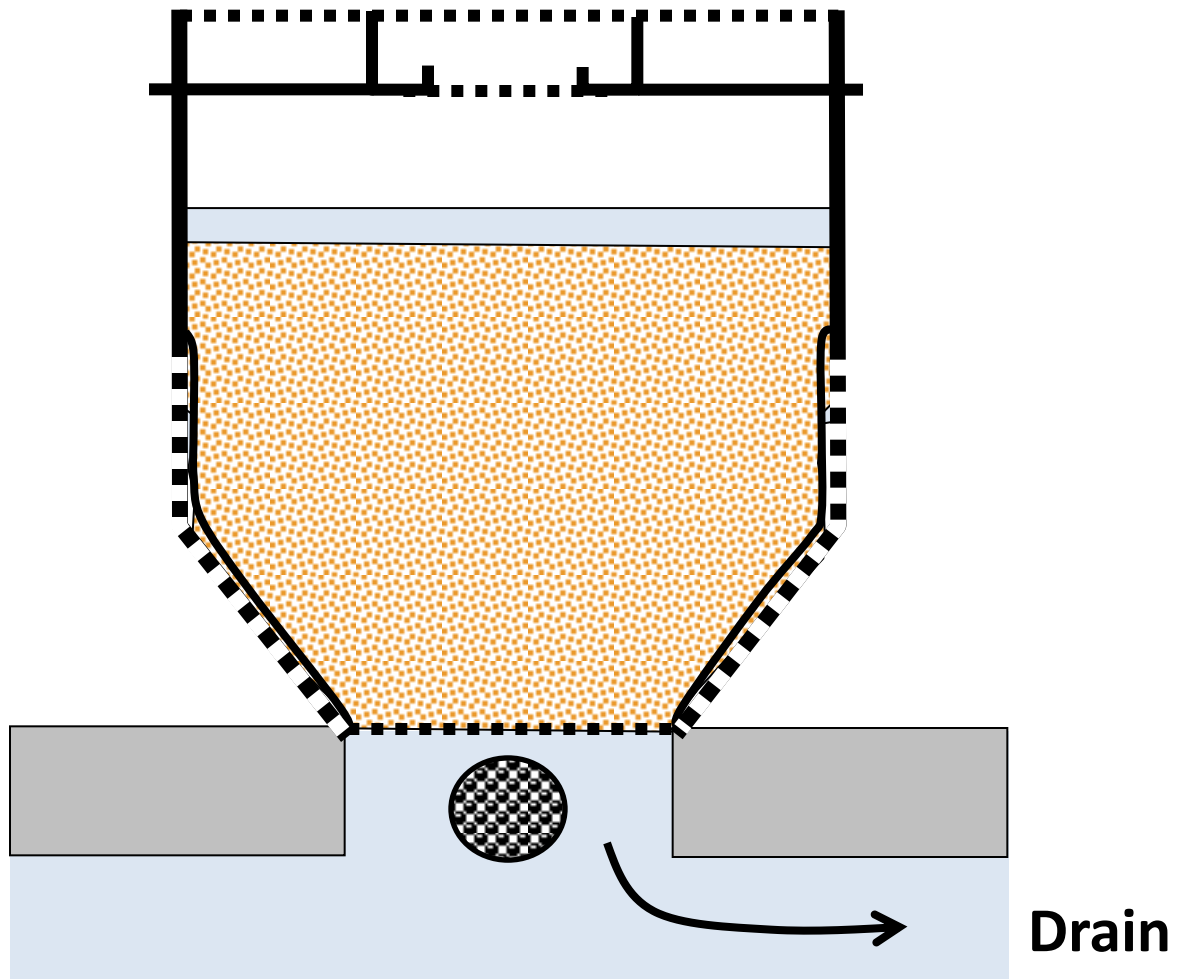
Backwash Supply

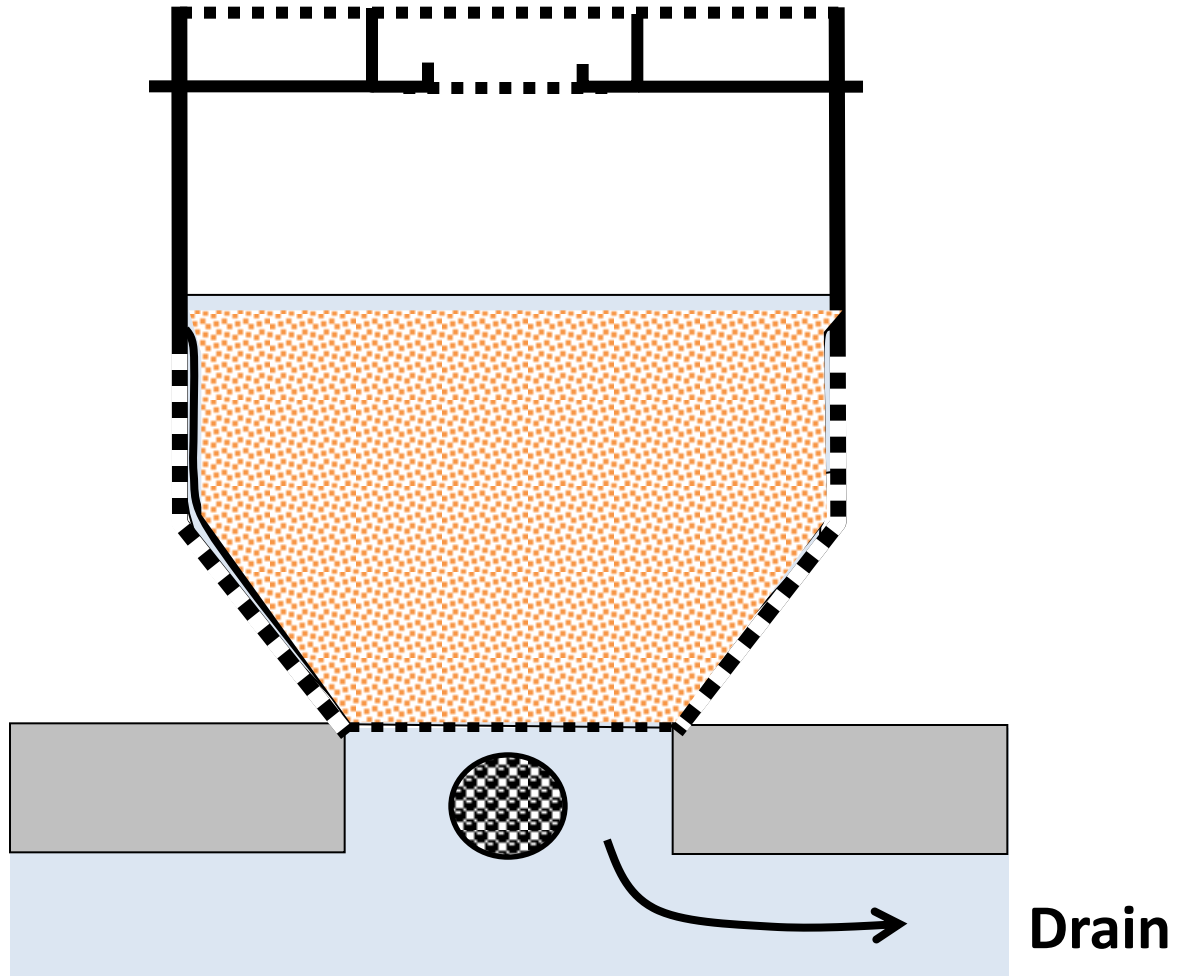


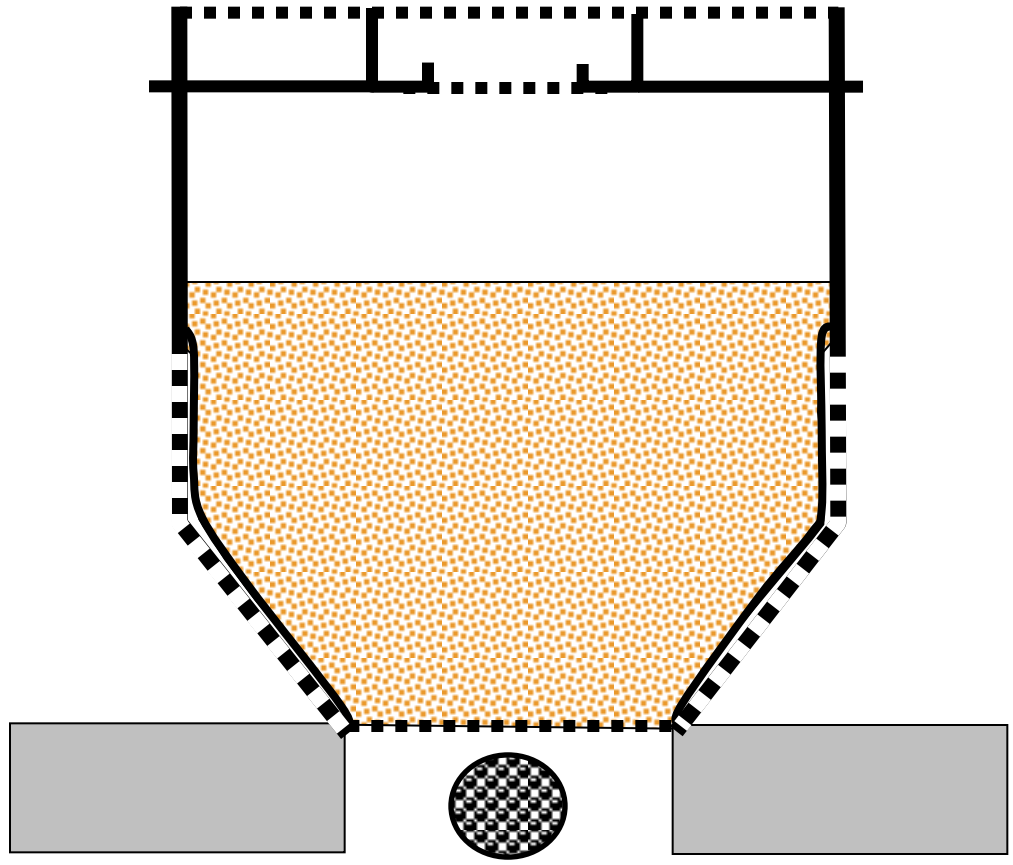
Backwash Supply

Waste









Simulating 20-Year Life of Compression Bladder



Simulating 20-Year Life of Compression Bladder



WWETCO FlexFilter™ & Bio-FlexFilter™

Wet Weather Management

Biological Treatment

Physical Chemical Treatment



Emerging Technologies

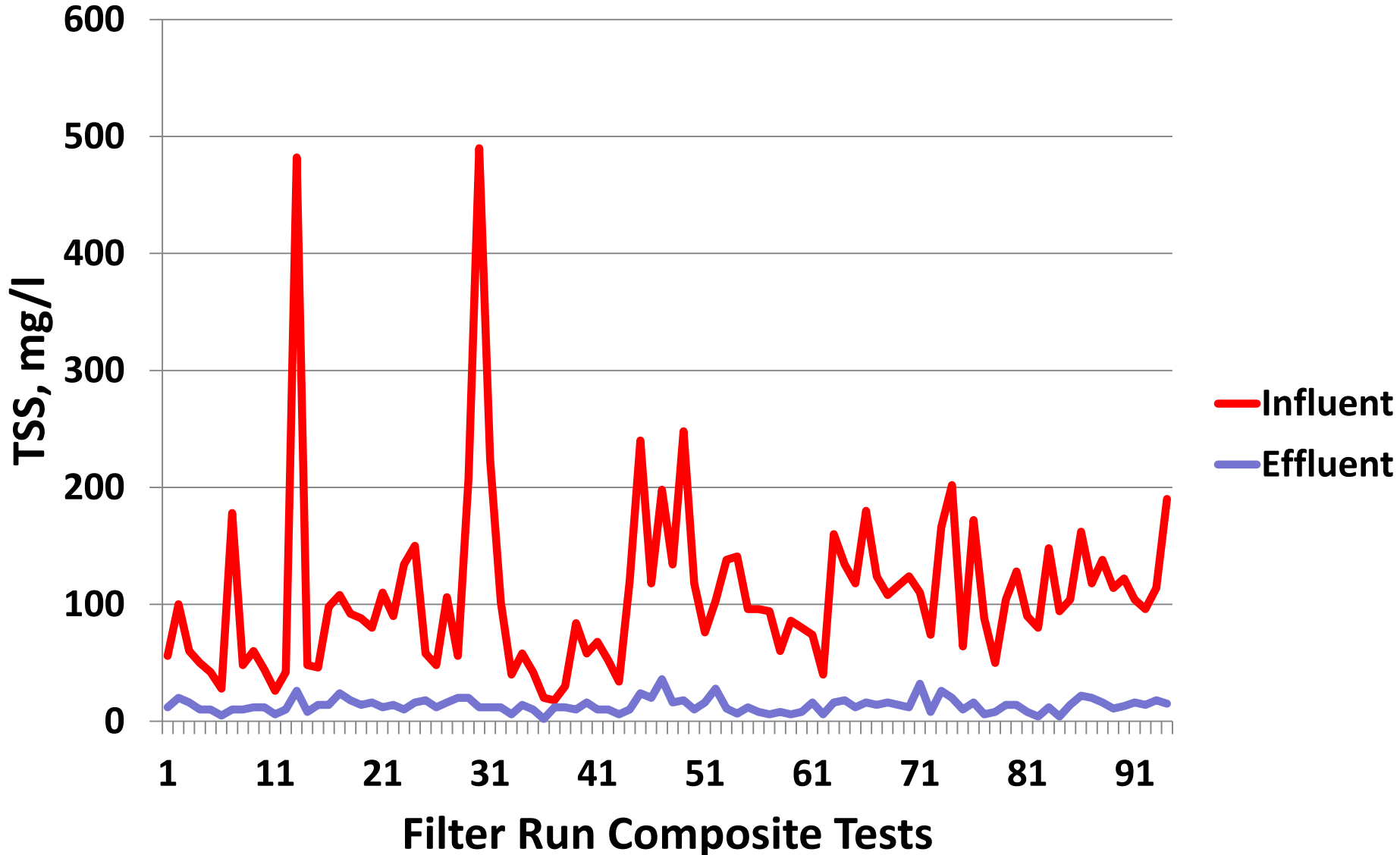
for Wastewater Treatment and In-Plant Wet Weather Management



TSS

Primary Influent Filtration - March to September 2011

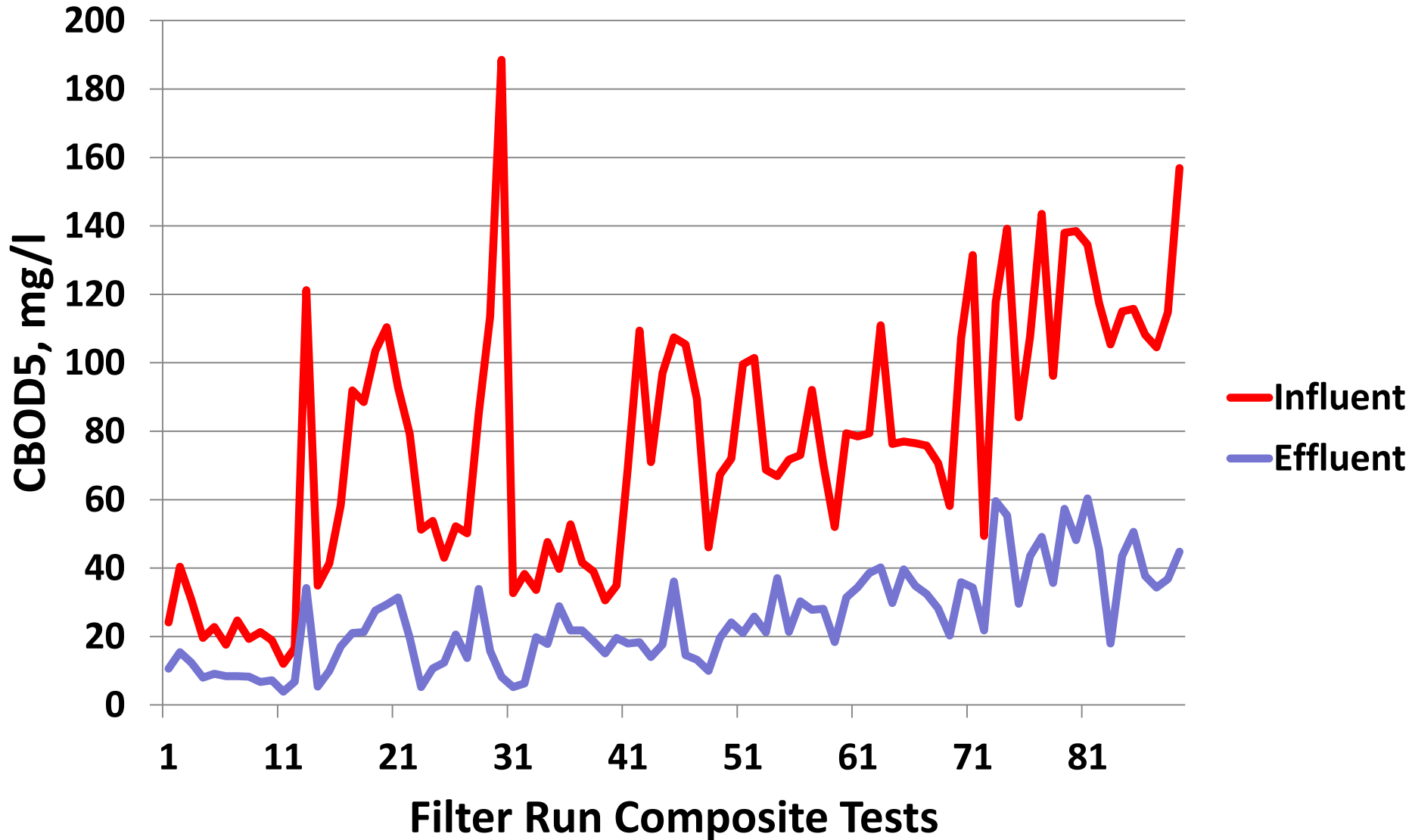
Average Filter Effluent 13 mg/l



CBOD₅

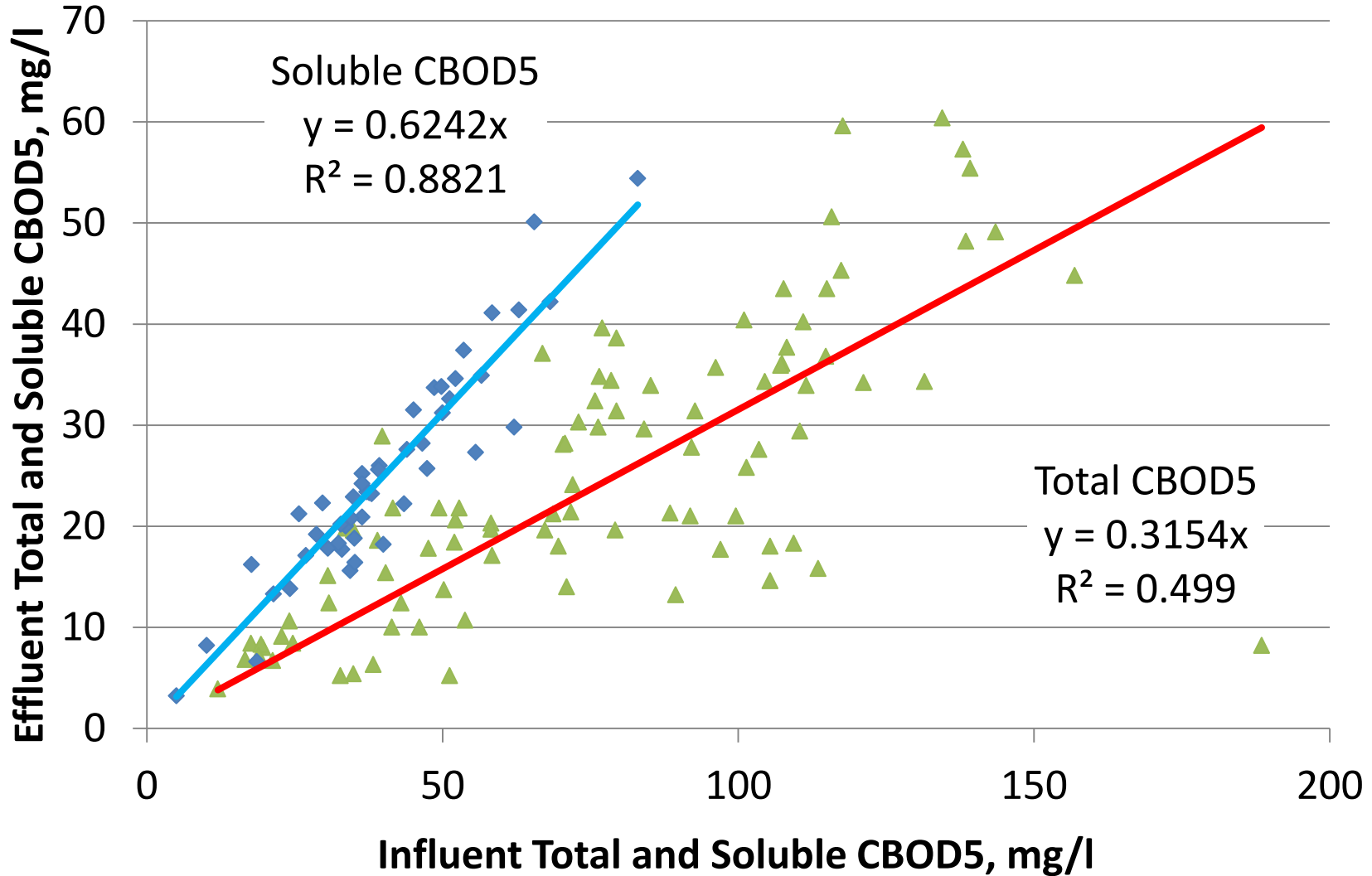
Primary Influent Filtration - March to September 2011

Average Filter Effluent 25 mg/l



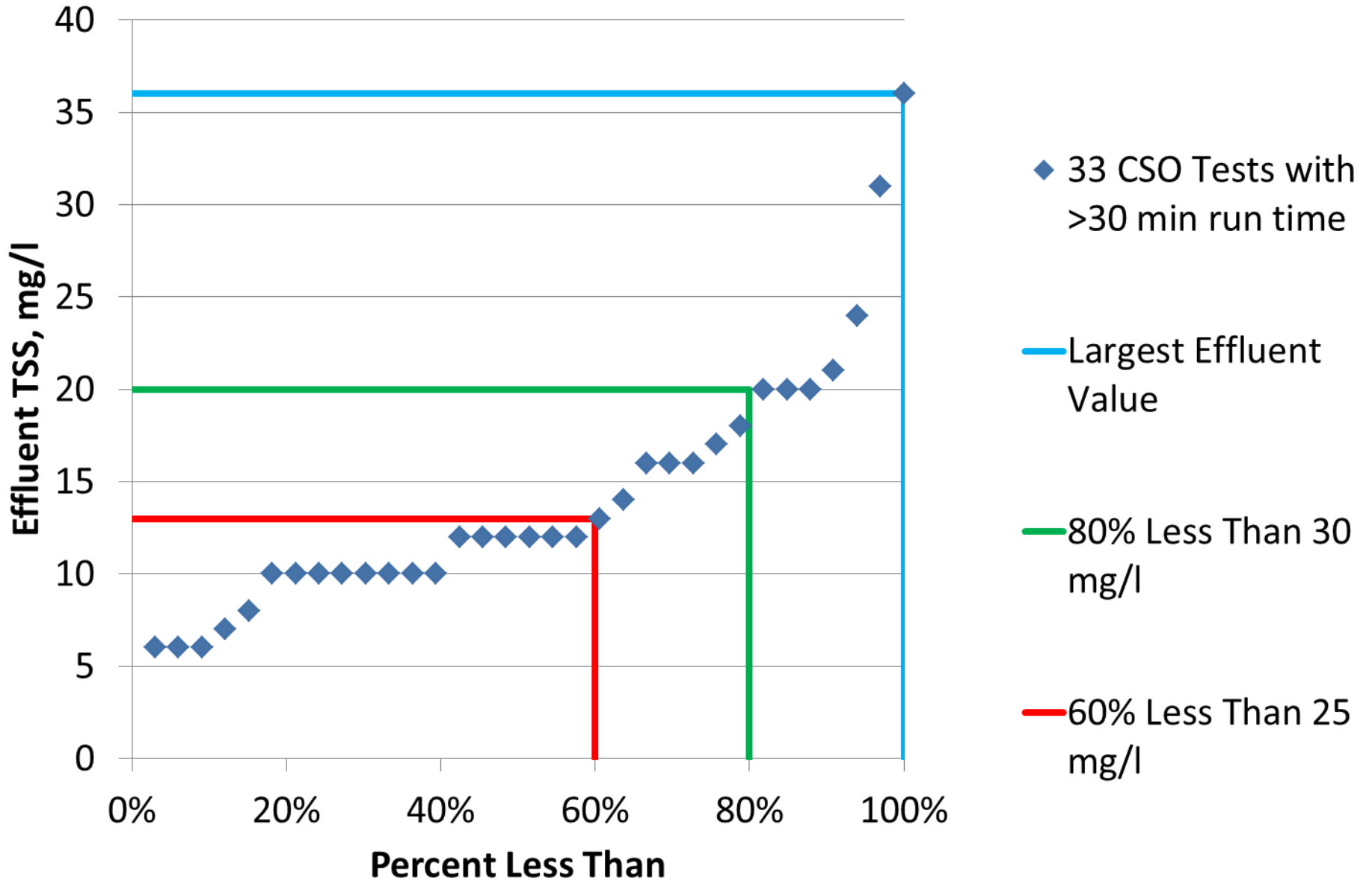
Total and Soluble CBOD5 Removal

▲ Total CBOD ◆ Soluble CBOD

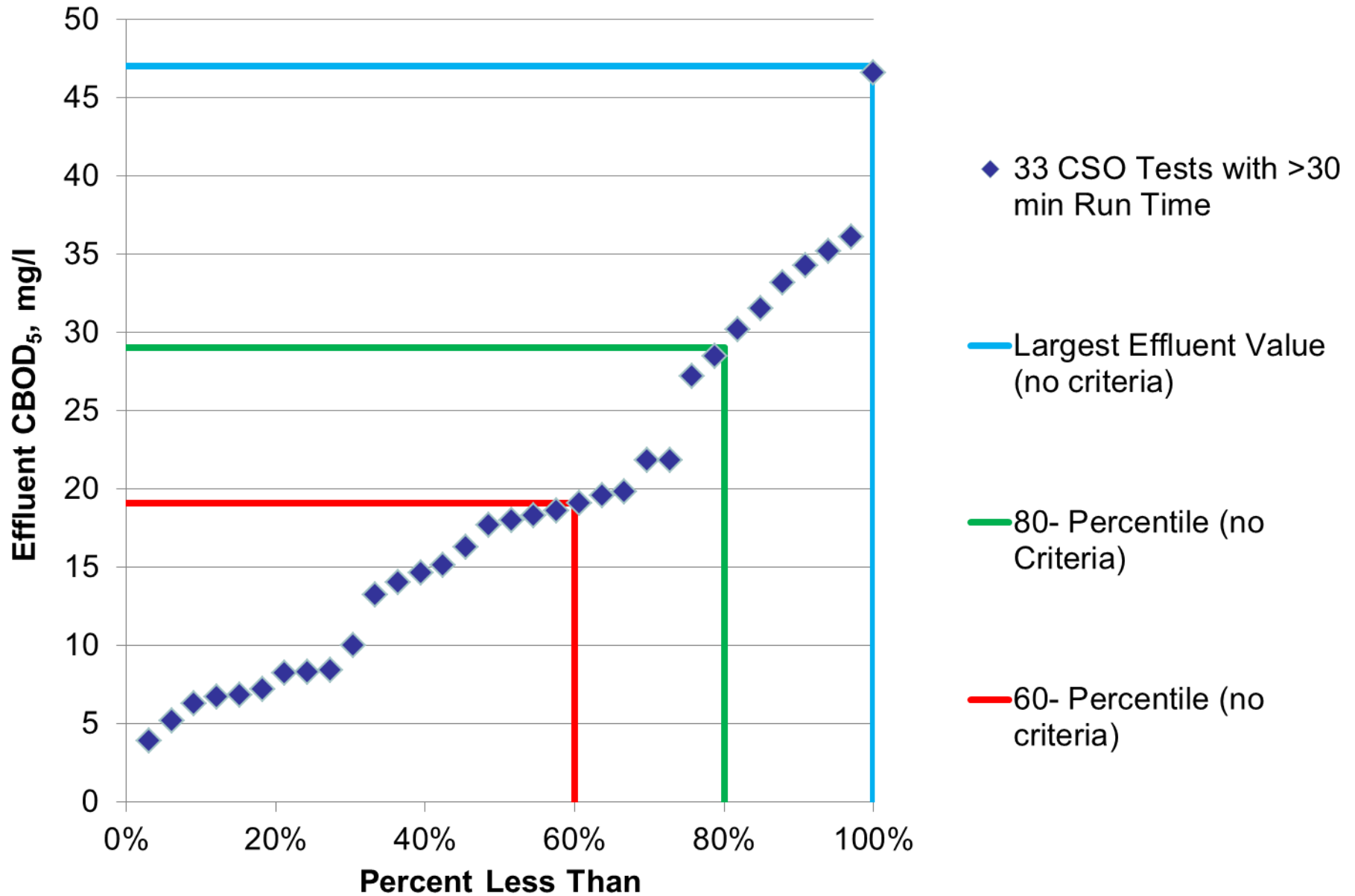


Filter Tests During CSO Conditions

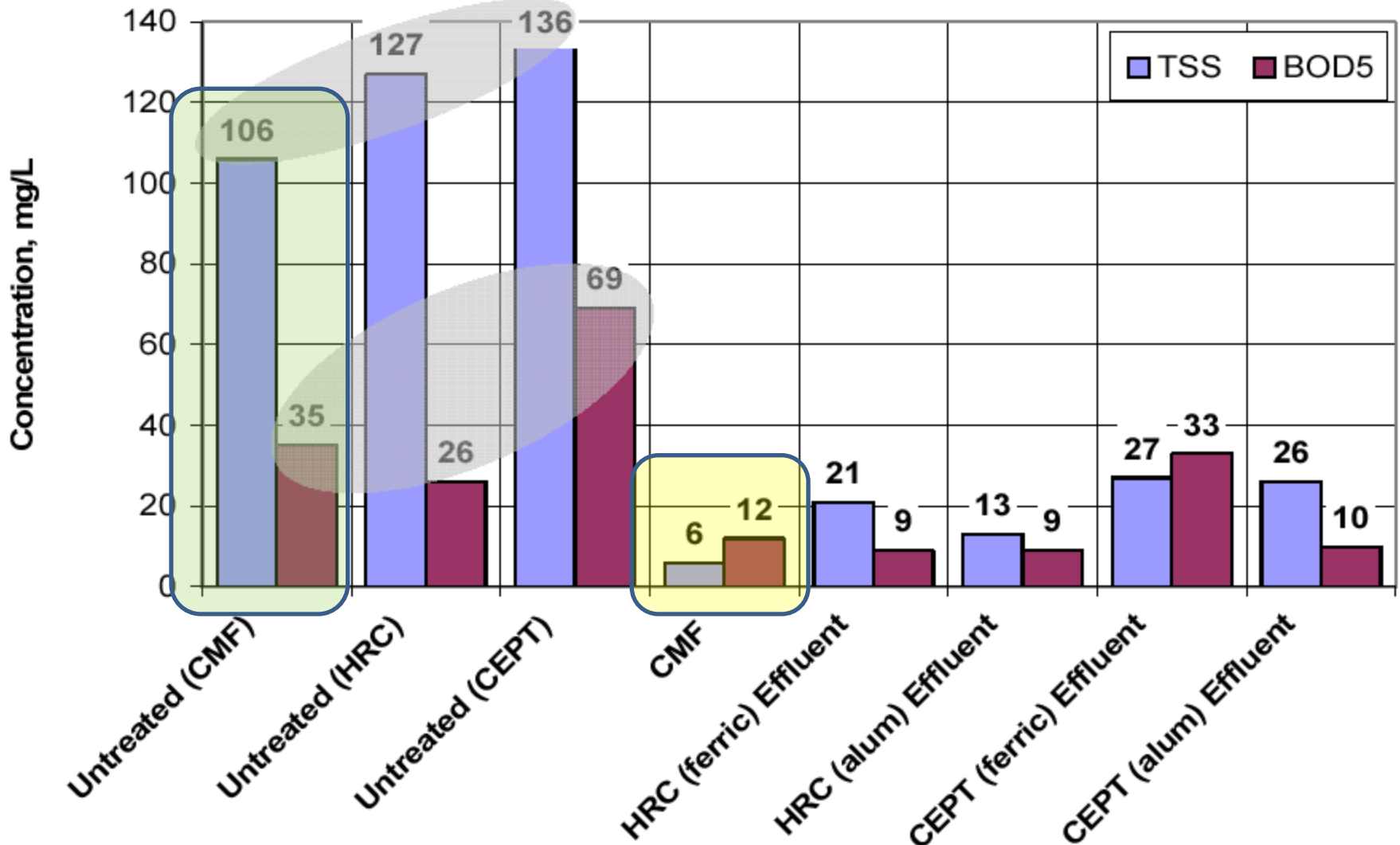
Effluent TSS Statistics



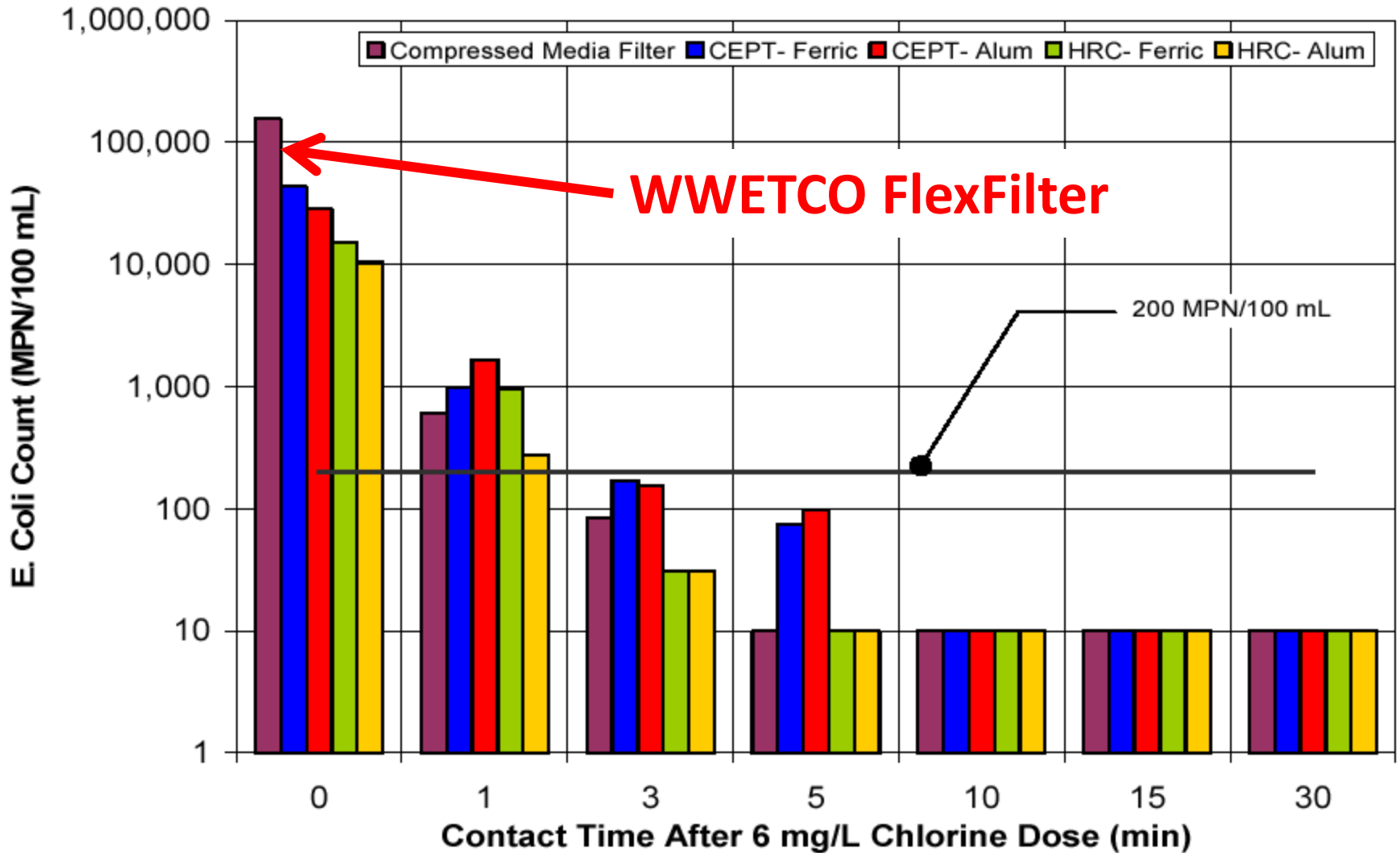
Filter Tests During CSO Conditions Effluent CBOD₅ Statistics



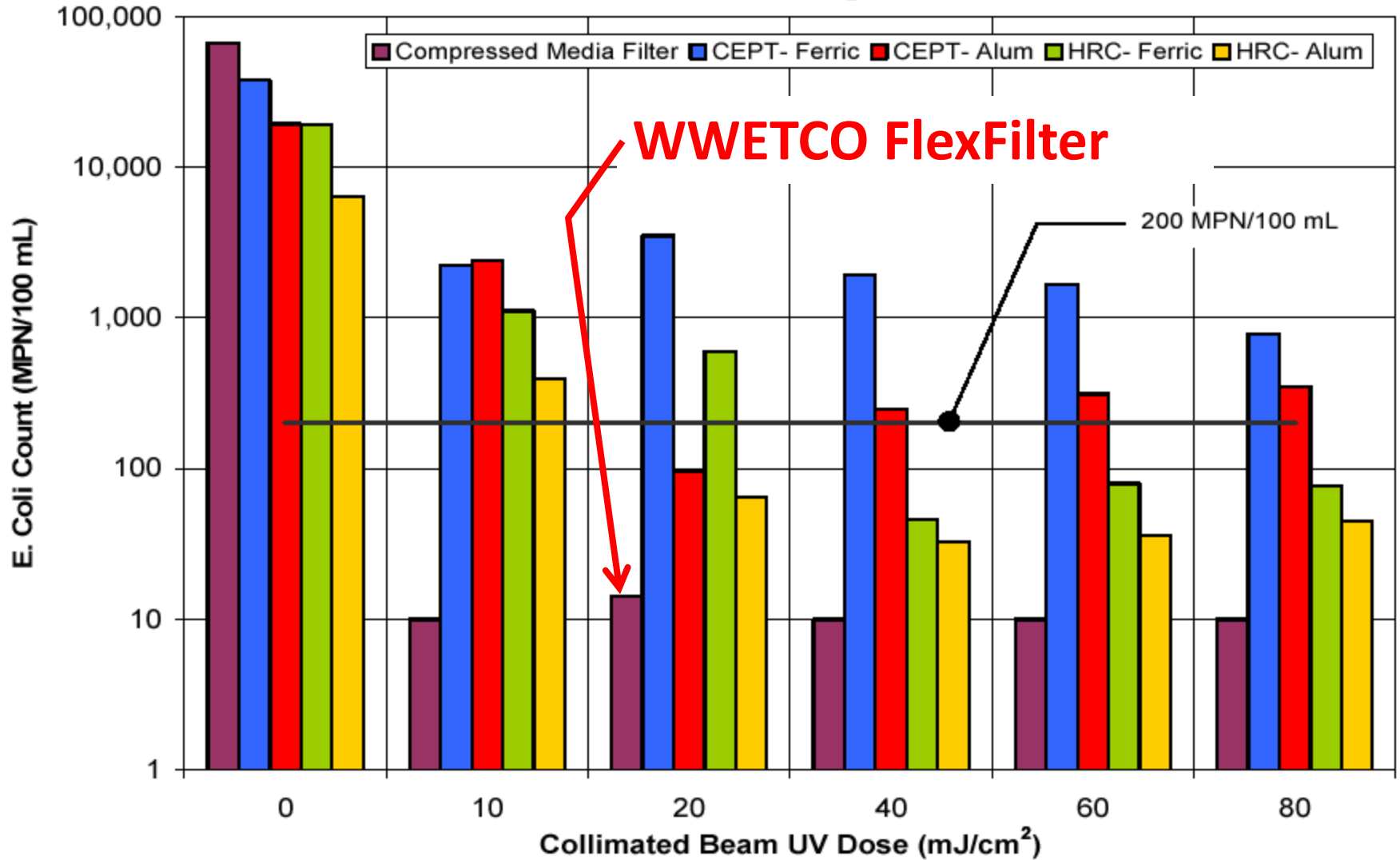
April 2009 Wet Weather Testing (St. Joseph, MO)



April 2009 Wet Weather Testing (St. Joseph, MO)



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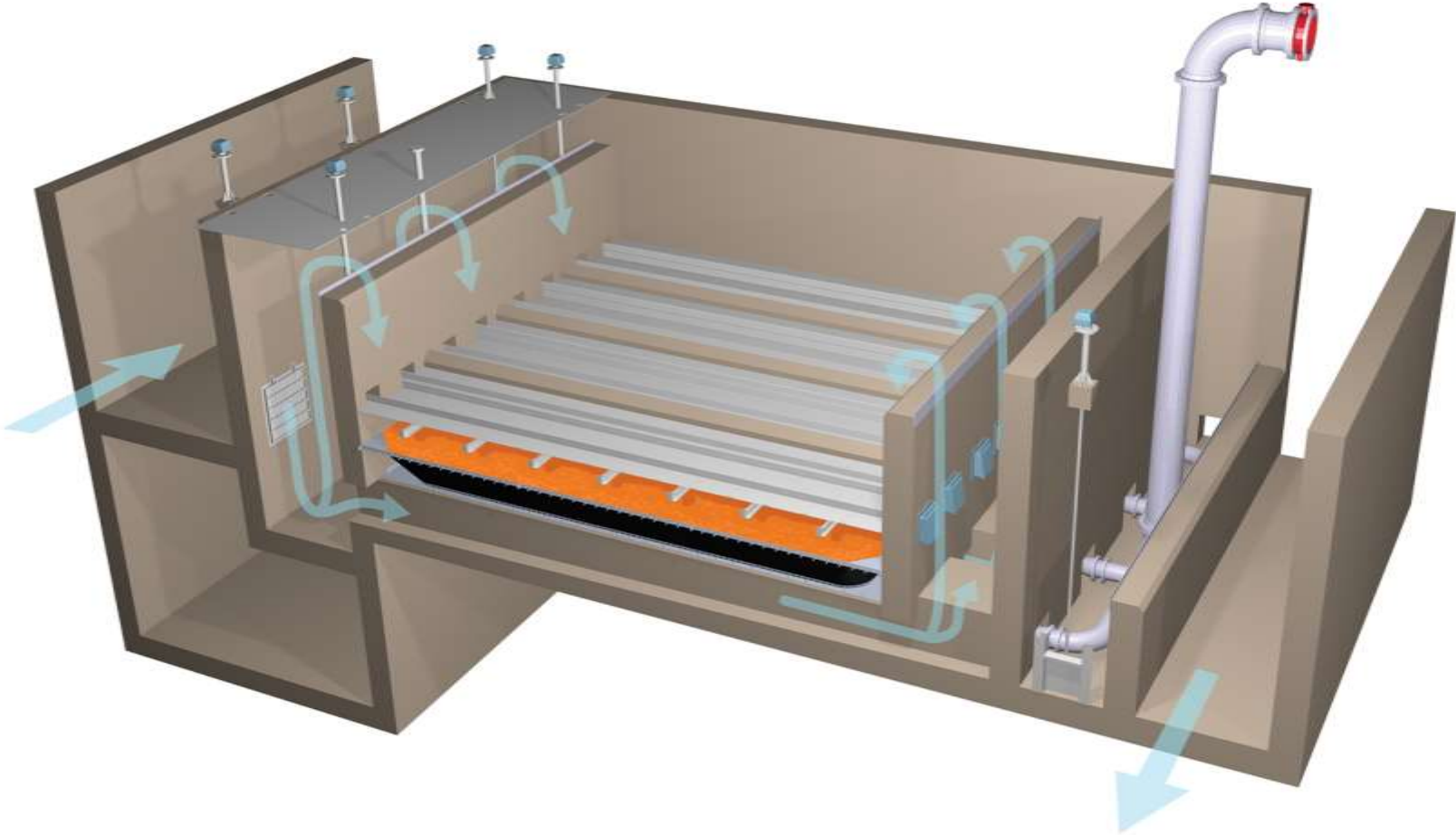
The Springfield WWTP was upgraded to control and treat its CSOs and includes the following components:

- **6 MGD additional capacity through the plant (34 to 40 MGD peak hydraulic capacity)**
- **Overflow screening (1/2" bar screening)**
- **11-cell FlexFilter for 100 MGD excess flow treatment**
- **10-minute contact basin for filter effluent disinfection with sodium hypochlorite**
- **Dechlorination with sodium bisulfite**
- **Effluent Pumping**
- **Backwash storage and 9 MGD pump return to biological processes (food return)**

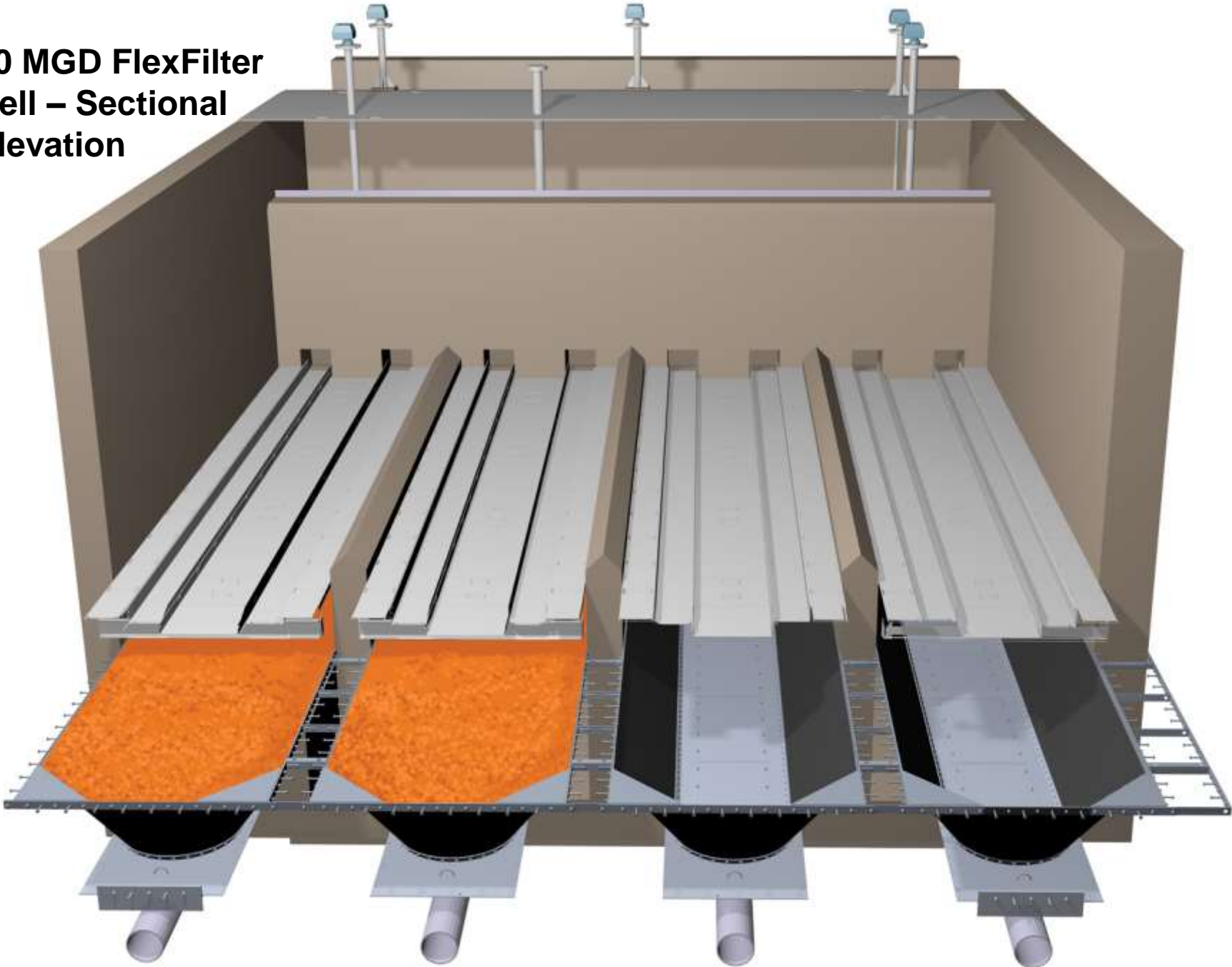




10 MGD FlexFilter Cell – Longitudinal Elevation



**10 MGD FlexFilter
Cell – Sectional
Elevation**







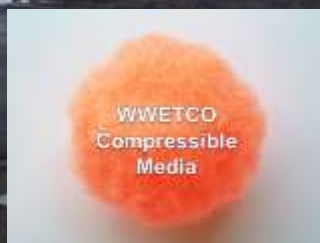


Springfield, Ohio 100 MGD CSO Treatment System

- 11-cell compressed media filter that treats excess wet weather flows to levels better than secondary treatment criteria with an effluent amenable to UV or chemical disinfection.
- Facility can be used during dry weather to polish the plant effluent including phosphorous control to very low levels.
- In a dual-use role this facility will remove about twice the amount of pollutants compared to that contributed from wet weather alone.

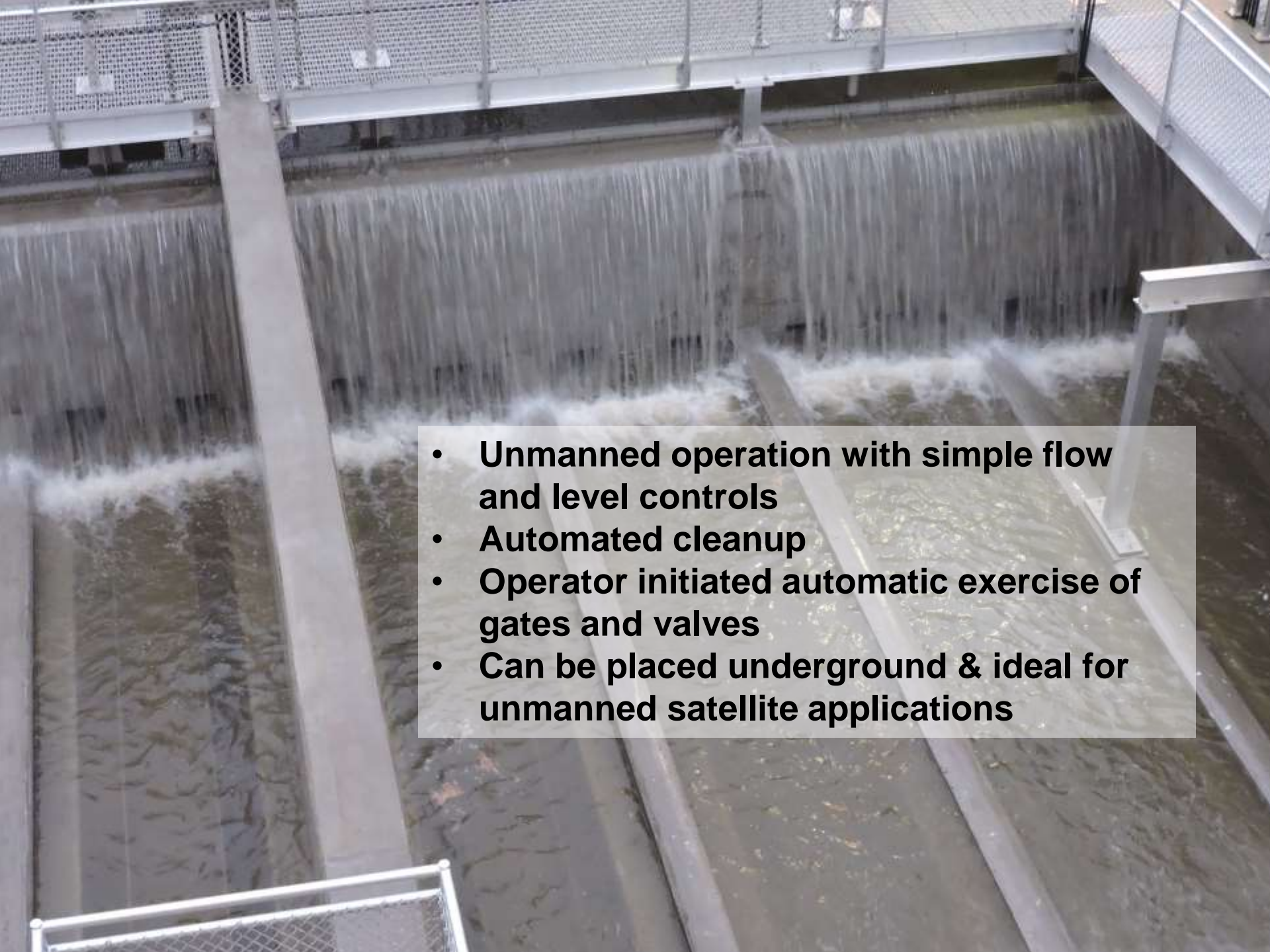


WWETCO FlexFilter
by WesTech



- **High-rate / high-performance / small footprint**
- **No chemicals required to remove solids**
- **Operating power less than \$5 per million gallons treating CSO**
- **Operating power less than \$1 per million gallons when polishing**





- **Unmanned operation with simple flow and level controls**
- **Automated cleanup**
- **Operator initiated automatic exercise of gates and valves**
- **Can be placed underground & ideal for unmanned satellite applications**

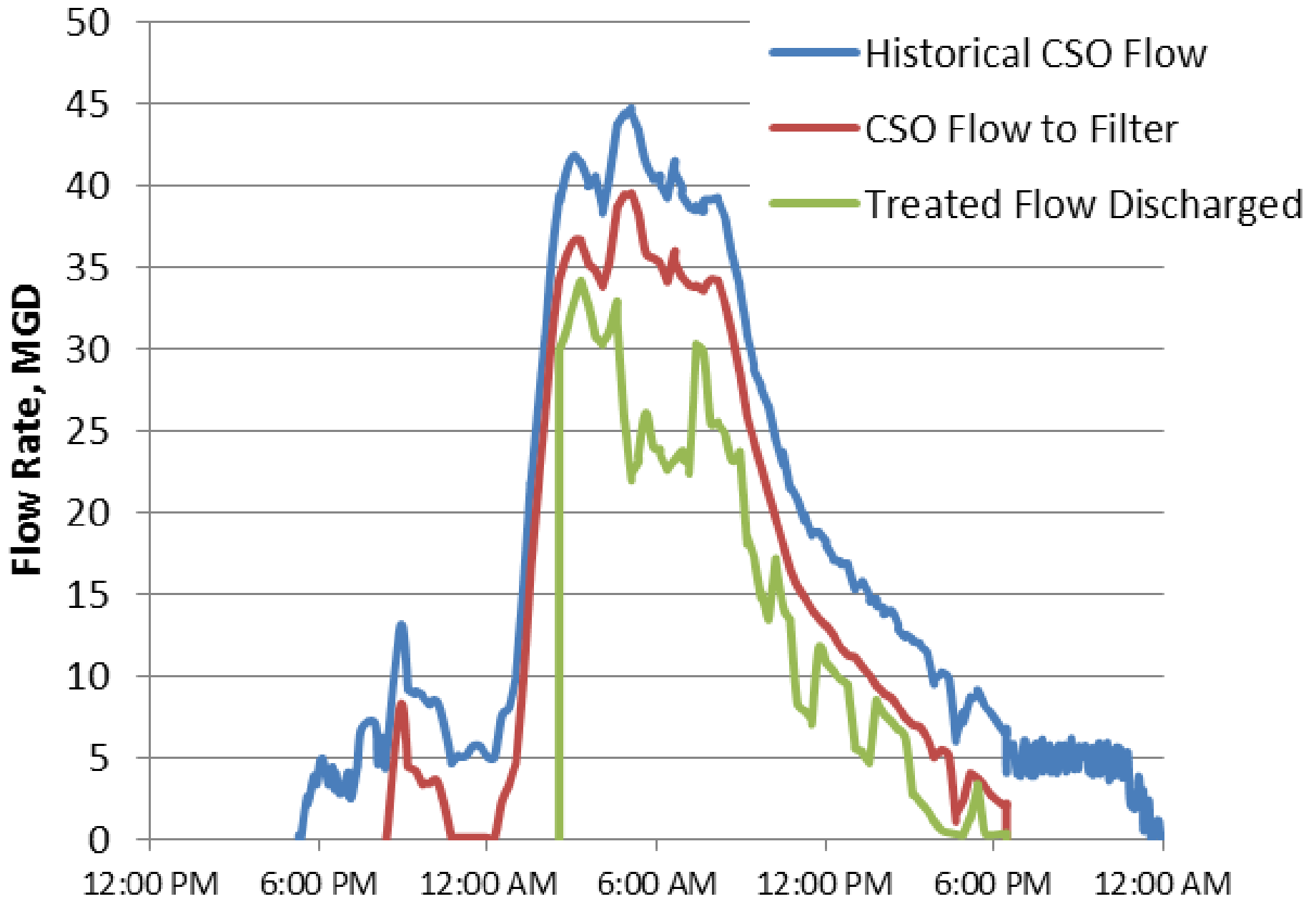
The HRT Facility components contribute to a quantifiable and significant benefit to the control and treatment of the historical distribution of CSOs. Specifically:

- The additional flow through capacity completely treats many of the smaller events and a significant portion of the larger events and this load is treated by the WWTP before discharge to the river.
- The 11-cell filter matrix reduces the particulate pollution producing an effluent that is within “secondary effluent” concentrations thus reducing the load to the river.
- The entire HRT structure (filter, backwash and disinfection chamber volumes) captures a considerable volume from ever discharging, reducing the load to the river.
- The backwash pump return transfers flow (food) to the WWTP biological treatment process during the event thus capturing a significant volume from ever discharging and reducing the load to the river.

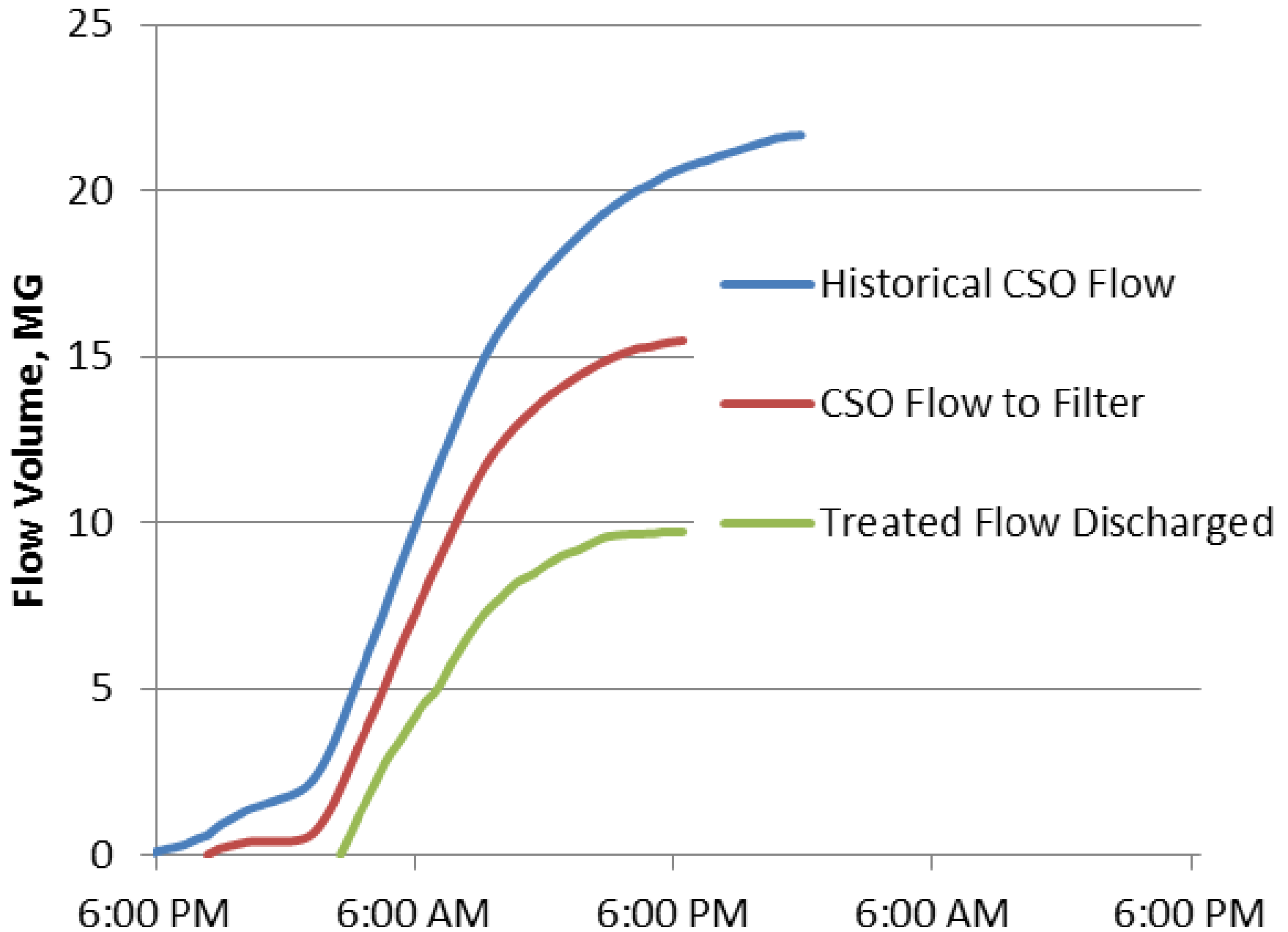
Environmental benefits are measured with respect to the three CSO load calculations (composite concentration x volume) defined as follows:

- 1. Historical CSO Load – Volume of WWTP flow when above 34 MGD x influent composite**
- 2. Load to the Filters – Volume of HRT flow x influent composite**
- 3. Treated Load Discharged – Volume of disinfection effluent flow x effluent composite**

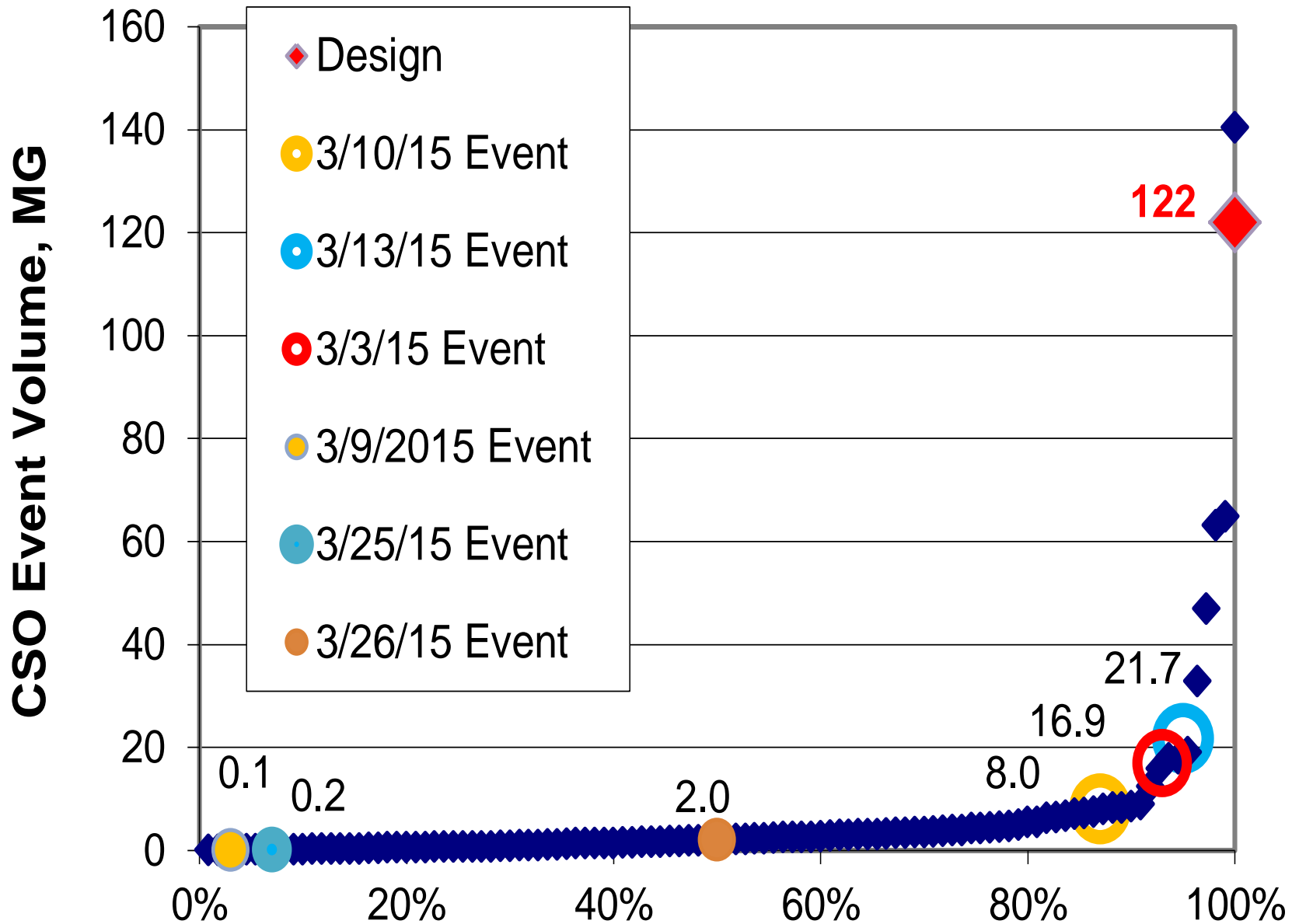
Springfield Event 3/13/15



Springfield Event 3/13/15

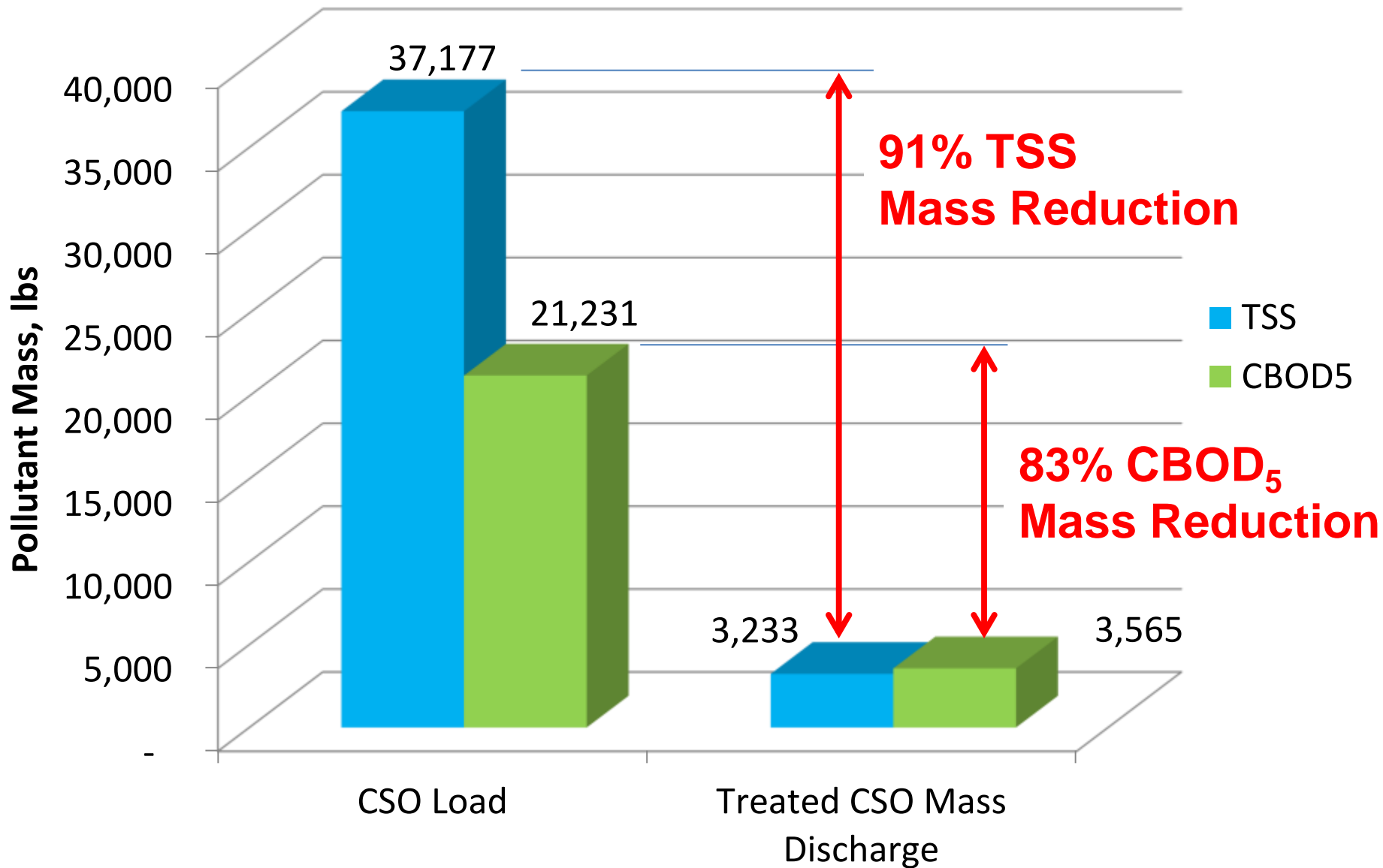


Frequency of CSO Event Volume



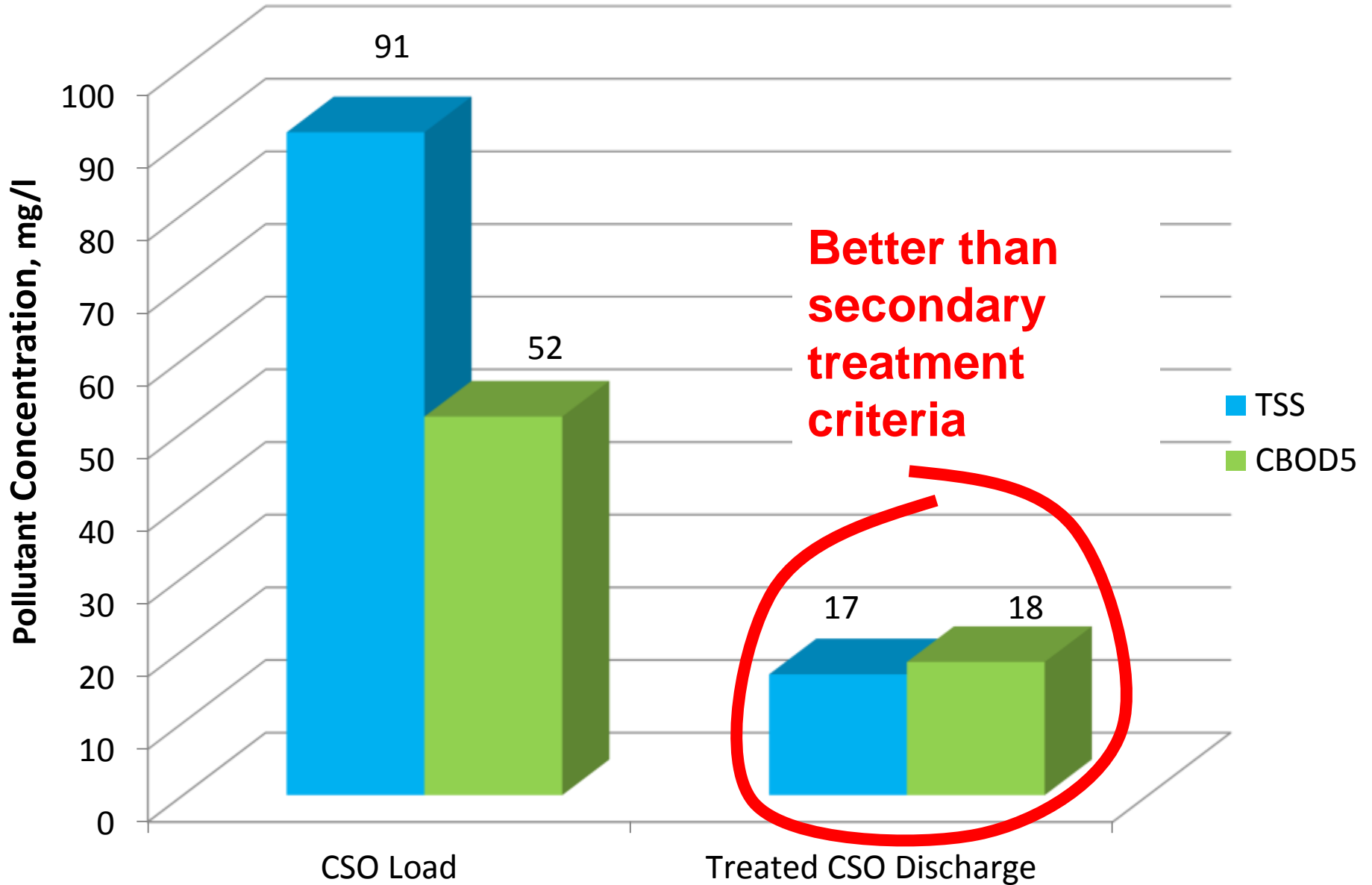
Springfield OH CSO HRT Results for March 2015

Pollutant Mass Removals



Springfield OH HRT Results for March 2015

Pollutant Concentration Reductions

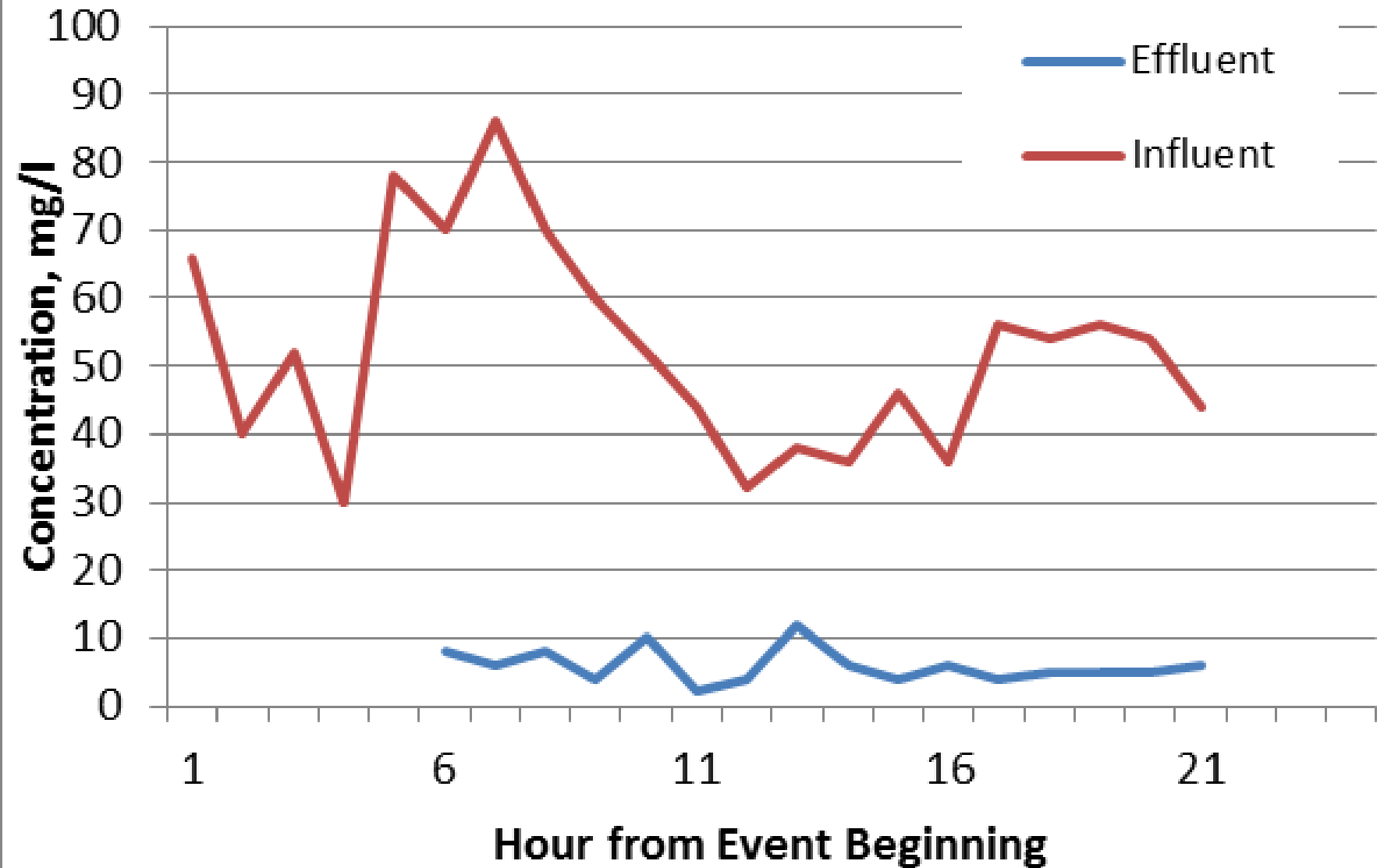


The total pollutant reduction for the implemented system for March 2015 can be summarized as follows:

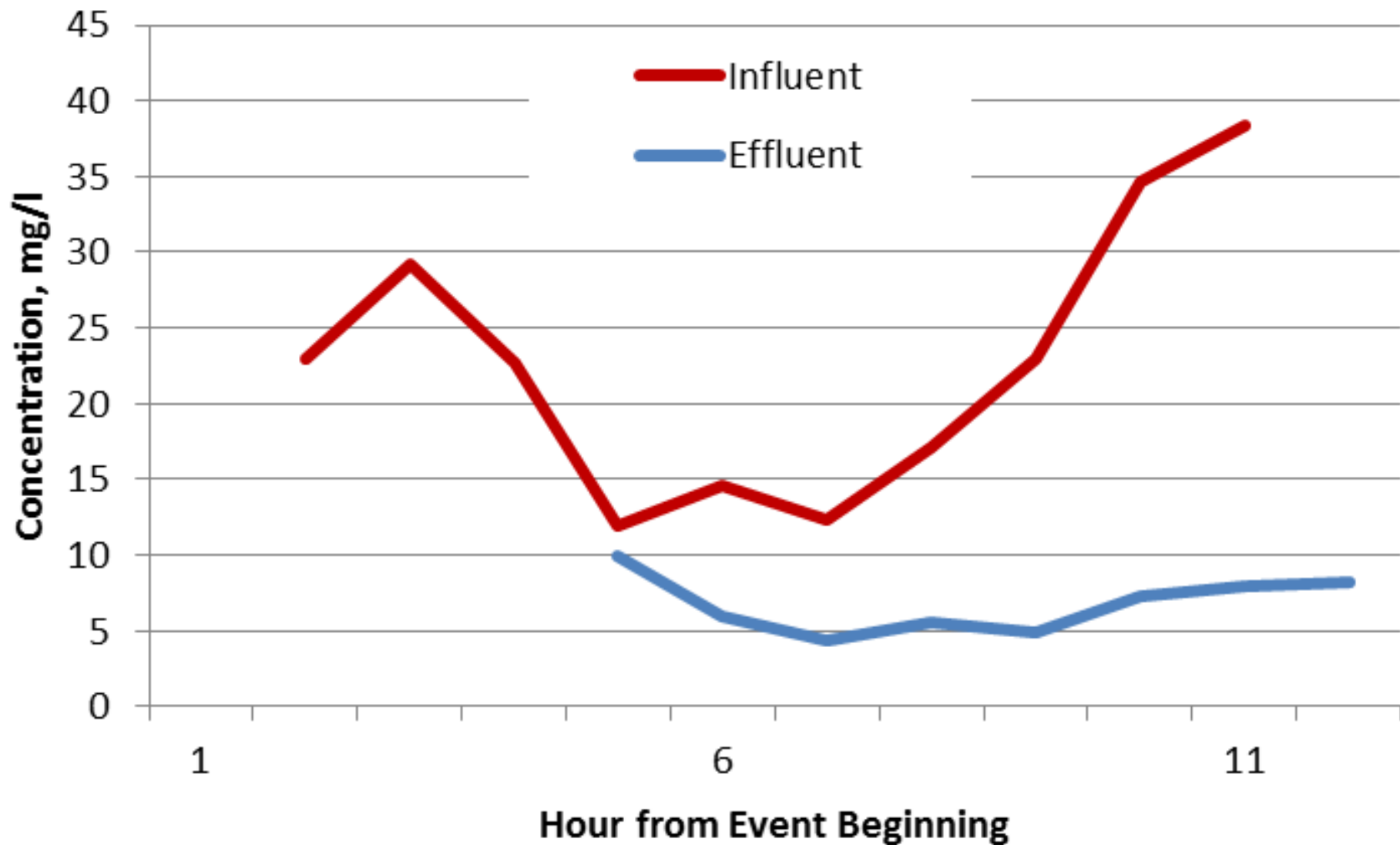
- **91% TSS load reduction**
- **83% CBOD load reduction**
- **Treated Discharge TSS = 17 mg/l average
(6, 14 & 26 mg/l)**
- **Treated Discharge CBOD = 18 mg/l average
(26, 30 & 7 mg/l)**

Springfield HRT Event 3/13/15

TSS - 89% Reduction in Conc. 95% in Mass



Springfield HRT Event 3/13/15
CBOD₅ - 62% Reduction in Conc. 87% in Mass



March 13 Event Flow and Filter Levels

Selected Sequence



Cell #7
4.1 hr 1st

Cell #8
4.1 hr 1st

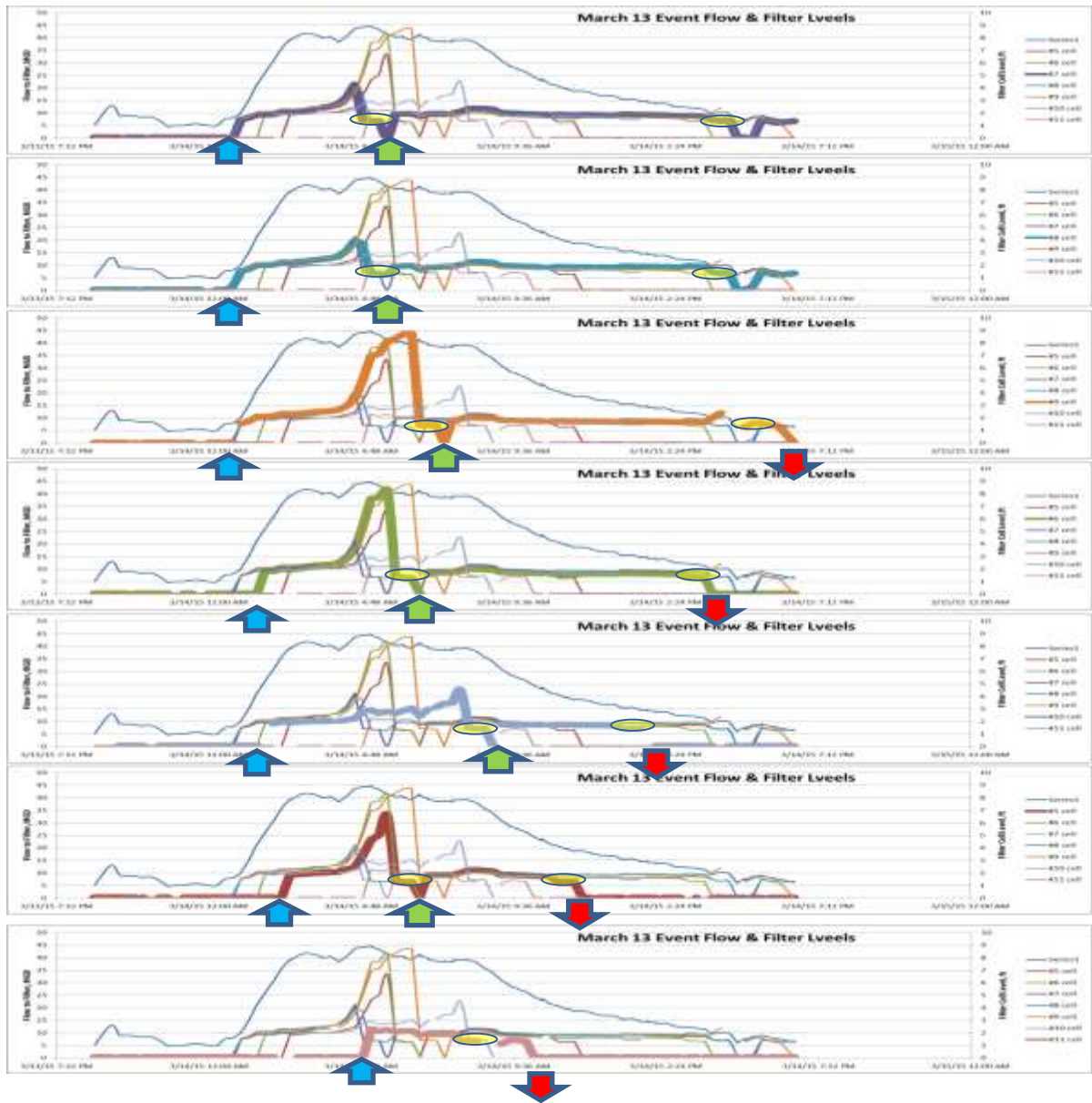
Cell #9
5.4 hr 1st

Cell #6
4 hr 1st

Cell #10
5.4 hr 1st

Cell #5
3.3 hr 1st

Cell #11
2.8 hr 1st



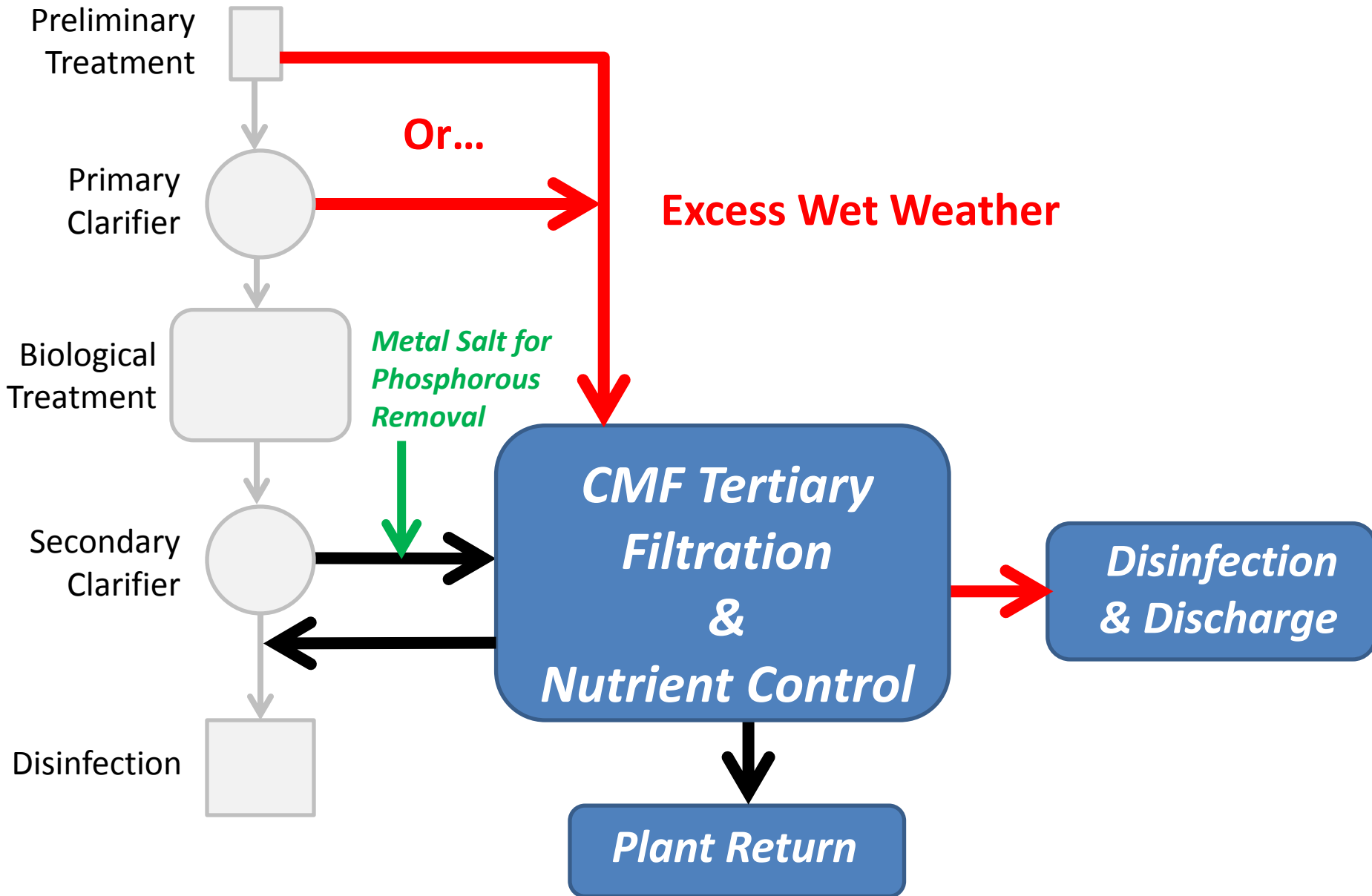
1st Start

2nd Start

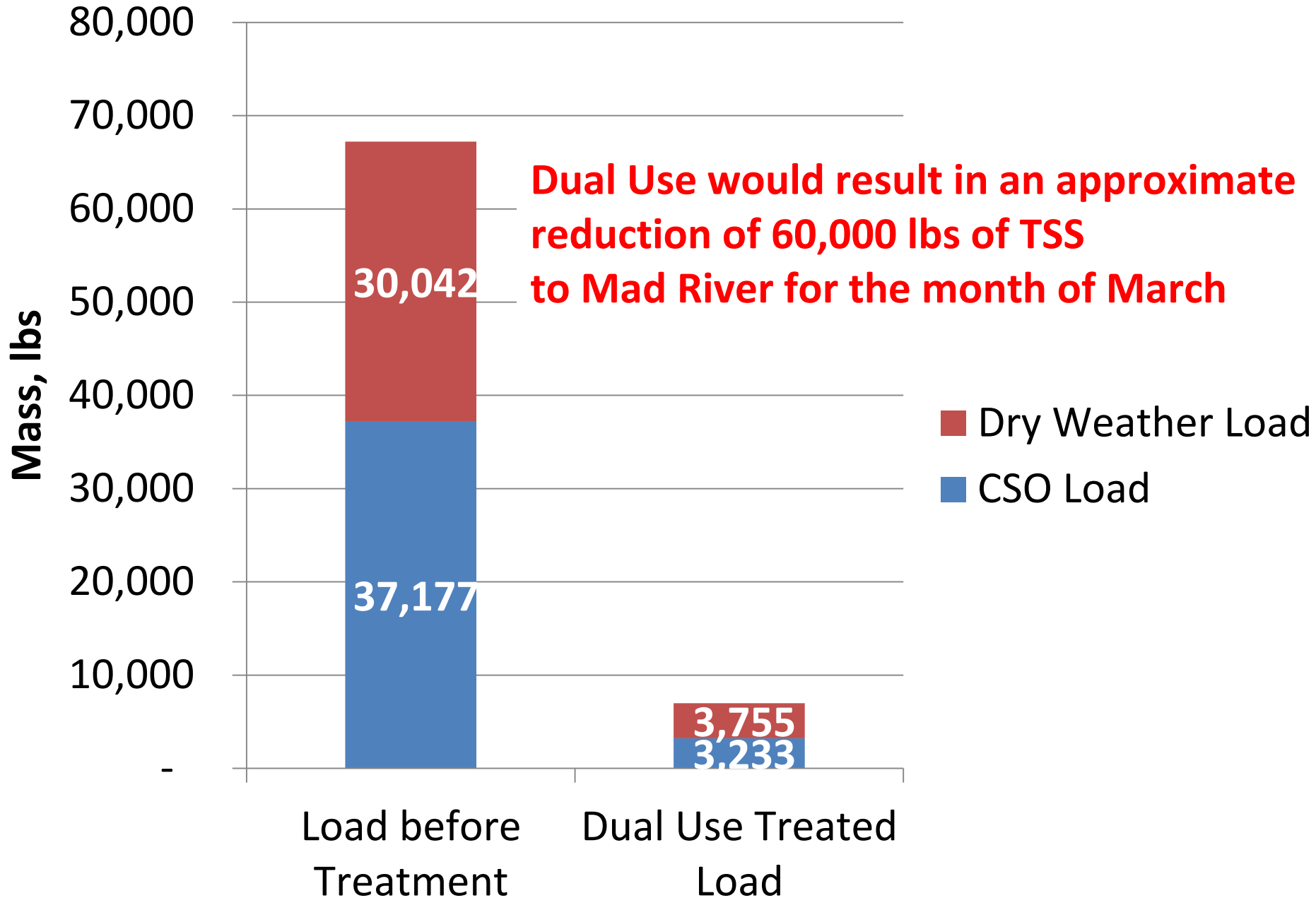
Stop

Backwash

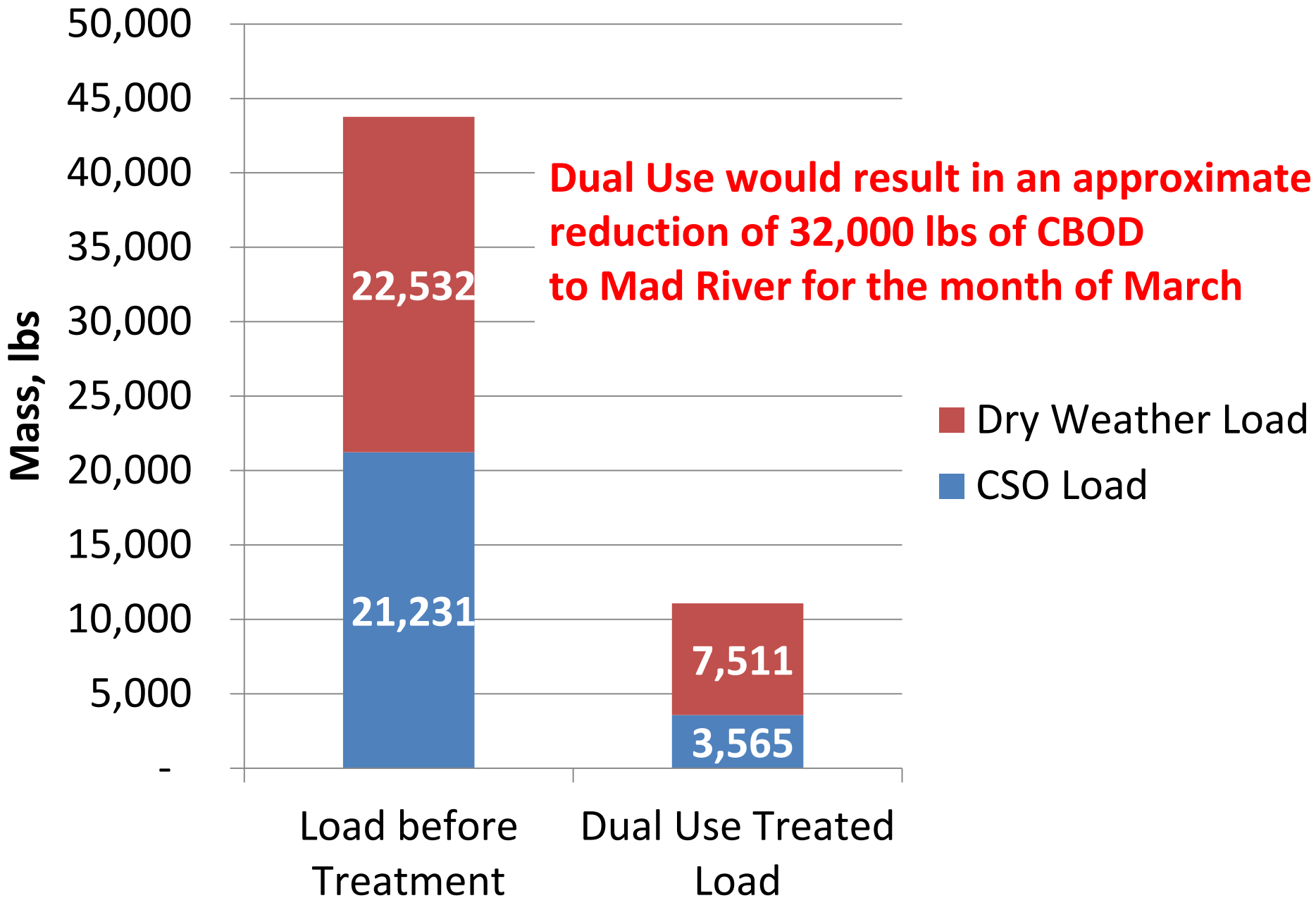
Dual Use Application



Dual-Use TSS Removal Projection March 2015



Dual Use CBOD Removal Projection March 2015



Performance Testing by Engineering Community

- High-Rate, High-Performance with secondary treatment level results.
- Dual Function Technology for Wet Weather Treatment and Dry Weather Polishing resulting in significantly greater improvements to receiving water quality.
- Ideal for unmanned satellite treatment.
- Amenable to UV and Chemical disinfection.
- Low O&M requirements including labor, power and replacement parts.
- No chemicals required to remove solids.
- Minimal additional solids to process.
- Prevents starving of biological processes.

