



Water Treatment Optimization for Cyanotoxins

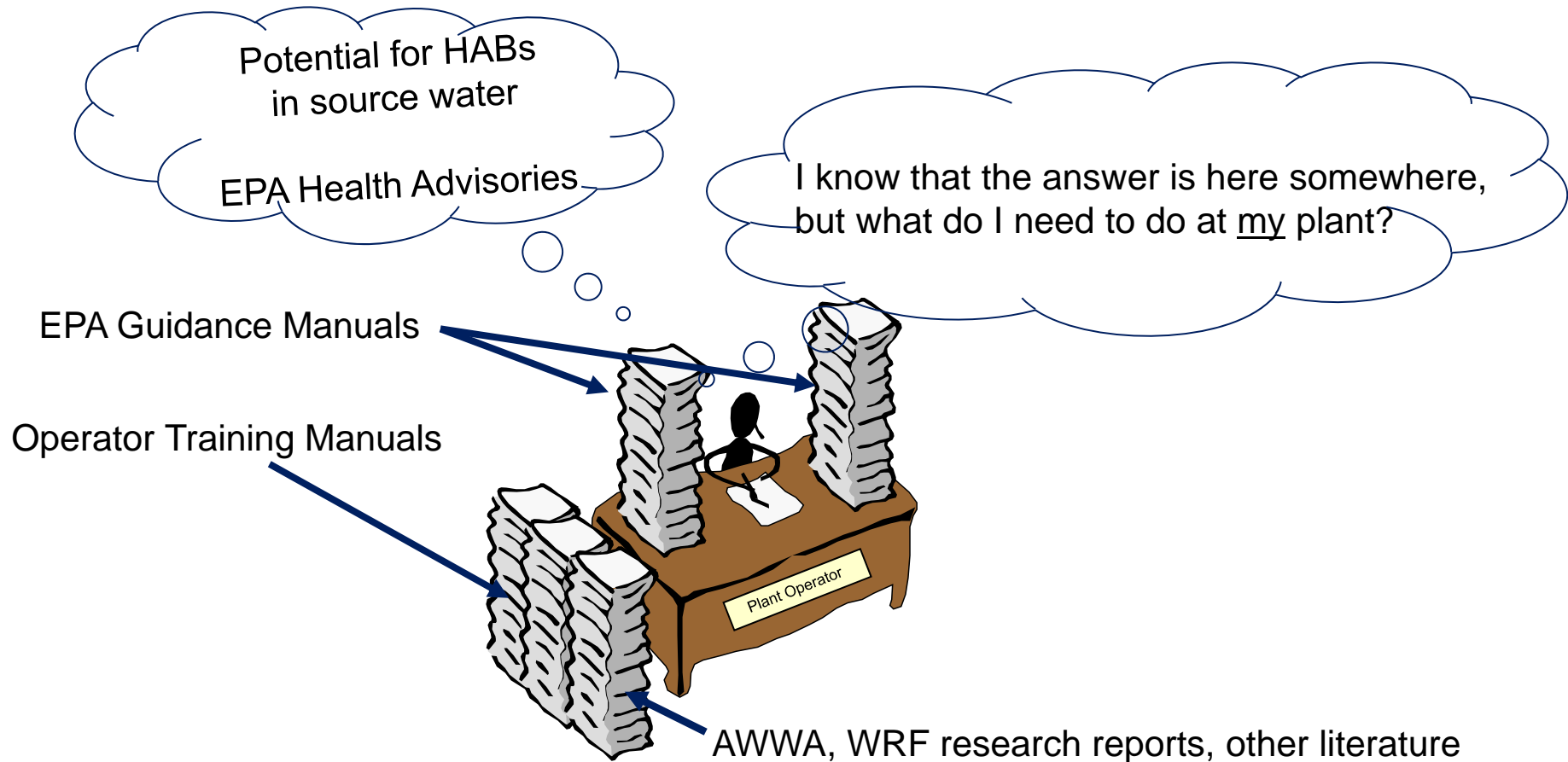
*A Comprehensive Performance Evaluation
Approach*

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The Operator's Dilemma:





Area-Wide Optimization Program (AWOP) solution:

- Develop approaches to assess why a treatment plant doesn't perform as desired.
- Develop knowledge/skills to help operators make changes at their treatment plants and achieve desired performance levels.
- Measurable improvements at individual plants
- Use existing facilities and enhanced process control.



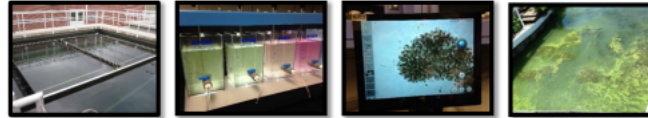
HAB CPE Development Pilot Project

- Partnering with Ohio EPA
- Series of 4 pilot HAB CPEs at Ohio WTPs
- Develop protocol for conducting a HAB CPE by modifying the existing microbial CPE framework
- Transfer capability to conduct CPEs to Ohio EPA staff, and other states (long-term)
- Ohio EPA HAB water treatment experience at plant level



Water Treatment Optimization for Cyanotoxins

Version 1.0



<https://www.epa.gov/ground-water-and-drinking-water/cyanotoxins-drinking-water>

Office of Water (MS-140)

EPA 810-B-16-007

October 2016



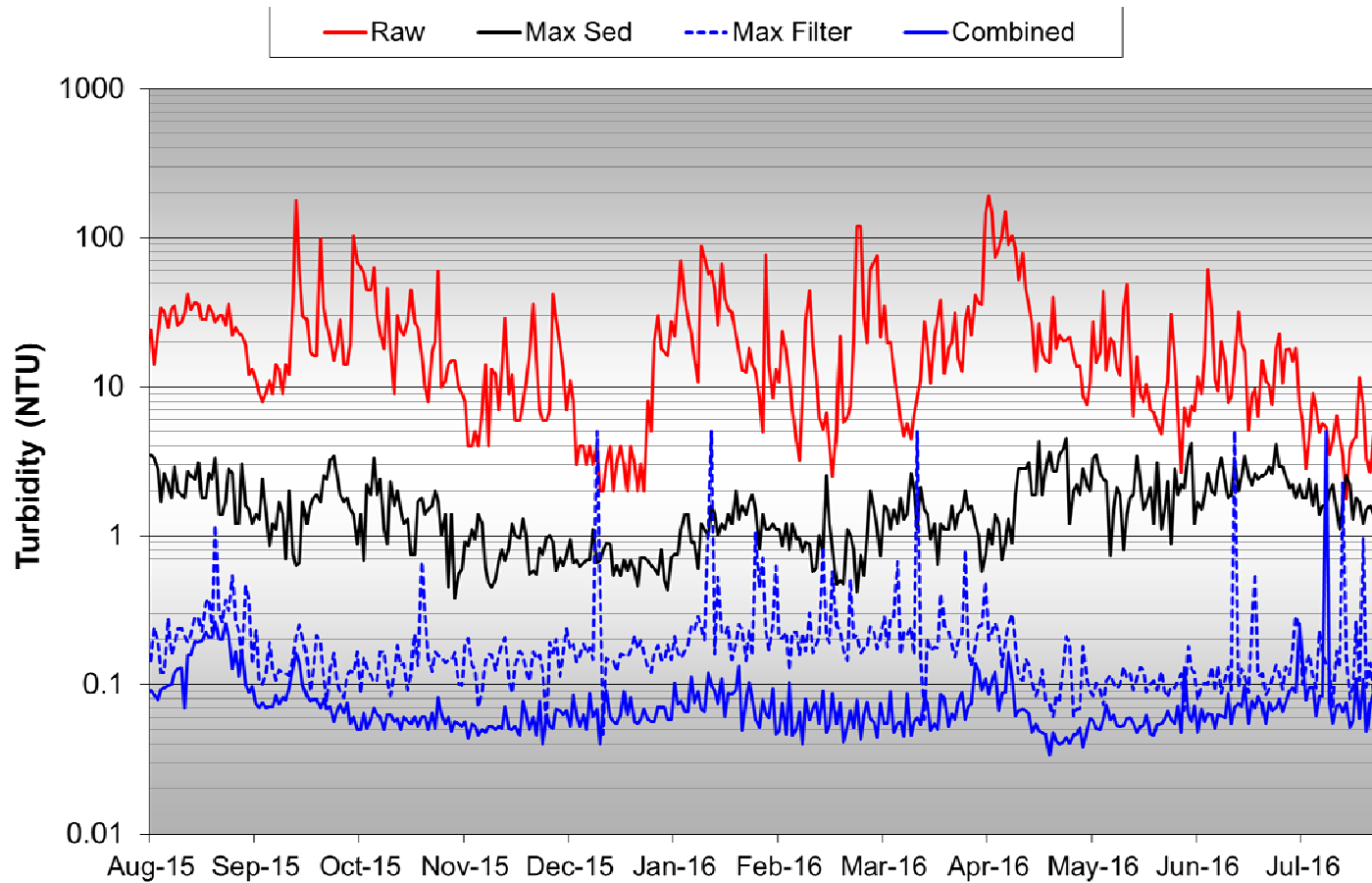
Case Study #1: Western Lake Erie System

- Conventional treatment (coagulation, flocculation, sedimentation)
- PAC
- NaMnO_4 pre-oxidation
- Sodium hypochlorite disinfection



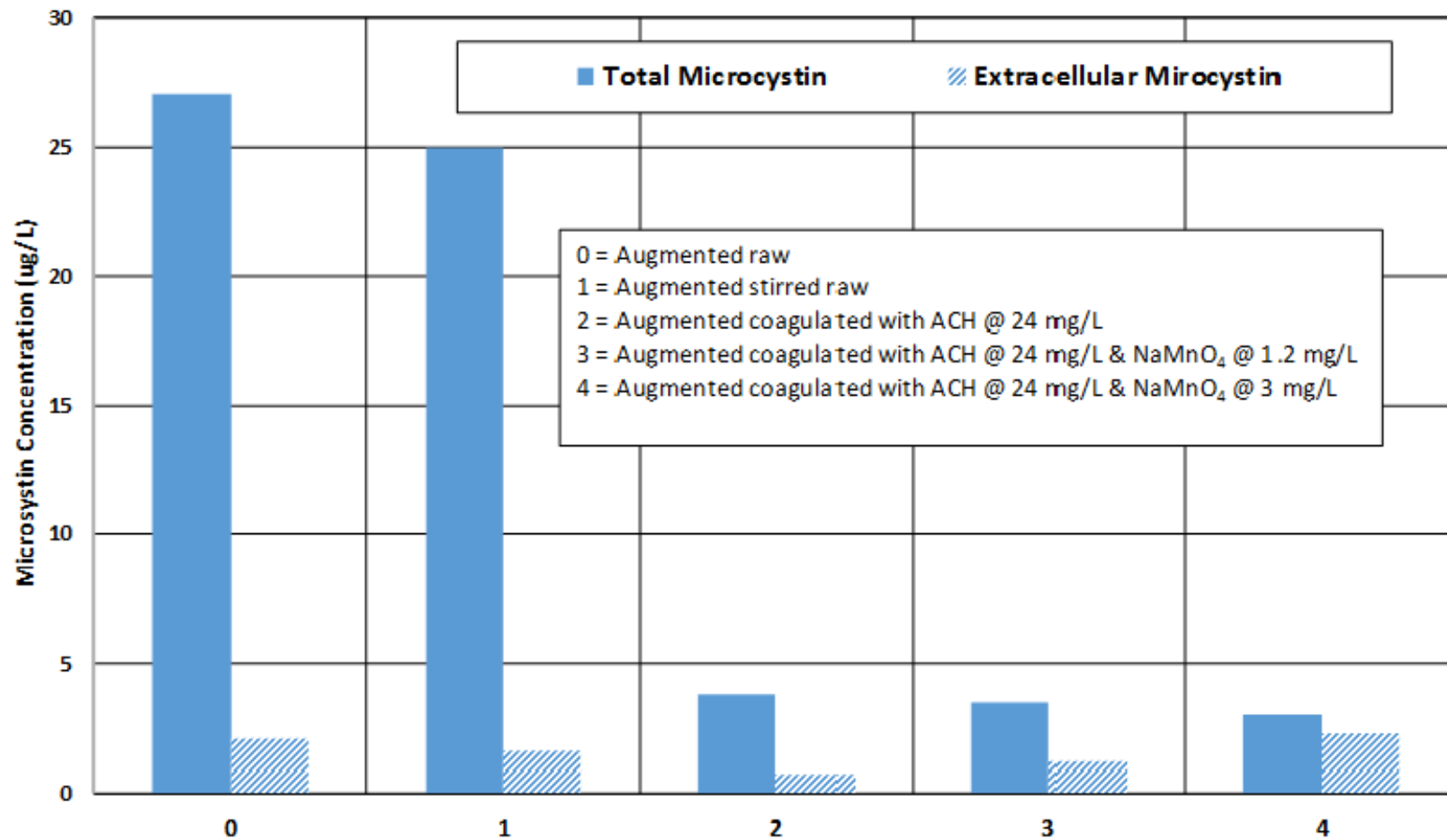


Turbidity Profile



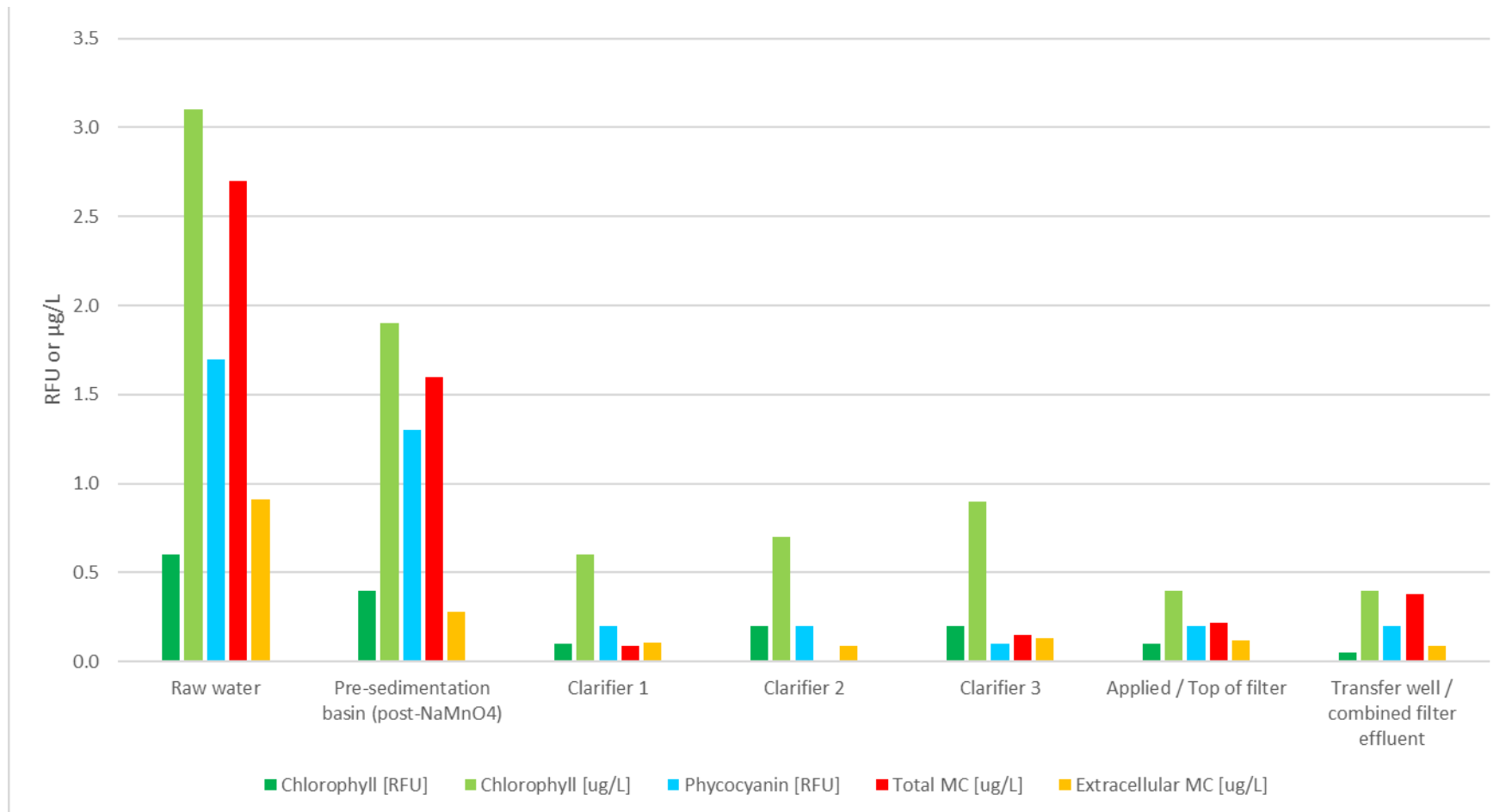


Microcystin Data
Jar test conducted on August 3, 2016



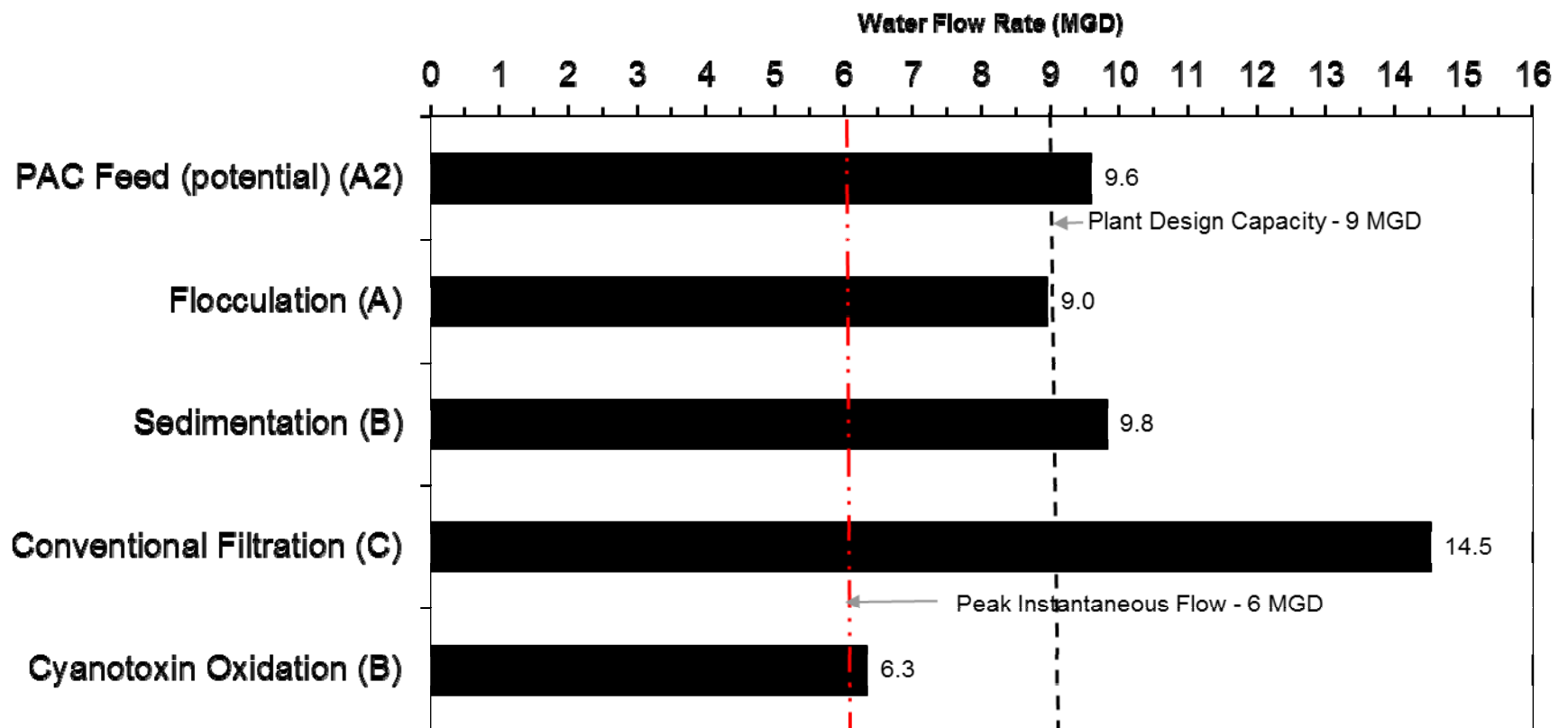


Plant profile sampling





Major Unit Process Evaluation





Case Study #1 Lessons-Learned:

- Value of plant profile in understanding capability of each unit process
- Difficulty in estimating PAC capacity – isotherms underreport due to competing organics in actual raw water
- Performance-limiting factors identified were not necessarily tied to HABs and have a more continuous impact on plant operations



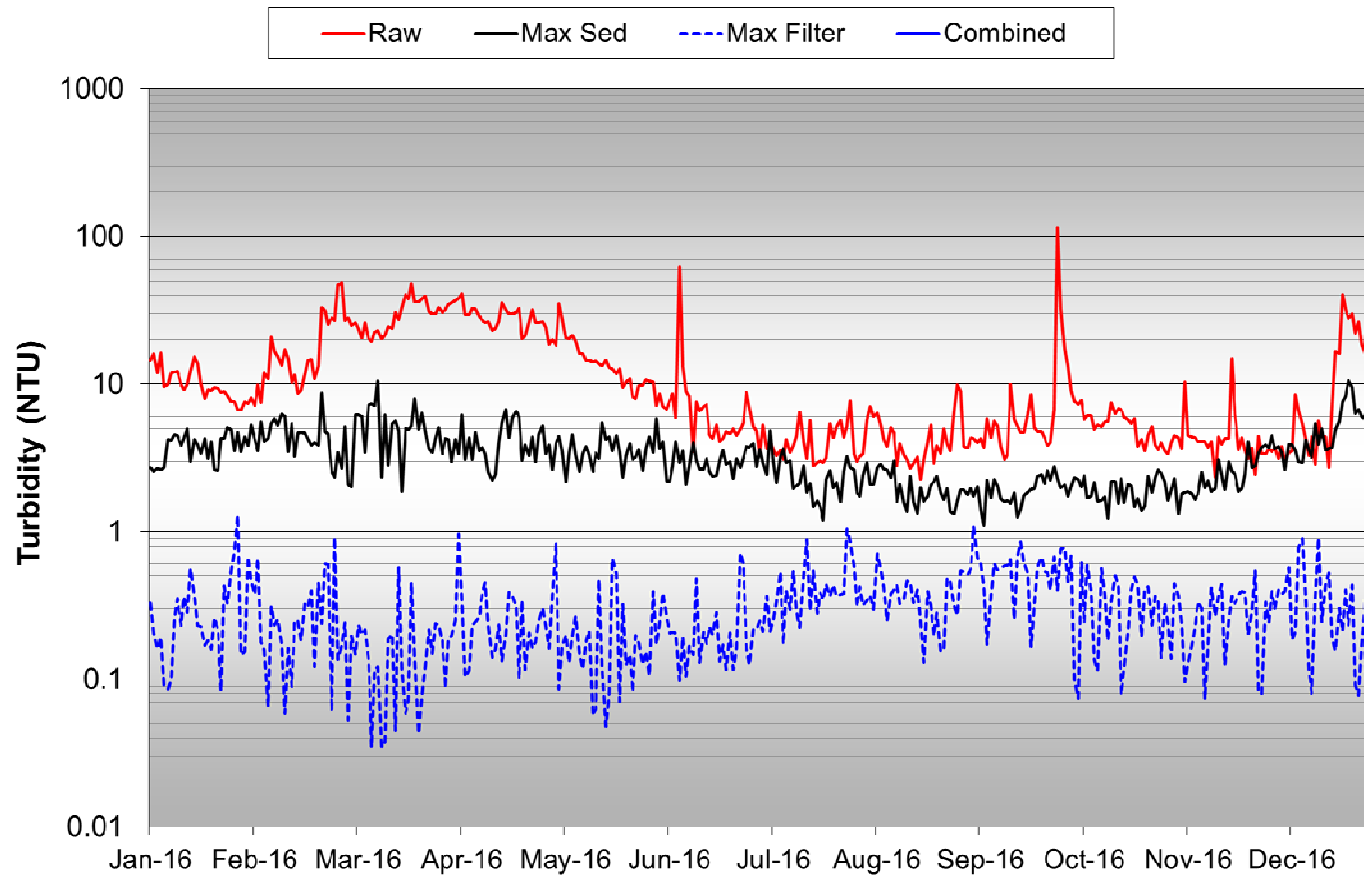


Case Study #2: Inland Lake System

- In-stream reservoir
- Conventional treatment with softening (lime and soda ash)
- PAC addition at raw water intake
- Chlorine gas disinfection

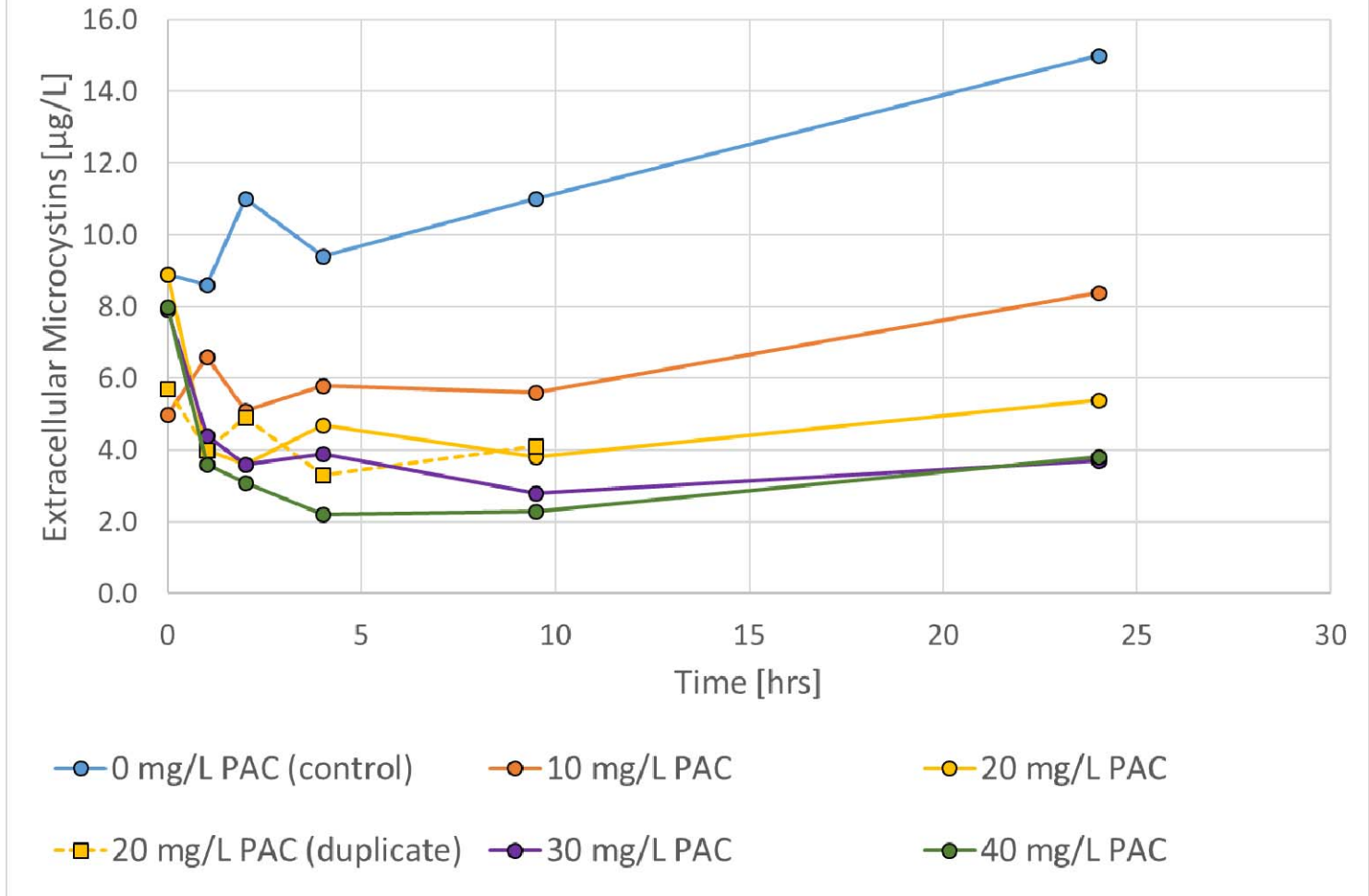


Turbidity Profile





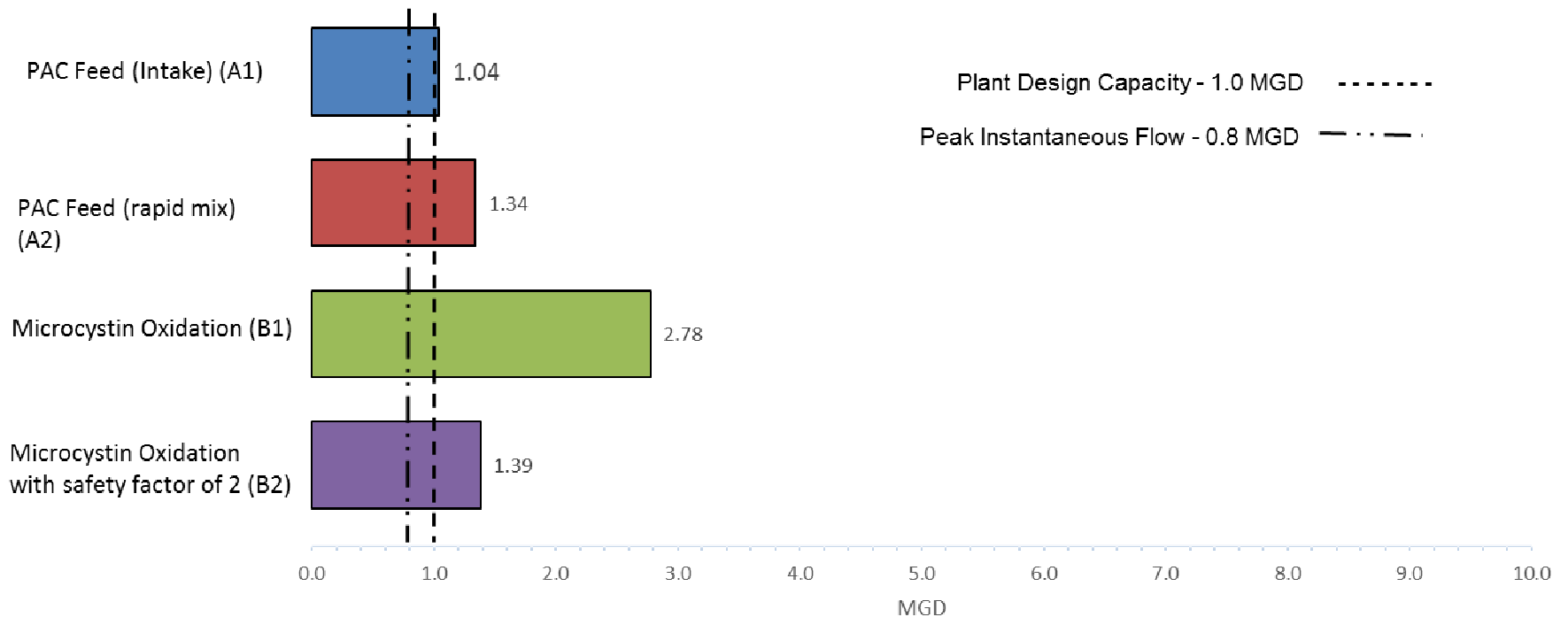
PAC Jar Test





Major unit process evaluation

Microcystins Adsorption & Destruction





Case Study #2 Lessons-Learned

- Performance-limiting factors identified were not necessarily tied to HABs and have a more continuous impact on plant operations
- Difficulty in estimating PAC capacity
 - Jar testing protocol to help with MUP evaluation
 - Further studies at EPA research lab





Thank You!

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