Microbial and Disinfection Byproducts
Rule Revisions Working Group

Meeting 9: June 27-29, 2023

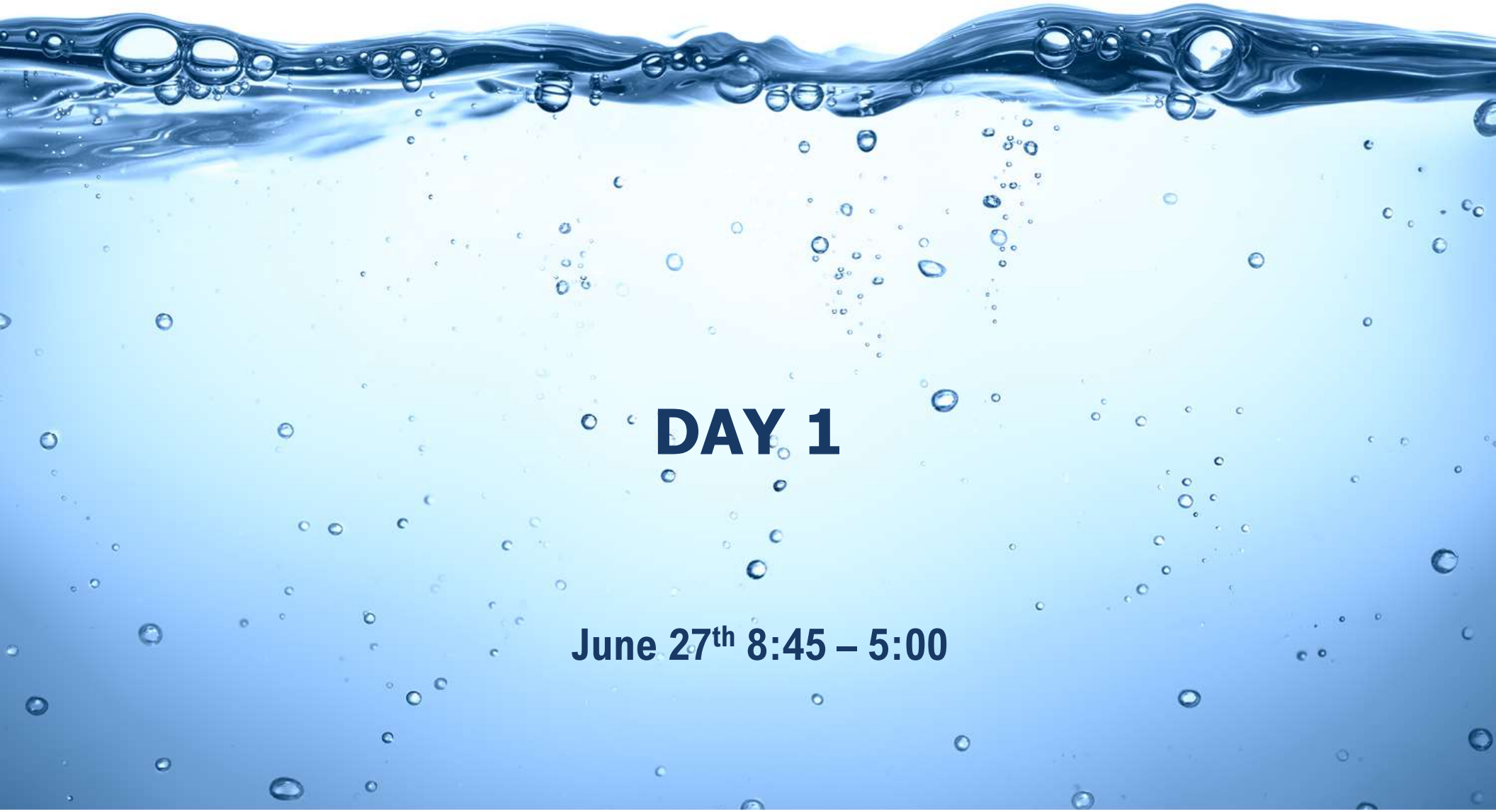
EPA

OFFICE OF GROUND WATER
AND DRINKING WATER

Internet Connection

- **Network: GuestEPA –login according to your directions and password**

- *Troubleshoot:* Guest Wi-Fi (Configure Computer) - Brief
  - Go to your network settings (*Network and Sharing Center)*
  - *Setup new connection or network*
  - *Manually connect to a wireless network*
  - Enter:
    - Name: *GuestEPA*
    - Security type: *WPA2-Enterprise*
    - Encryption type: *AES*
    - Check: *Start connection automatically* & *connect even if network is not broadcasting*
  - Navigate to *GuestEPA Wireless Network Properties*, click *Security*, ensure security & encryption type are correct
    - Authentication method: Microsoft Protected EAP (PEAP)
    - Check: Remember my credentials for this connection each time I'm logged in
  - In *Settings* next to the authentication method, uncheck *Validate server certificate*, click *OK* to accept changes
  - Under *Select Authentication Method*, next to *Secured password (EAP-MSCHAP v2)*, click *Configure*, uncheck *Automatically use my Windows logon name and password (and domain if any)* option.
  - Save & close
  - Open browser to logon



DAY 1

June 27th 8:45 – 5:00

MEETING OPENING

Elizabeth Corr, DFO, U.S.EPA OGWDW

WELCOME

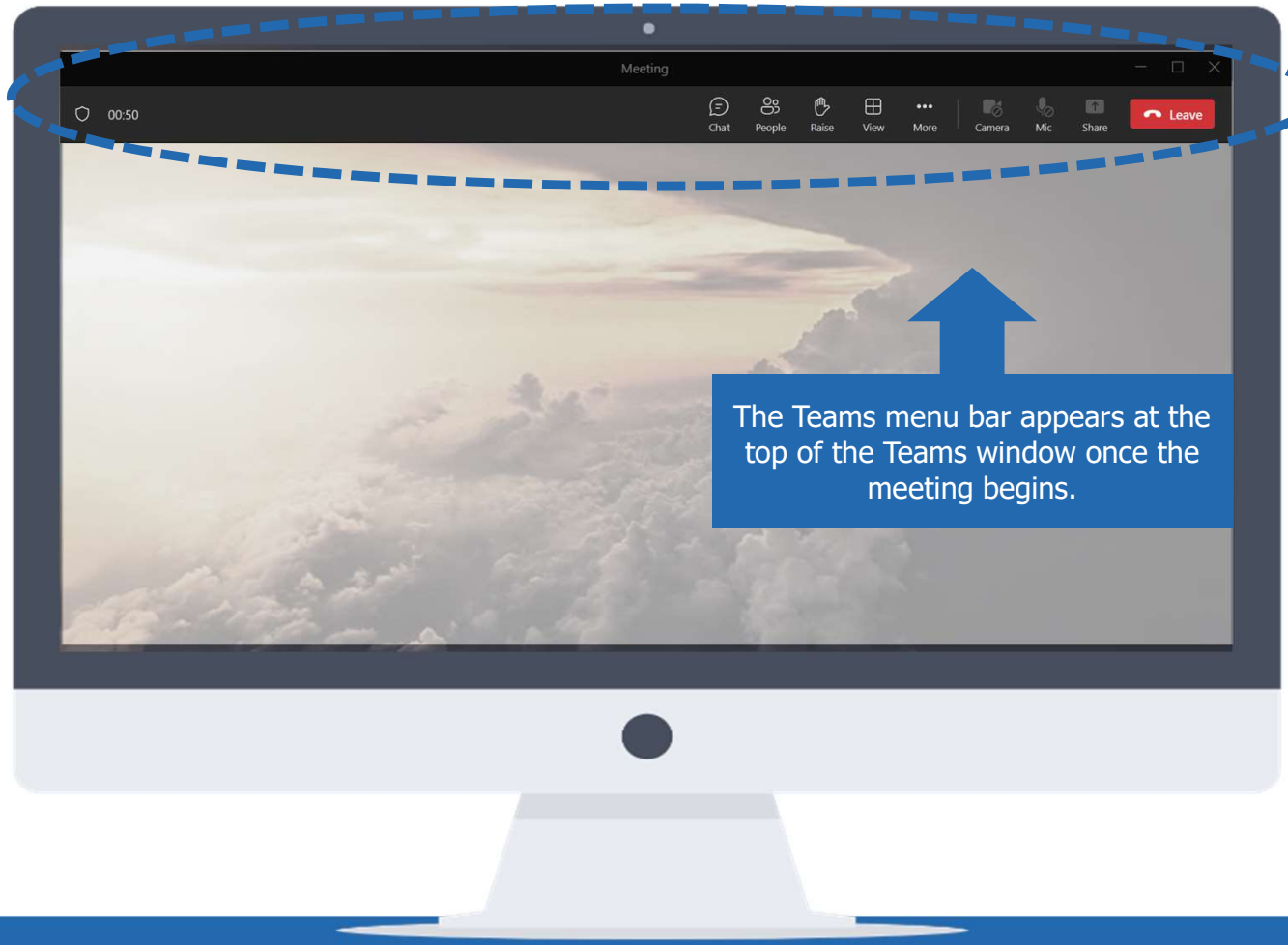
Jennifer McLain, Director
EPA Office of Ground Water and Drinking Water

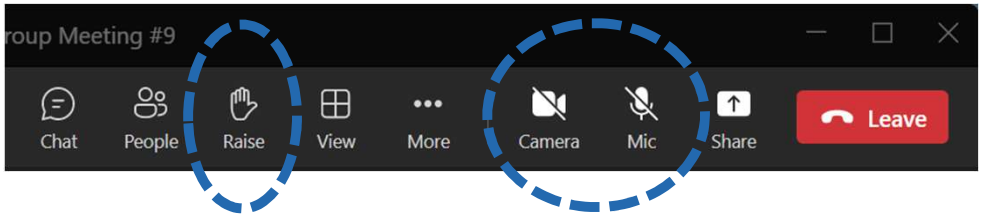
OPENING REMARKS

Lisa Daniels & Andy Kricun, WG Co-Chairs

Today's Virtual Meeting: Microsoft Teams Controls

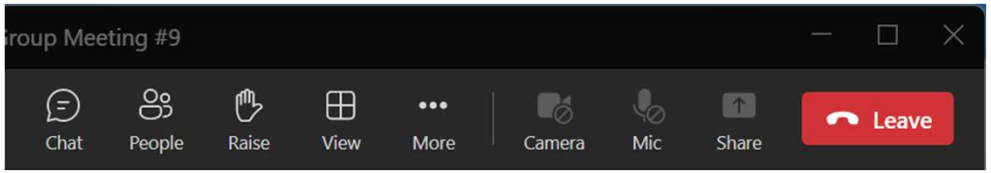
This meeting is **not** being recorded





Remote Working Group Members/Panelists/Technical Analysts

- You can raise your hand and turn your camera and microphone on and off with the respective icons. If you are having audio difficulties send an email to **taner.durusu@cadmusgroup.com**



Public Attendees

- You are in listen only mode and will not be able to unmute. If you are having audio difficulties send an email to **taner.durusu@cadmusgroup.com**
- If you are having issues joining the from Eventbrite, send an email to **leeland.gotlieb@cadmusgroup.com**

Chat is **not enabled** for this meeting

- Any comments you may have can be sent to **MDBPRevisions@epa.gov** or to Public Docket: www.regulations.gov / Docket ID Number: EPA-HQ-OW-2020-0486

EPA AND FACILITATION TEAM

Eric Burneson
EPA OGWDW, Standards and Risk Management Division Director

Crystal Rodgers-Jenkins
EPA OGWDW, Associate Director, Standards and Risk Management Division

Ryan Albert
EPA OGWDW, Chief Standards and Risk Management Division

Ken Rotert
EPA OGWDW

Rich Weisman
EPA OGWDW

Rob Greenwood
Ross Strategic

Sarah Faust
Ross Strategic

Dana Stefan
Ross Strategic

Leeland Gotlieb
Cadmus

Erin Mateo
Cadmus

Taner Durusu
Cadmus

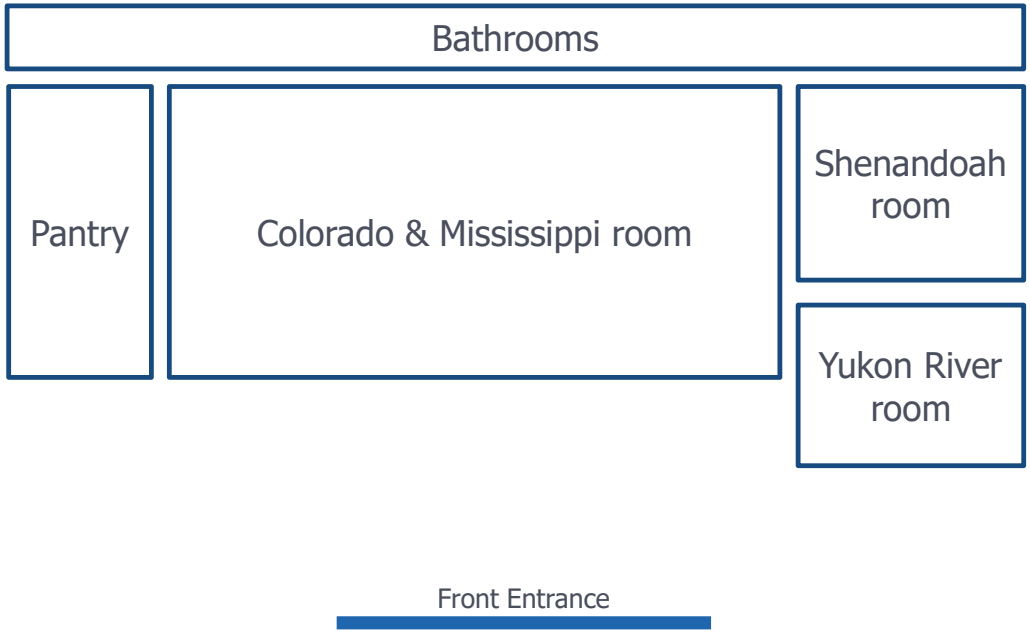
Christine DeRieux
Cadmus

Today's Agenda

8:45-11:30	• Segment 1: Agenda Review and Meeting Procedures • Segment 2: Context Setting • Segment 3: Premise Plumbing – Improve Building Water Quality • Segment 4: Distribution System: Disinfectant Residual and Overall Water Quality and Opportunistic Pathogen benefits
	60 Minute Lunch Break (11:30-12:30 pm ET)
12:30-2:10	• Segment 4: Distribution System: Disinfectant Residual and Overall Water Quality and Opportunistic Pathogen benefits (cont.) • Segment 5: Treatment and Distribution System - Regulated and Unregulated DBPs
	20 Minute Break (2:10-2:30 pm ET)
2:30-5:00	• Segment 5: Treatment and Distribution System - Regulated and Unregulated DBPs (cont.) • Segment 6: Distribution System - Finished Water Storage Tanks • Segment 7: Day 2 Look Ahead

William D. Ruckelshaus Conference Center

- Rooms
  - Colorado and Mississippi room (present)
  - Shenandoah room
  - Yukon River room
- Bathrooms
  - Water fill station
- Pantry
  - Microwave, fridge
  - Vending machines
  - Water fill station



Segment 2: Context Setting

June 27,2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Context Setting: Regulatory Background

- MDBP rules identified as candidates for revision under Six-Year Review 3.
- EPA charge to NDWAC – provide advice and recommendations on key issues related to potential revisions to MDBP rules.
- NDWAC formed Working Group that includes individuals with a variety of backgrounds.
- EPA Revisions to rules will consider NDWAC input and follow procedures established for rulemakings including publication of a proposal and opportunity for public comment.
- Proposal informed by Health Risk Assessment and Cost Analysis (HRRCA). The HRRCA includes:
  - a characterization of a water system baseline and estimate of affected entities;
  - identification of a method for estimating costs;
  - identification of a method for estimating quantifiable and nonquantifiable benefits of exposure reduction;
  - discussion of uncertainties;
  - a cost-benefit determination.
- Completion of several additional reviews including statutory and Executive Order reviews (e.g., Unfunded Mandates Reform Act; EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).
- Revisions to the MDBP rules may consider potential changes to all aspects of a national primary drinking water regulation (NPDWR) such as MCLGs, MCLs, and/or Treatment Techniques, and related considerations such as monitoring locations, monitoring schedules, analytical methods, compliance determinations, public notifications, reporting, and recordkeeping requirements.
- EPA can elect to pursue non-regulatory approaches.

Context Setting: EPA Charge to NDWAC

Consensus recommendations are anticipated to cover the following topics:

- Disinfectant residuals and opportunistic pathogen
- Regulated and unregulated DBPs
- Finished water storage facilities
- Distribution system water quality management
- Source water approach, including DBP precursor removal
- Mischaracterized ground water under the direct influence of surface water (GWUDI) systems
- Sanitary Surveys
- Water Safety Plans
- Consecutive and small systems

Context Setting: NDWAC Direction to WG

Develop recommendations for NDWAC consideration addressing the following:

- Advancing public health protection while balancing the risks of microbial control with managing disinfection byproduct formation.
- Addressing public health concerns caused by opportunistic pathogens (e.g., *Legionella*), disinfection byproducts (e.g., unregulated haloacetic acids), and possibly other emerging contaminants.
- Addressing implementation challenges to reduce the burden of existing MDBP regulations while maintaining or enhancing public health protection.
- Ensuring efficient simultaneous compliance with other drinking water regulations when implementing any proposed revisions to the MDBP rules.
- Additional potential non-regulatory approaches that may improve public health protection from the contaminants under consideration.
- Opportunities to advance environmental justice in regulatory revisions to equitably protect consumers' health, particularly disadvantaged and historically underserved consumers.

Context Setting: WG Product

- Provide group recommendations to the NDWAC where consensus is reached and alternatives where consensus is not reached in the time available.
- Alternatives will be captured in the final Working Group product.
- Working Group members also will have an opportunity to submit up to three pages of individual, attributed comments for inclusion in the Working Group product without modification.

Context Setting: In-Person Deliberations

- Desired meeting outcome – sense of emergent recommendations
- Straw polling – level of comfort (high, medium, low) and why
- Small group work – recommendations work between M9 and M10
- Leverage points in complex systems
- WG recommendations – package of elements that work together
- Technical Analysts – direct discussion participants
- Research and Analysis Needs – review between M9 and M10
- Additional intervention ideas – review between M9 and M10
  - Source Water: GWUDI determinations
  - Treatment: Filtration improvements for turbidity control
  - Distribution System: GW systems to provide DS disinfection; revisit OEL; DBP monitoring burden reduction
- Track the following Tuesday and Wednesday:
  - Opportunities to address Environmental Justice (including electronic reporting and public engagement)
  - Ensuring efficient simultaneous compliance
  - Addressing implementation challenges to reduce burden

Segment 3: Premise Plumbing – Improve Building Water Quality

June 27, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 3 Discussion Questions

- What are the strengths and vulnerabilities of the identified interventions and implementation actions related to expanding the scope of building requirements and standing up a national building water quality program initiative?
- How might the vulnerabilities be overcome from a federal, state, and/or local government perspective?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 4: Distribution System: Disinfectant Residual and Overall Water Quality and Opportunistic Pathogen benefits

June 27, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 4 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) a minimum numeric residual in the DS, 2) revised sampling and monitoring requirements, and 3) revised compliance determination level?
- In support of improved disinfectant residual and overall distribution water quality, what are the strengths and vulnerabilities of 1) establishing a “find and fix” framework for distribution water quality, 2) incorporating distribution system requirements into proposed MDBP rules, and 3) preparing a distribution system toolbox to improve overall water quality?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?


60-MINUTE LUNCH BREAK
11:30 – 12:30

Segment 4: Distribution System: Disinfectant Residual and Overall Water Quality and Opportunistic Pathogen benefits (cont.)

June 27, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 4 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) a minimum numeric residual in the DS, 2) revised sampling and monitoring requirements, and 3) revised compliance determination level?
- In support of improved disinfectant residual and overall distribution water quality, what are the strengths and vulnerabilities of 1) establishing a “find and fix” framework for distribution water quality, 2) incorporating distribution system requirements into proposed MDBP rules, and 3) preparing a distribution system toolbox to improve overall water quality?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 5: Treatment and Distribution System - Regulated and Unregulated DBPs

Scott Summers, Technical Analyst

June 27, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Control of TOC and the Impact on Distribution System Water Quality

R. Scott Summers
Professor Emeritus University of Colorado – Boulder

NDWAC –TWG Presentation – 6-27-23

Objectives

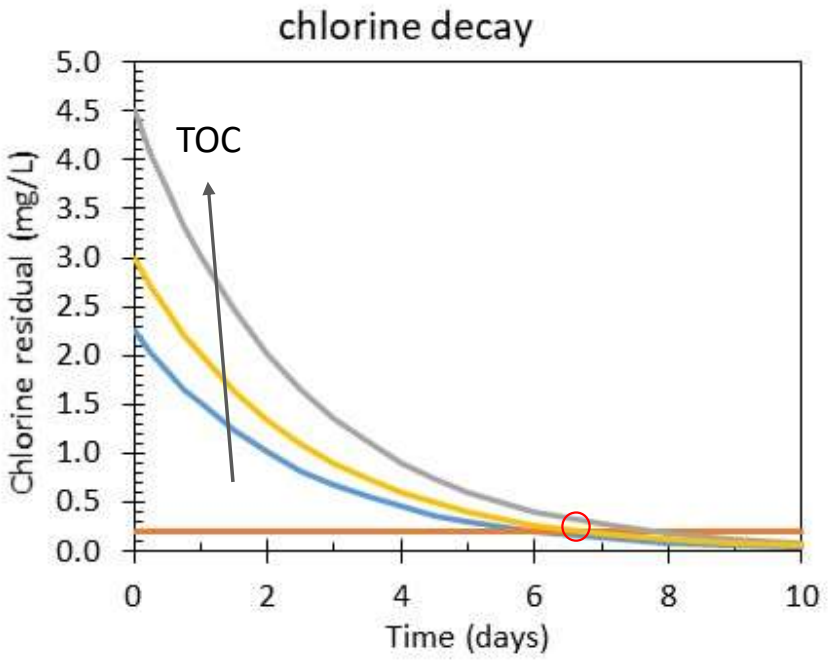
- Address working group questions and requests on the impact of TOC on distribution system water quality
- Address treatment approaches for lowering TOC concentrations

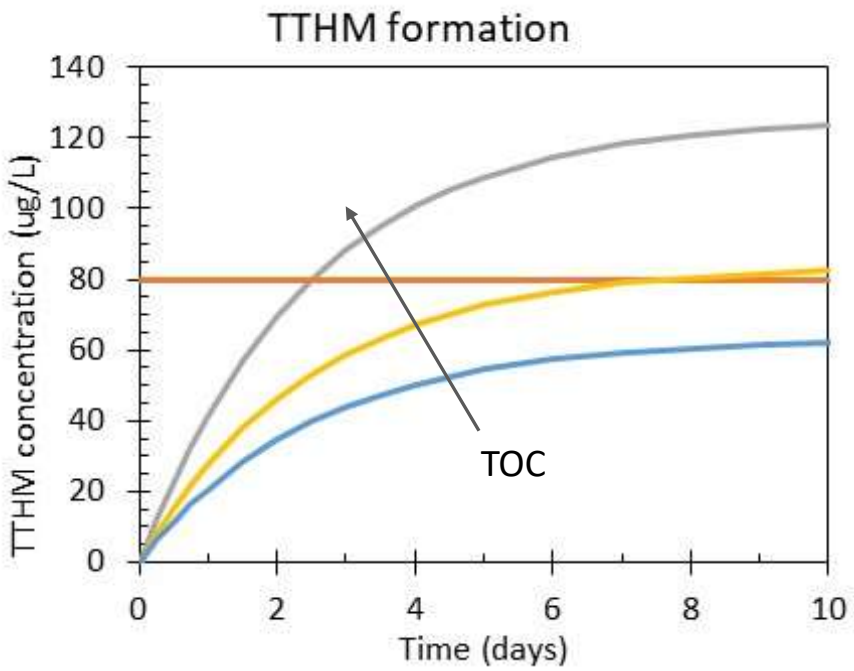
Dissolved Organic Matter (DOM)

- Large impact on water treatment:
  - Disinfectant /oxidant demand
  - Disinfectant by-product (DBP) levels
  - Disinfectant residual stability
  - Microbial regrowth
  - Corrosion
  - Treatment process efficiency
    - disinfection, coagulation, GAC adsorption, membranes

- Treatment effectiveness of DOM can be characterized by:
  - coagulable fraction
  - biodegradable fraction
  - adsorbable fraction
  - negative charge
  - high molecular weight

Meeting a minimum chlorine residual without exceeding the disinfection byproduct MCL is strongly impact by TOC





TOC impact on chlorine demand and DBP formation

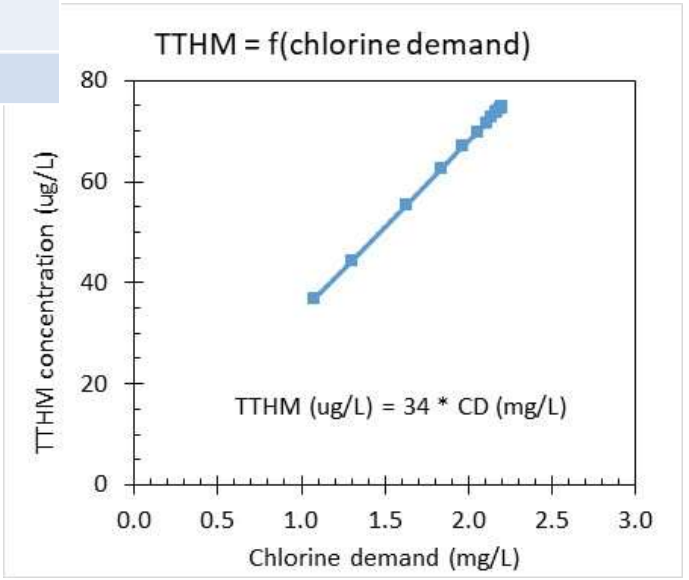
- Chlorine reacts with OM to form
  - DBPs
  - Oxidized OM - biodegradable
- A chlorine dose to TOC ratio of 1.5 mg/L chlorine to 1 mg/L TOC is needed to achieve
  - about 1 mg/L residual after 1 day and a detectable residual after 5 days

TOC (mg/L)	Required Chlorine dose (mg/L)
3	4.5
2.5	3.75
2	3

TOC impact on chlorine demand and DBP formation

- Chlorine reacts with OM to form
  - DBPs
  - Oxidized OM - biodegradable
- A chlorine dose to TOC ratio of 1.5 mg/L chlorine to 1 mg/L TOC is needed to achieve
  - about 1 mg/L residual after 1 day and a detectable residual after 5 days

TOC (mg/L)	Required Chlorine dose (mg/L)
3	4.5
2.5	3.75
2	3



- DBP formation equation

$$DBP = A(TOC \times UVA)^a (Cl_2)^b (Br^-)^c (Temp)^d (pH)^e (time)^f$$

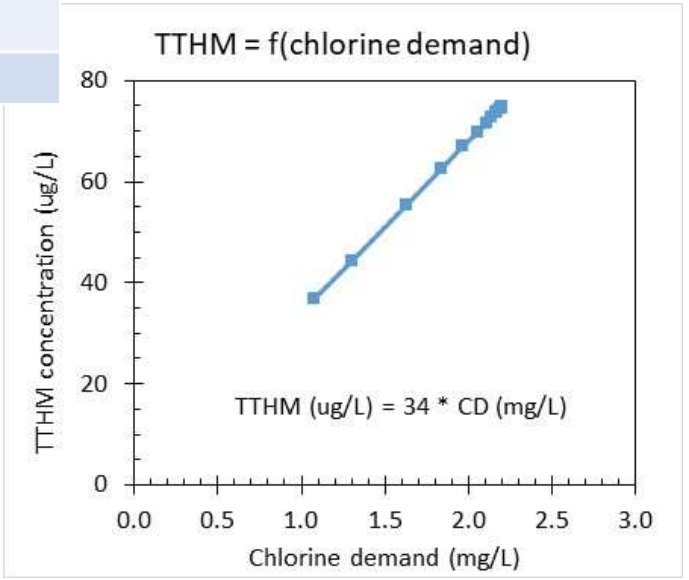
- TTHM formation equation

$$TTHM = 23.9(TOC * UVA)^{0.403} (Cl_2)^{0.225} (Br^-)^{0.141} (1.1560)^{(pH-7.5)} (1.0263)^{(Temp-20)} (time)^{0.264}$$

TOC impact on chlorine demand and DBP formation

- Chlorine reacts with OM to form
  - DBPs
  - Oxidized OM - biodegradable
- A chlorine dose to TOC ratio of 1.5 mg/L chlorine to 1 mg/L TOC is needed to achieve
  - about 1 mg/L residual after 1 day and a detectable residual after 5 days

TOC (mg/L)	Required Chlorine dose (mg/L)
3	4.5
2.5	3.75
2	3



- DBP formation equation

Cl_2 = 1.5 x TOC

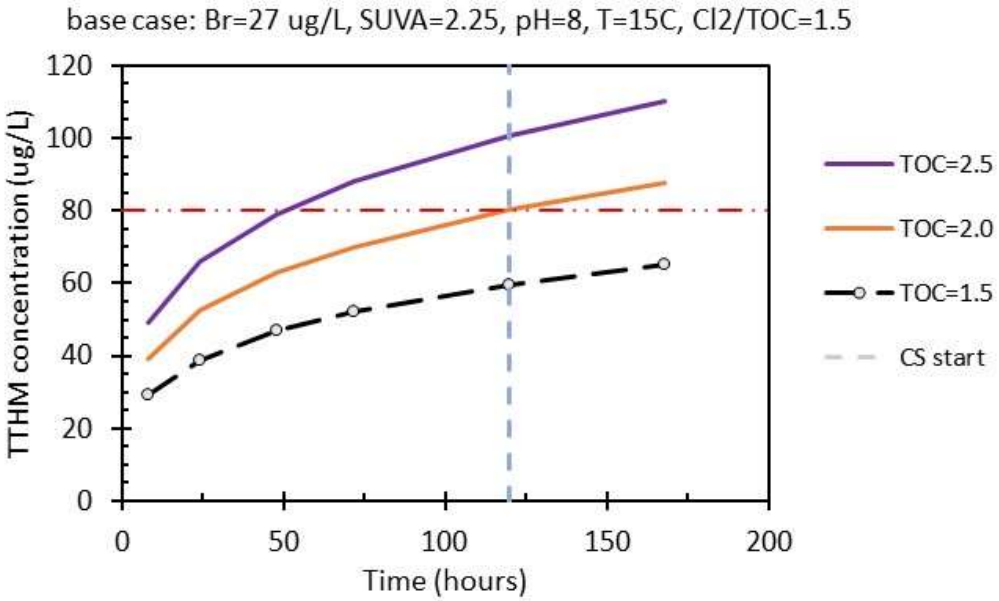
$$DBP = A(TOC \times UVA)^a (Cl_2)^b (Br^-)^c (Temp)^d (pH)^e (time)^f$$

UVA = SUVA x TOC

- TTHM formation equation

$$TTHM = 23.9(TOC * UVA)^{0.403} (Cl_2)^{0.225} (Br^-)^{0.141} (1.1560)^{(pH-7.5)} (1.0263)^{(Temp-20)} (time)^{0.264}$$

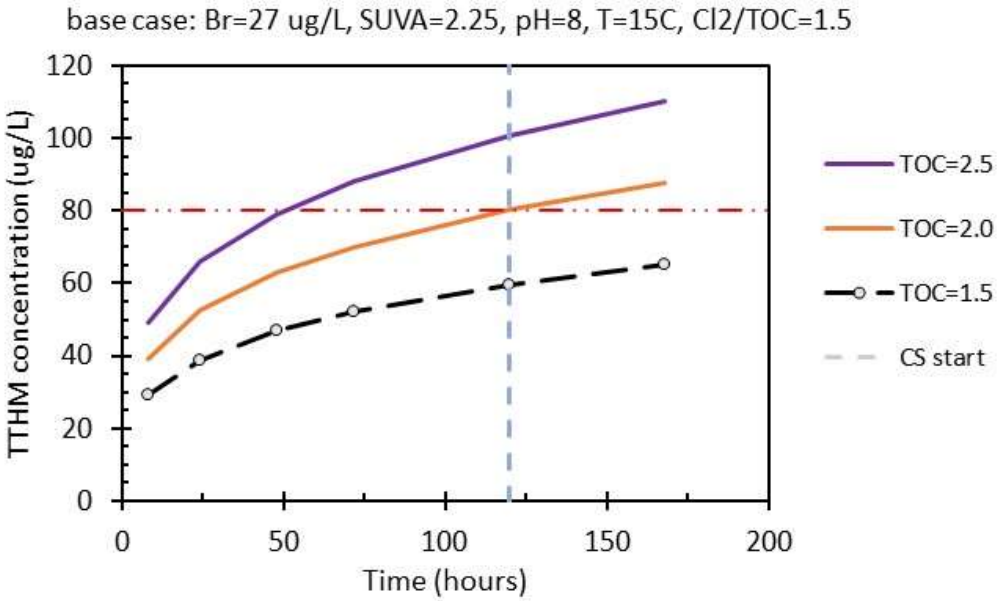
Impact of TOC on TTHM formation

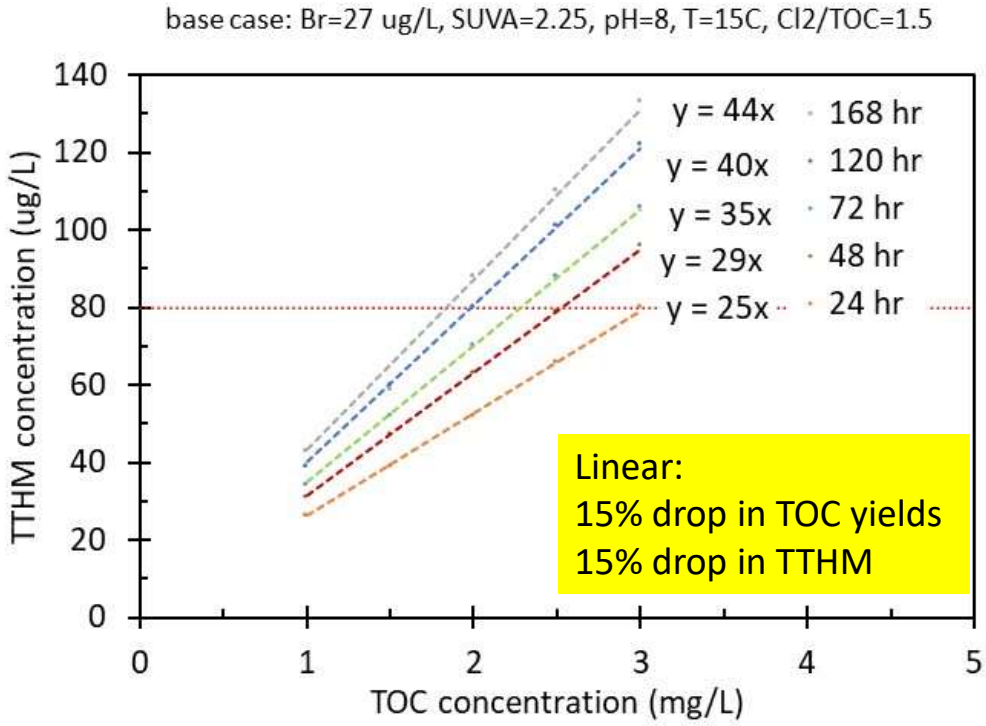


Impact of TOC on TTHM formation

Time (hr)	Max TOC (mg/L)
24	3.2
48	2.8
72	2.3
120	2.0
168	1.8

Maximum TOC at the point of chlorination above which the MCL is exceeded





TOC has a similar impact on HAA formation

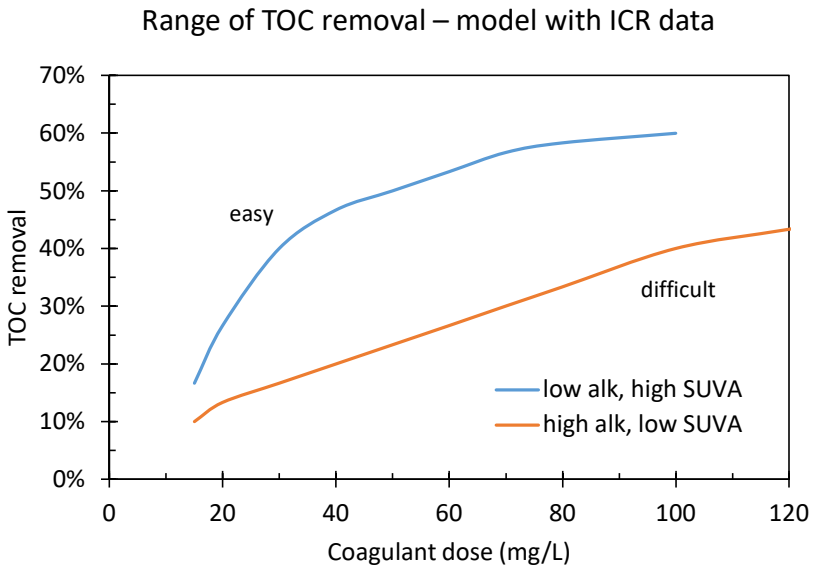
The impact of TOC on the formation of the unregulated DBPs, especially the nitrogenous based DBPs is not established.

DOM coagulation

Removal is a function of

- Water quality – UVA/TOC, alkalinity, pH
- Coagulant – type and dose

case	SUVA =UVA/TOC	Alkalinity (mg/L)	pH
easy	4.3	24	7.7
difficult	2	168	8.3



40 to 60% coagulable fraction

USEPA WTP Model, 2022

Raw Water TOC, mg/L	System size	Serving >= 10,000		
	Total #Facility Years =	757		
		Raw Water Alkalinity, mg $CaCO_3$/L		
		0-60	>60 to 120	>120
2.0 < TOC <= 4.0	#Facility Years	227	136	103
	Required %TOC removal	35%	25%	15%
4.0 < TOC <= 8.0	#Facility Years	132	25	107
	Required %TOC removal	45%	35%	25%
TOC > 8.0	#Facility Years	21	--	6
	Required %TOC removal	50%	40%	30%

Conventional SW treatment

Required TOC removal criteria 3x3 matrix

Developed with the thought that 90% of the WTPs could meet the required removal

Alternative compliance criteria

- Raw water TOC or SUVA <2
- Finished water TOC or SUVA <2
- Diminishing return on jar tests – work with the state
- < 40/30 TTHM/HAA5 for FCL systems
- Raw TOC < 4, raw water Alk > 60, and TTHM/HAA5 < 40/30.

Raw Water TOC, mg/L	System size	Serving >= 10,000		
	Total #Facility Years =	757		
		Raw Water Alkalinity, mg $CaCO_3$/L		
		0-60	>60 to 120	>120
2.0 < TOC <= 4.0	#Facility Years	227	136	103
	Mean Removal	**49%**	**43%**	**35%**
	Required %TOC removal	35%	25%	15%
4.0 < TOC <= 8.0	#Facility Years	132	25	107
	Mean Removal	**63%**	**50%**	**47%**
	Required %TOC removal	45%	35%	25%
TOC > 8.0	#Facility Years	21	--	6
	Mean Removal	**71%**	**--**	**56%**
	Required %TOC removal	50%	40%	30%

Conventional SW treatment

Required TOC removal criteria 3x3 matrix

Developed with the thought that 90% of the WTPs could meet the required removal

Alternative compliance criteria

- Raw water TOC or SUVA <2
- Finished water TOC or SUVA <2
- Diminishing return on jar tests – work with the state
- < 40/30 TTHM/HAA5 for FCL systems
- Raw TOC < 4, raw water Alk > 60, and TTHM/HAA5 < 40/30.

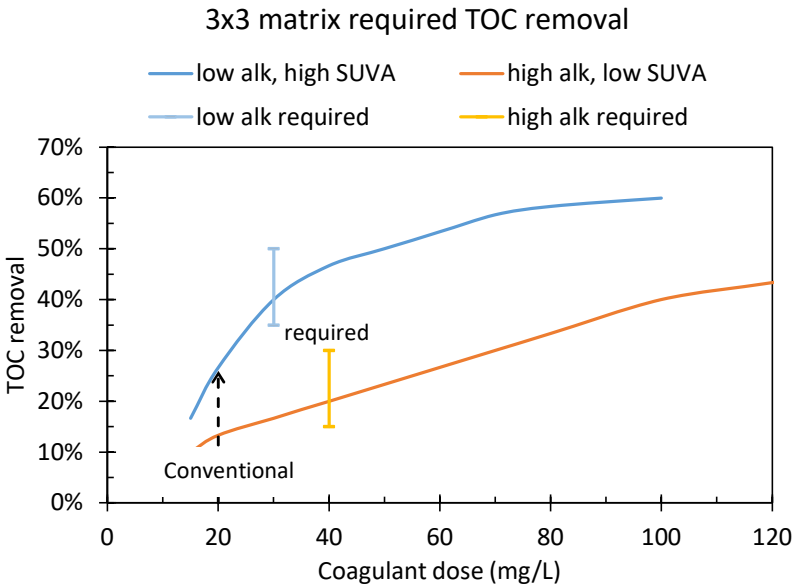
	Weighted average removal		Weighted average removal
>10,000		**<10,000**	
Required	31%	Required	31%
Achieved	49%	Achieved	46%
Delta	18%	Delta	15%

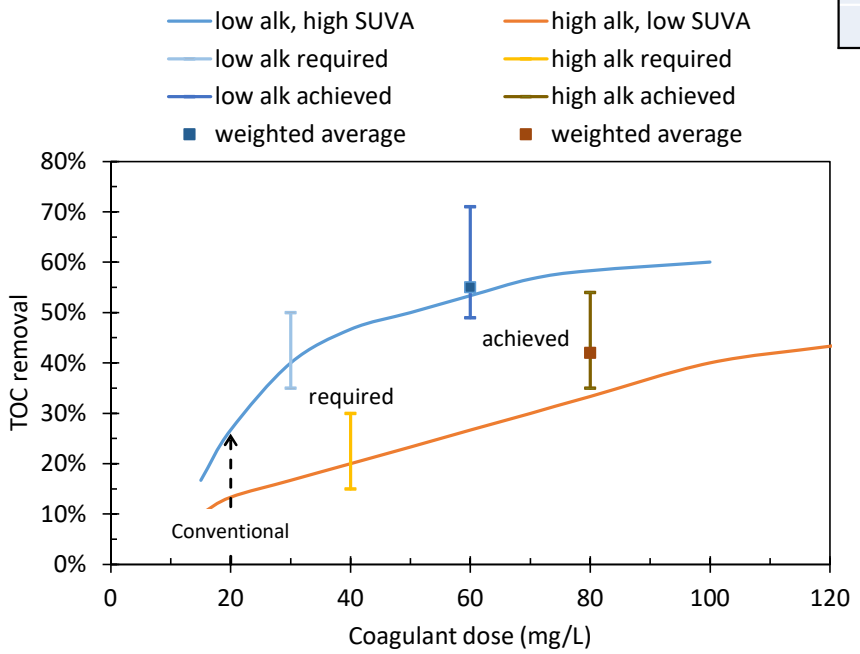
DOM coagulation

Removal is a function of

- Water quality – UVA/TOC, alkalinity, pH
- Coagulant – type and dose

	Weighted average removal
>10,000	
Required	31%
Achieved	49%
Delta	18%
<10,000	
Required	31%
Achieved	46%
Delta	15%

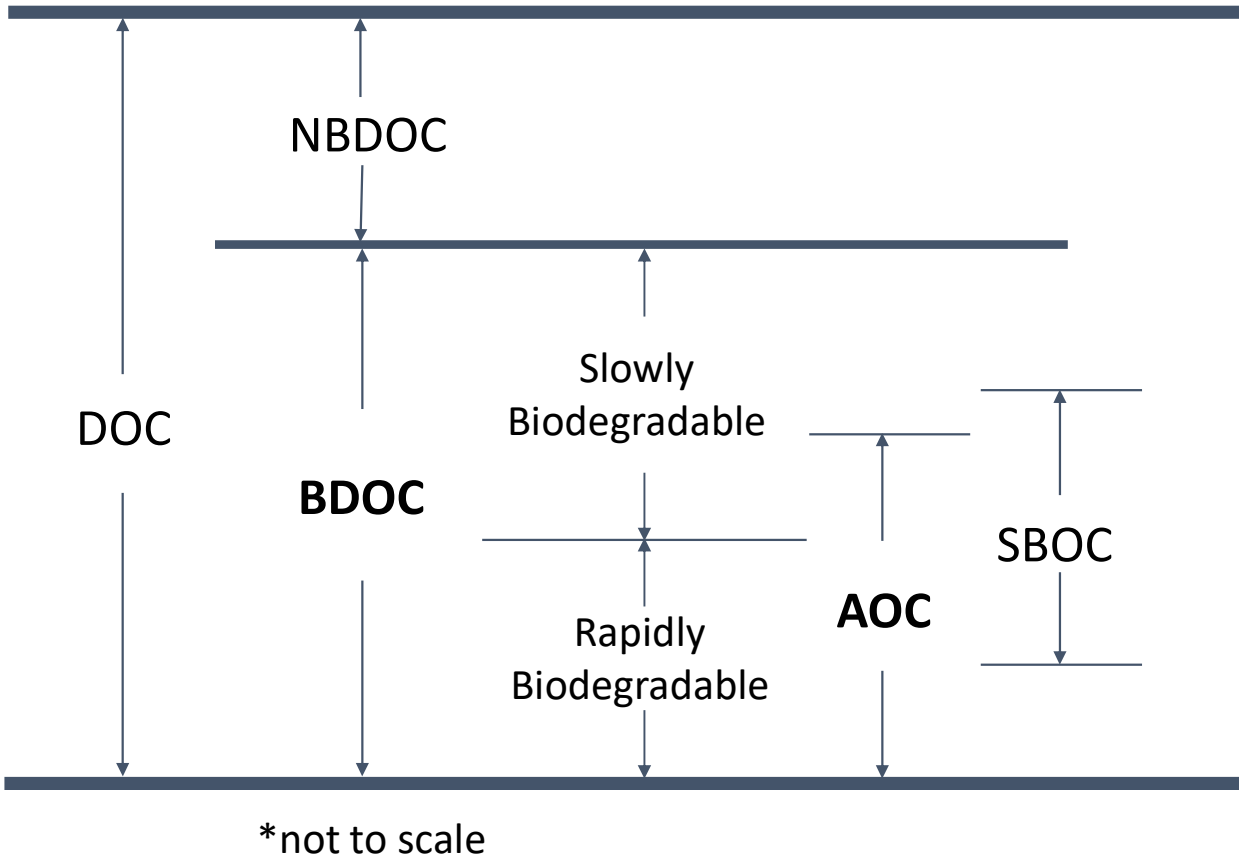


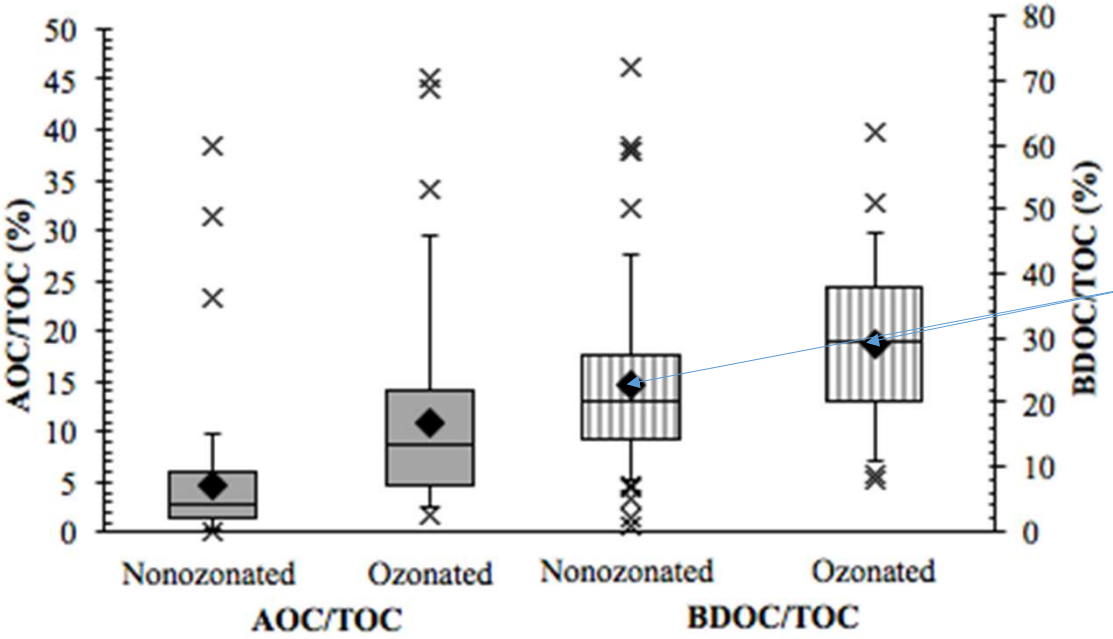


Only 7% of facility years had TOC %removal **achieved** that were <u>less</u> than **required** TOC %removal (alternative compliance criteria could be in effect)

Biodegradable OM Fractions in Drinking Water

- Biodegradable dissolved organic carbon (BDOC)
  - DOC consumed in a lab bioreactor
  - represents/ approaches the maximum BOM
- Assimilable organic carbon (AOC)
  - growth of specific microorganisms
  - represents easily biodegradable DOM
- Specific biodegradable organic compounds (SBOC)
  - analytical capability and quantifiable levels





Distribution of BDOC/TOC and AOC/TOC in filter influent with and without ozone

20 to 30% biodegradable fraction (BDOC)

n = 103

Terry and Summers, 2018

- BDOC or AOC serve a substrate for the growth/ regrowth of microorganisms in the distribution system
- Biostability in the distribution system can be achieved by decreasing the TOC
  - More stabile chlorine residual
  - Lower AOC and BDOC values

Biofiltration for Organic Matter Control

Biofilter definition-

- A filter operated in the absence of a disinfectant residual in the filter effluent

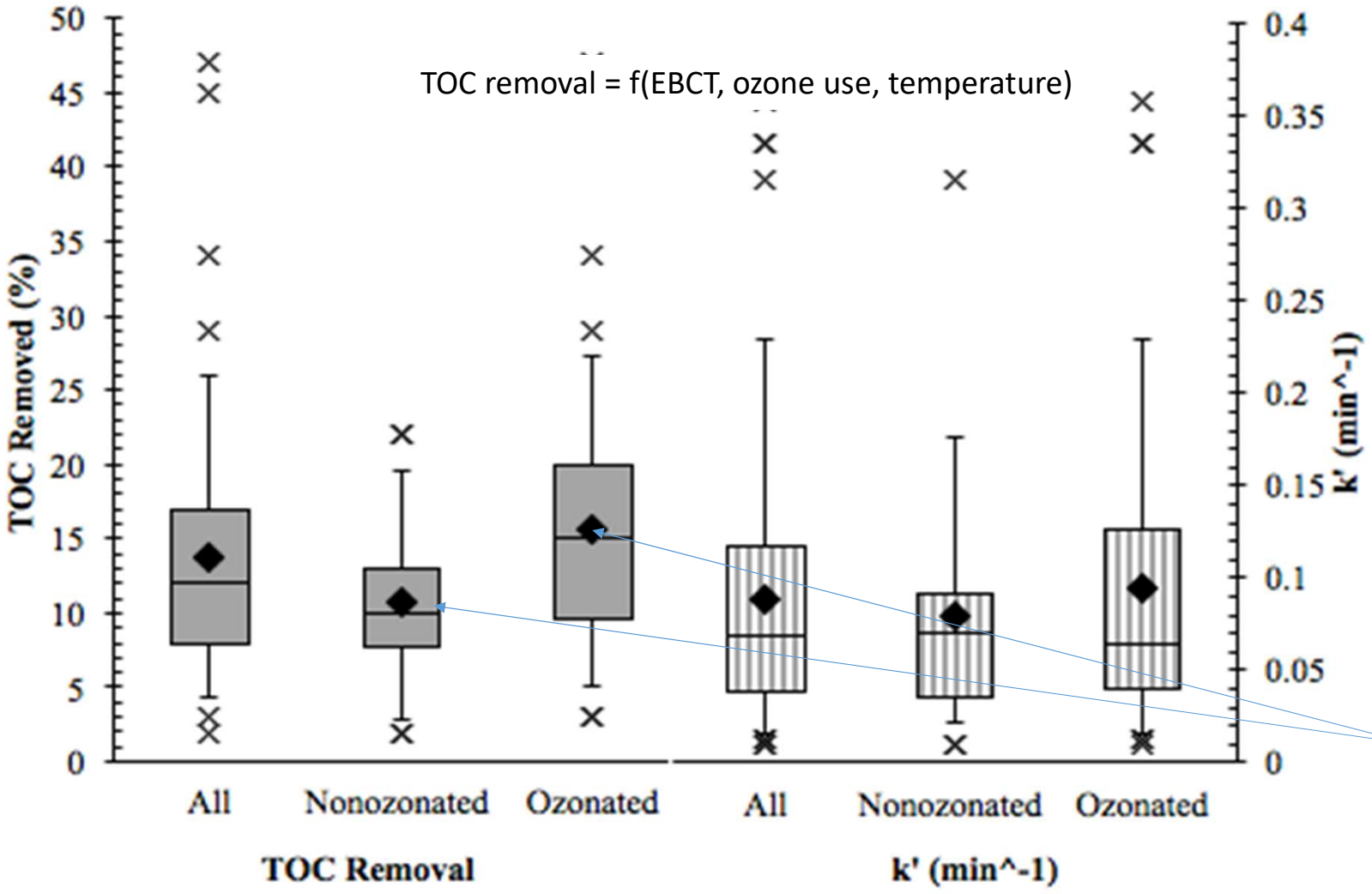
Optimized biofilter-

- A biofilter designed and operated to maximize the objectives of biofiltration without compromising particle control and pathogenic microorganism removal.

Uses traditional filter media

- sand, anthracite and GAC colonized by non-pathogenic, naturally occurring microorganisms

Followed by downstream disinfection



TOC removal = f(EBCT, ozone use, temperature)

Biofilter TOC removal and k' constant with and without ozone.

$$\frac{C_{Eff}}{C_{Inf}} = \exp(-k' \cdot EBCT)$$

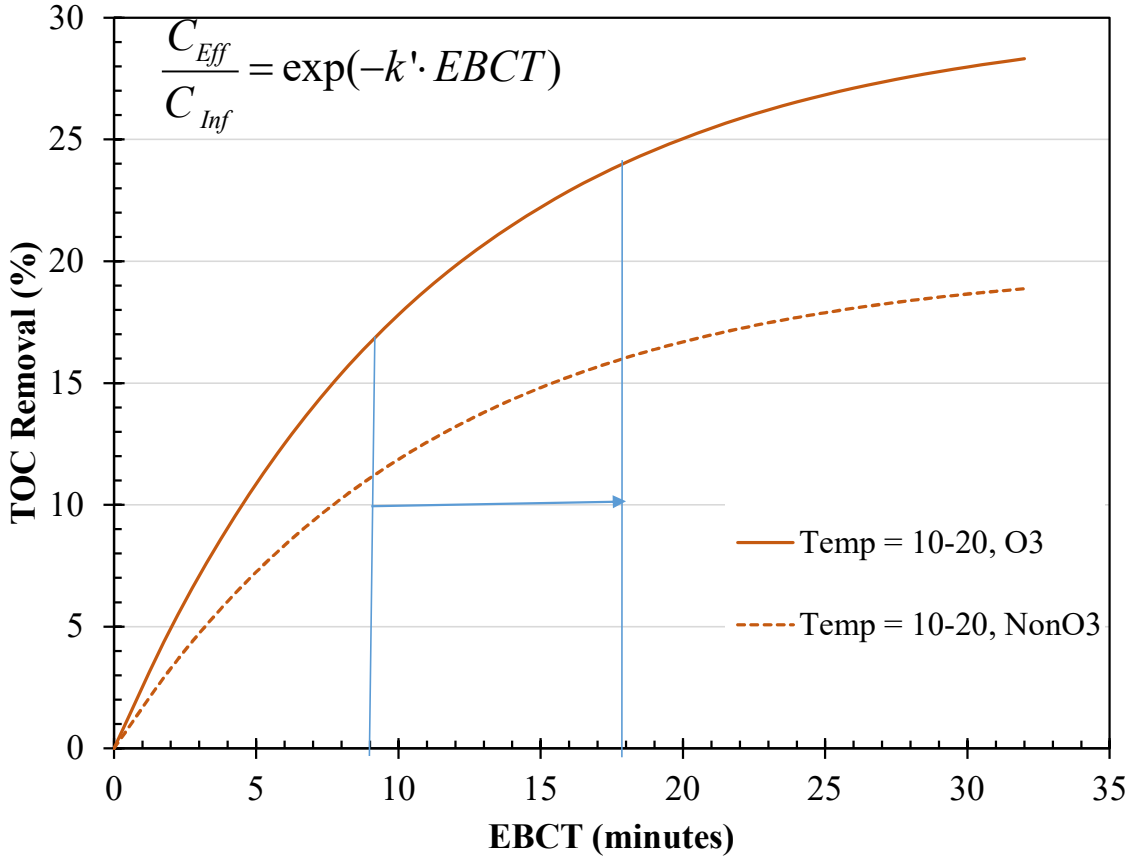
Average TOC removal: 11% w/o ozone and 16% with ozone

n = 117

The boxes represent 25th, 50th (median) and 75th percentiles, the diamonds represent averages, the error bars represent 5th and 95th percentiles, and the "x" represent outliers.

Terry and Summers, 2018

Simulated TOC removal as a function of EBCT for ozonated and non-ozonated waters



Associated BDOC values
Non-ozonated 20%
Ozonated 30%

Temp = 10-20°C
Associated k' values
k' = 0.09 min^{-1}

	EBCT = 9 min	EBCT= 18 min
Without O3	11	16
With O3	16	24

Terry and Summers, 2018

Granular Activated Carbon Adsorption of DOM

- DOM: mixture of compounds with a range of adsorbability
  - Non-sorbable (5 to 15%)
  - Weakly adsorbing
  - Strongly adsorbing
  - Slowly adsorbing
- Biodegradable fraction (10 to 15%).
- Desorption not as common with NOM.

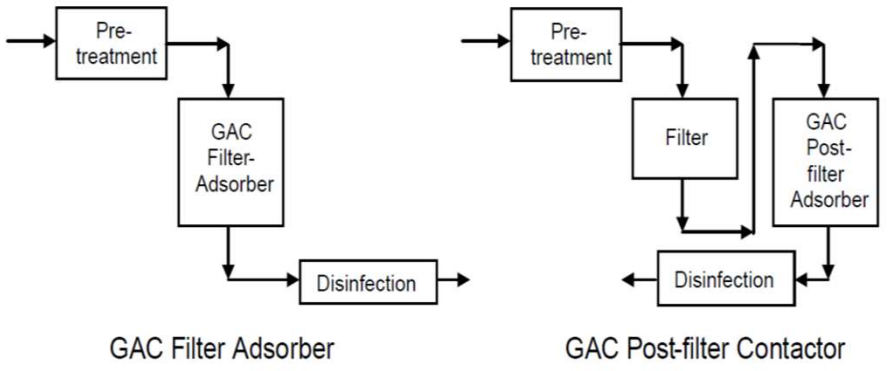


Figure 3-7. Common GAC application points

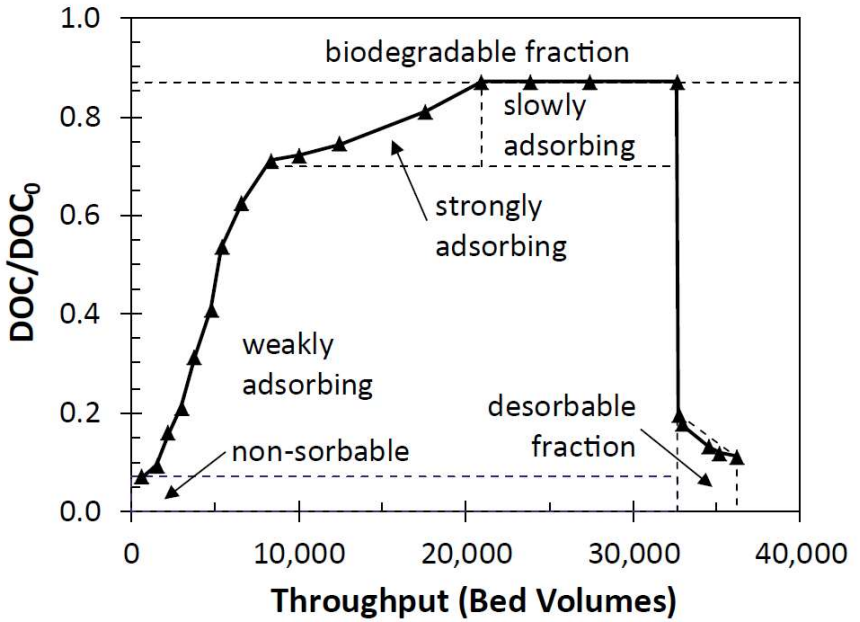
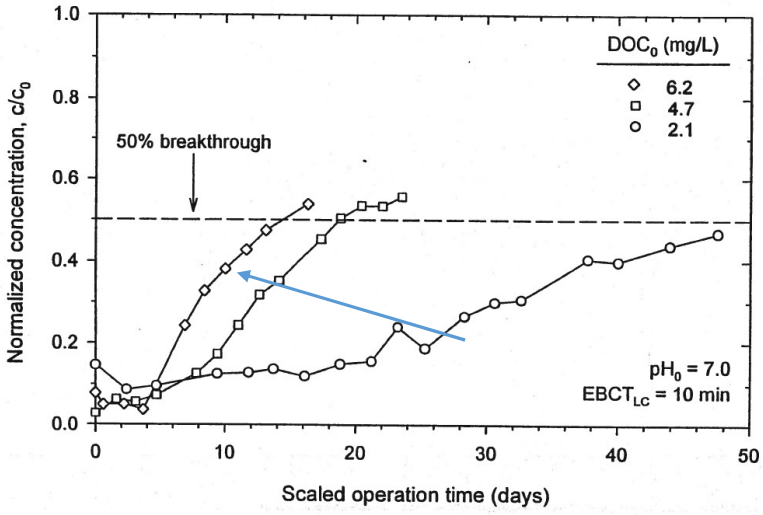


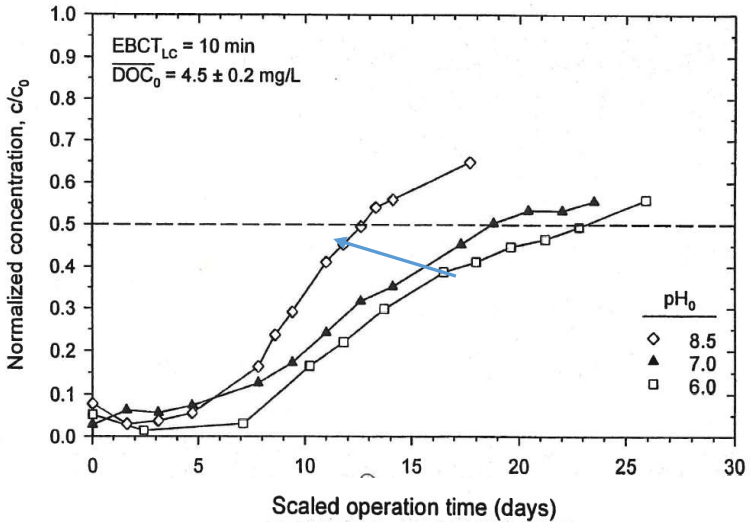
Figure 5-2. Typical DOM breakthrough behavior

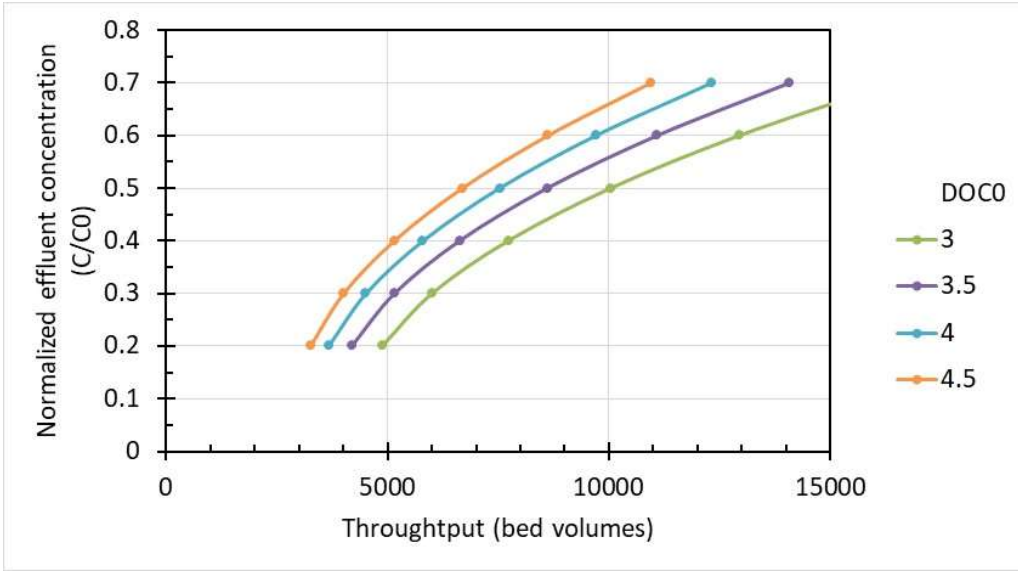
For an EBCT of 20 min, 1 year is 26,00 bed volumes

Chowdhury et al., 2013

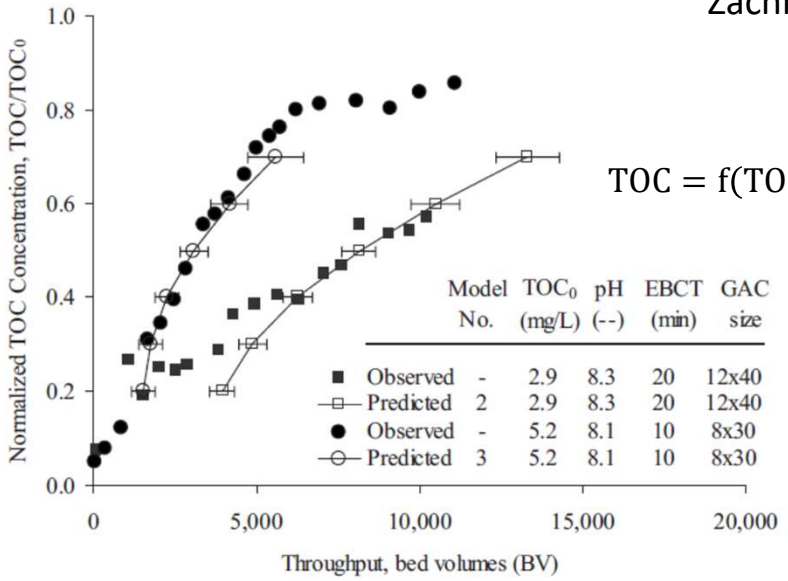
GAC Adsorption of DOM





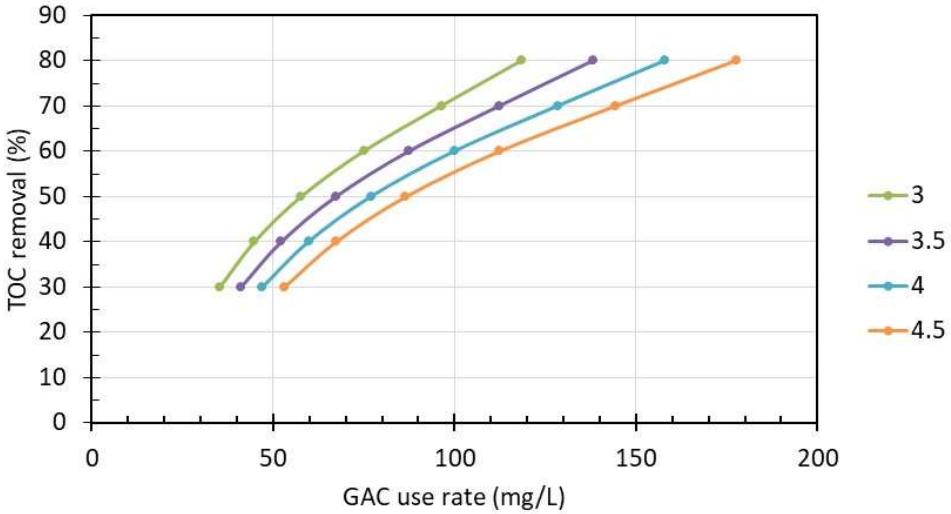


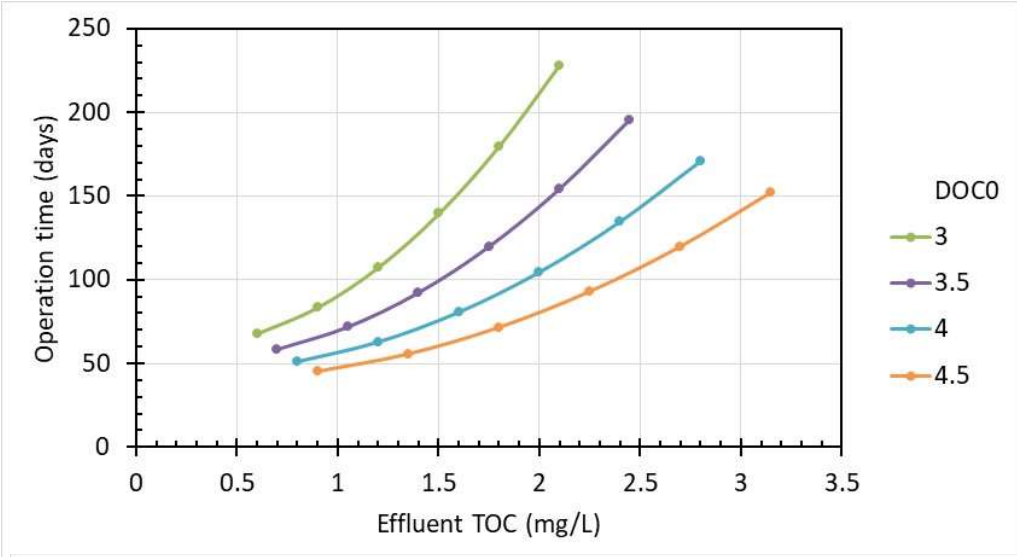
Zachman and Summers 2010

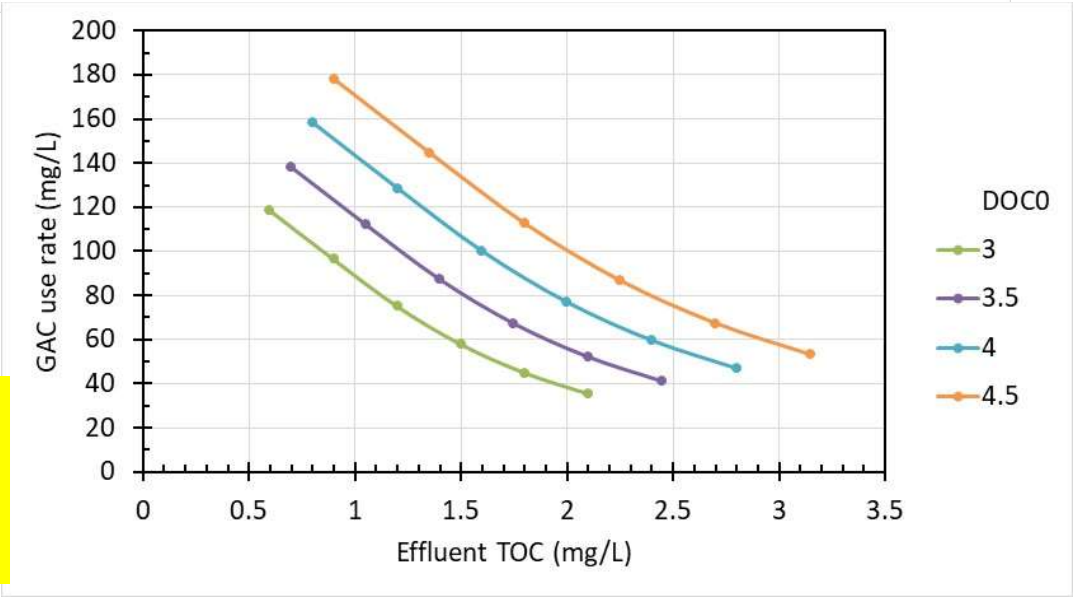


$$\mathrm{TOC} = \mathrm{f}(\mathrm{TOC}_0, \mathrm{pH}, \text{GAC type}, \mathrm{EBCT})$$

GAC Adsorption of DOM







GAC use rate (UR)

GAC mass / volume treated to a target effluent concentration or run time

mg/L or lbs/ 1000 gallons

Represents the O&M cost of GAC replacement

High levels of TOC removal can be achieved by GAC, but costs increase with removal.

Decreasing influent TOC extends GAC run time and lowers costs.

Treatment Summary

Cost

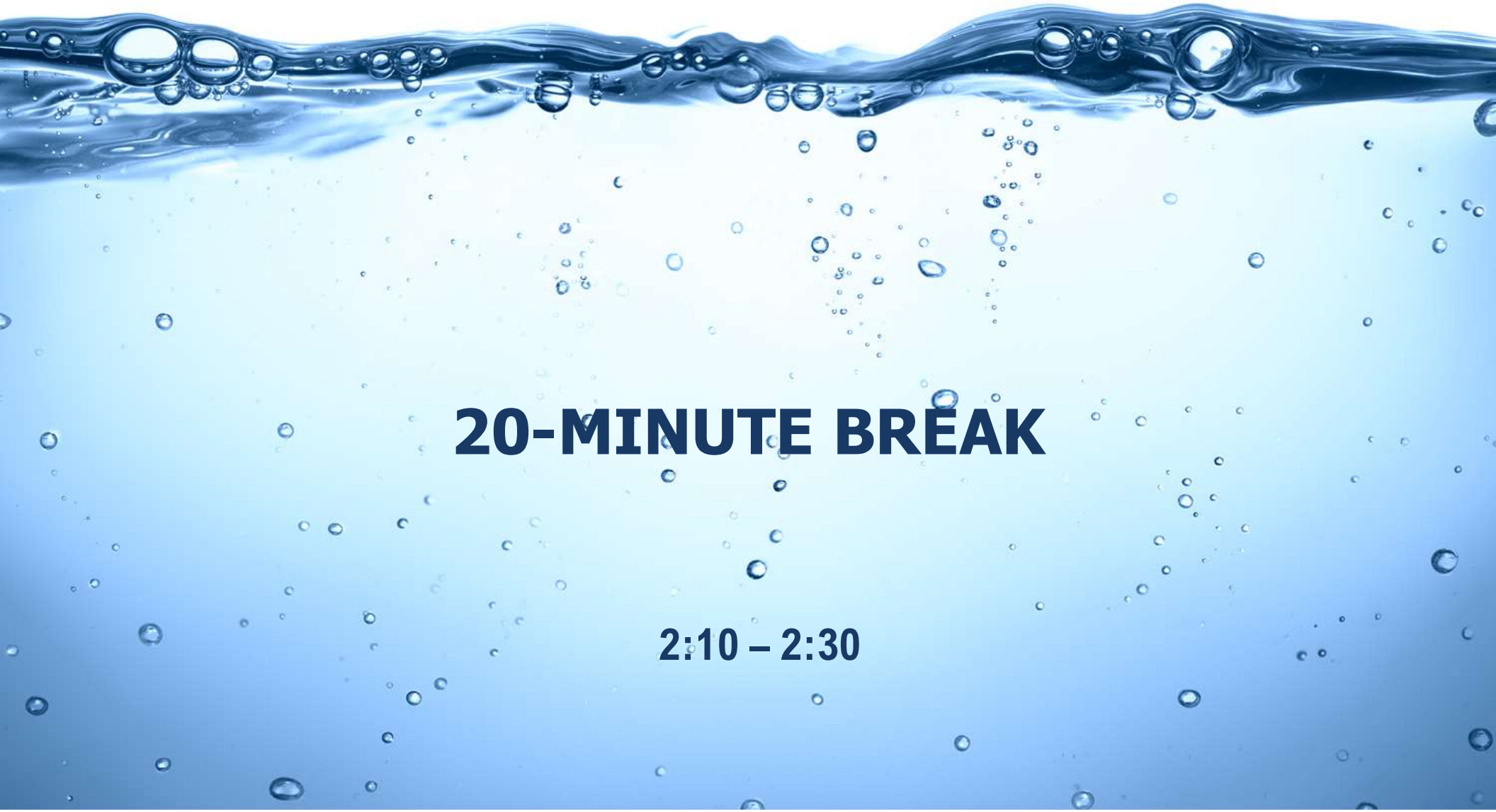
	Additional TOC removal
▪ Coagulation – function of coagulant dose	
▪ TOC removal "extended" beyond required 3x3 removal	15-20%
▪ Biofiltration – function of EBCT and temperature	
▪ without ozone	10-15%
▪ with ozone	15-20%
▪ Granular activated carbon (GAC) – function of run time	
▪ Maximum	75-80%
▪ Reasonable range	25-30%
▪ Ion exchange – function of run time	
▪ TOC removal similar to GAC	30-75%
▪ more expensive because of brine treatment	
▪ Nanofiltration/ reverse osmosis – function of pressure	
▪ High	>90%
▪ expensive because of brine treatment	

Treatment requires resources, including money.

More treatment requires additional resources, including money.

Segment 5 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) establishing MCLs for HAA9 or HAA6Br and 2) acknowledging new evidence and formulating new data collection, research, and analysis needs?
- What are the strengths and vulnerabilities of the implementation actions related to 1) expanding organic (and other precursor) removal requirements and 2) preparing enhanced optimization guidance for DBP control?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?


20-MINUTE BREAK
2:10 – 2:30

Segment 5: Treatment and Distribution System -Regulated and Unregulated DBP (cont.)

Scott Summers, Technical Analyst

June 27, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 5 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) establishing MCLs for HAA9 or HAA6Br and 2) acknowledging new evidence and formulating new data collection, research, and analysis needs?
- What are the strengths and vulnerabilities of the implementation actions related to 1) expanding organic (and other precursor) removal requirements and 2) preparing enhanced optimization guidance for DBP control?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 6: Distribution System - Finished Water Storage Tanks

June 27, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 6 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) requiring tank improvements, 2) requiring triggered action based on monitoring, and 3) preparing improved guidance?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 7: Day 2 look Ahead

June 27, 2023

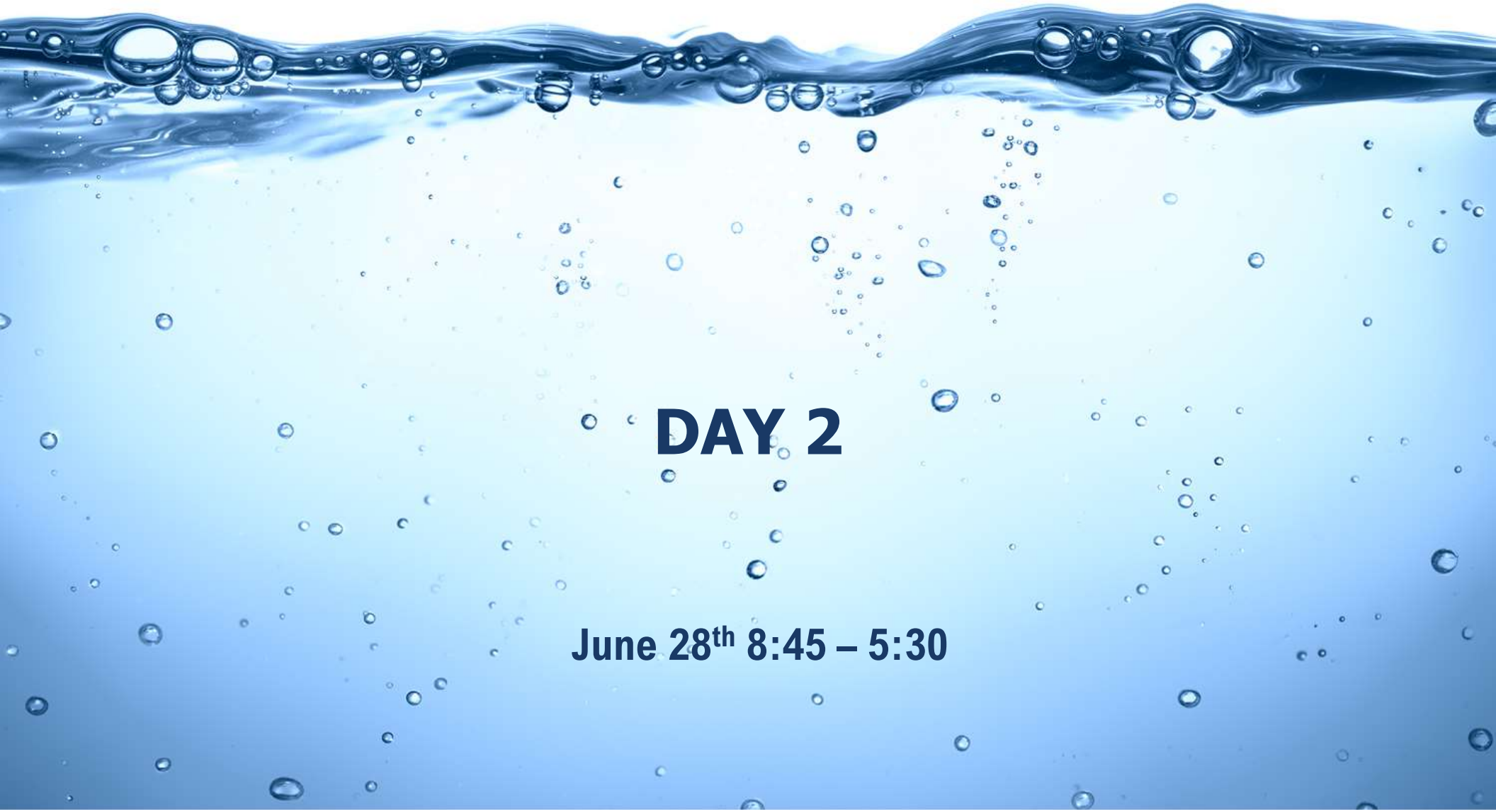
EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Tomorrow's Agenda

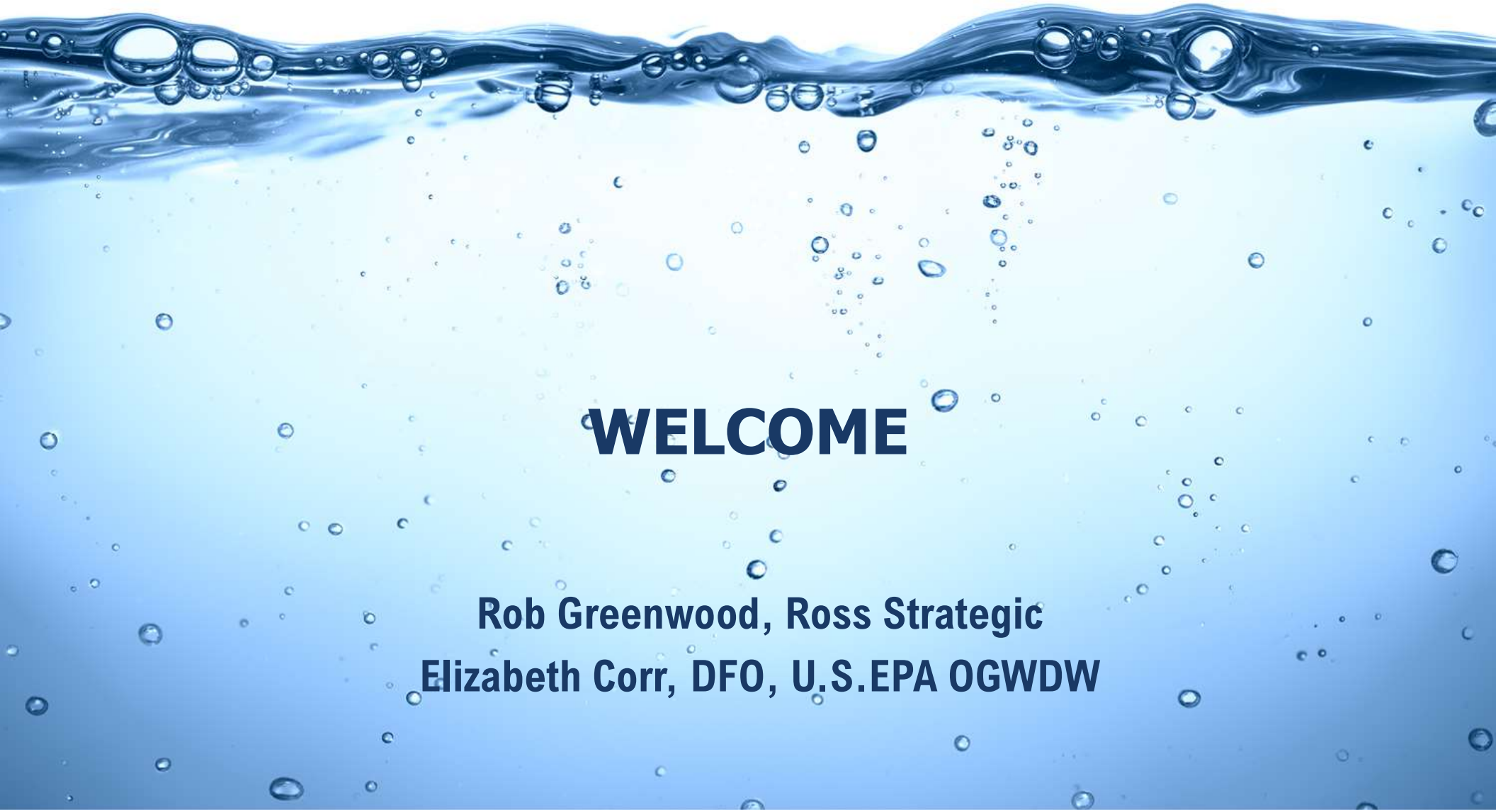
8:45-11:30	• Segment 8: Agenda Review and Meeting Procedures • Segment 9: Day 1 Reflection • Segment 10: Consecutive Systems • Segment 11: Treatment - Improve Chloramination Practice
	45 Minute Lunch Break (11:30-12:15 pm ET)
12:15-2:00	• Segment 11: Treatment - Improve Chloramination Practice (cont.) • Segment 12: Source Water – Source Control and Source Water Assessment
	20 Minute Break (2:00-2:20 pm ET)
2:20-5:30	• Segment 12: Source Water – Source Control and Source Water Assessment (cont.) • Segment 13: Enabling Environment - Technical, Managerial, and Financial Capacity • Segment 14: Enabling Environment - State Capacity • Segment 15: Day 3 Look Ahead


ADJOURN



DAY 2

June 28th 8:45 – 5:30



WELCOME

Rob Greenwood, Ross Strategic
Elizabeth Corr, DFO, U.S.EPA OGWDW

Today's Agenda

8:45-11:30	• Segment 8: Agenda Review and Meeting Procedures • Segment 9: Day 1 Reflection • Segment 10: Consecutive Systems • Segment 11: Treatment - Improve Chloramination Practice
	45 Minute Lunch Break (11:30-12:15 pm ET)
12:15-2:00	• Segment 11: Treatment - Improve Chloramination Practice (cont.) • Segment 12: Source Water – Source Control and Source Water Assessment
	20 Minute Break (2:00-2:20 pm ET)
2:20-5:30	• Segment 12: Source Water – Source Control and Source Water Assessment (cont.) • Segment 13: Enabling Environment - Technical, Managerial, and Financial Capacity • Segment 14: Enabling Environment - State Capacity • Segment 15: Day 3 Look Ahead

Segment 9: Day 1 Reflection

June 28, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Big Picture: Overall GAC Breakthrough

R. Scott Summers
Professor Emeritus University of Colorado – Boulder

NDWAC –TWG Presentation – 6-28-23

Summers, et al. WQTC 2022, GAC Use for the Control of PFAS, PPCPs, Regulated and Unregulated DBPs: the Role of EBCT and Influent TOC

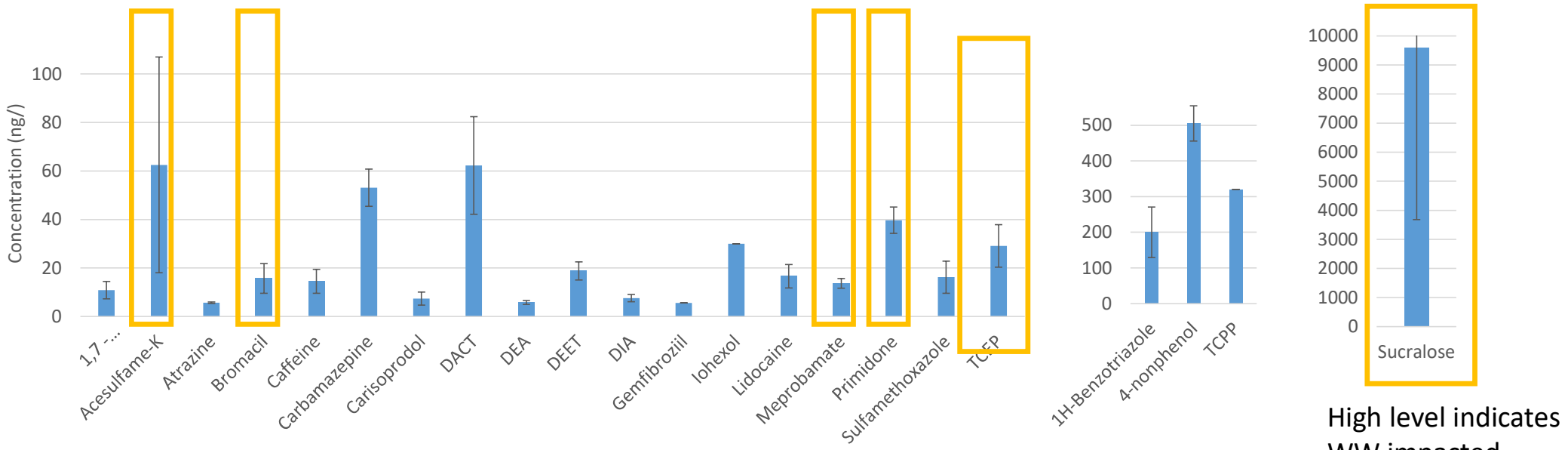
Objective:
Demonstration the effectiveness of GAC for a range of organic contaminants

Pretreated surface water:
Coagulation/AOP/Biofilter

Pilot plant GAC: Bituminous
10 min EBCT

GAC Influent WQ Parameter	Average	Standard Dev
TOC (mg/L)	2.21	0.21
UVA 254 (cm^{-1})	0.034	0.004
pH	7.29	0.39
Alkalinity (mg/L as $CaCO_3$)	134	6

GAC Influent PPCPs (22)



Summers et. al, 2022 AWWA WQTC

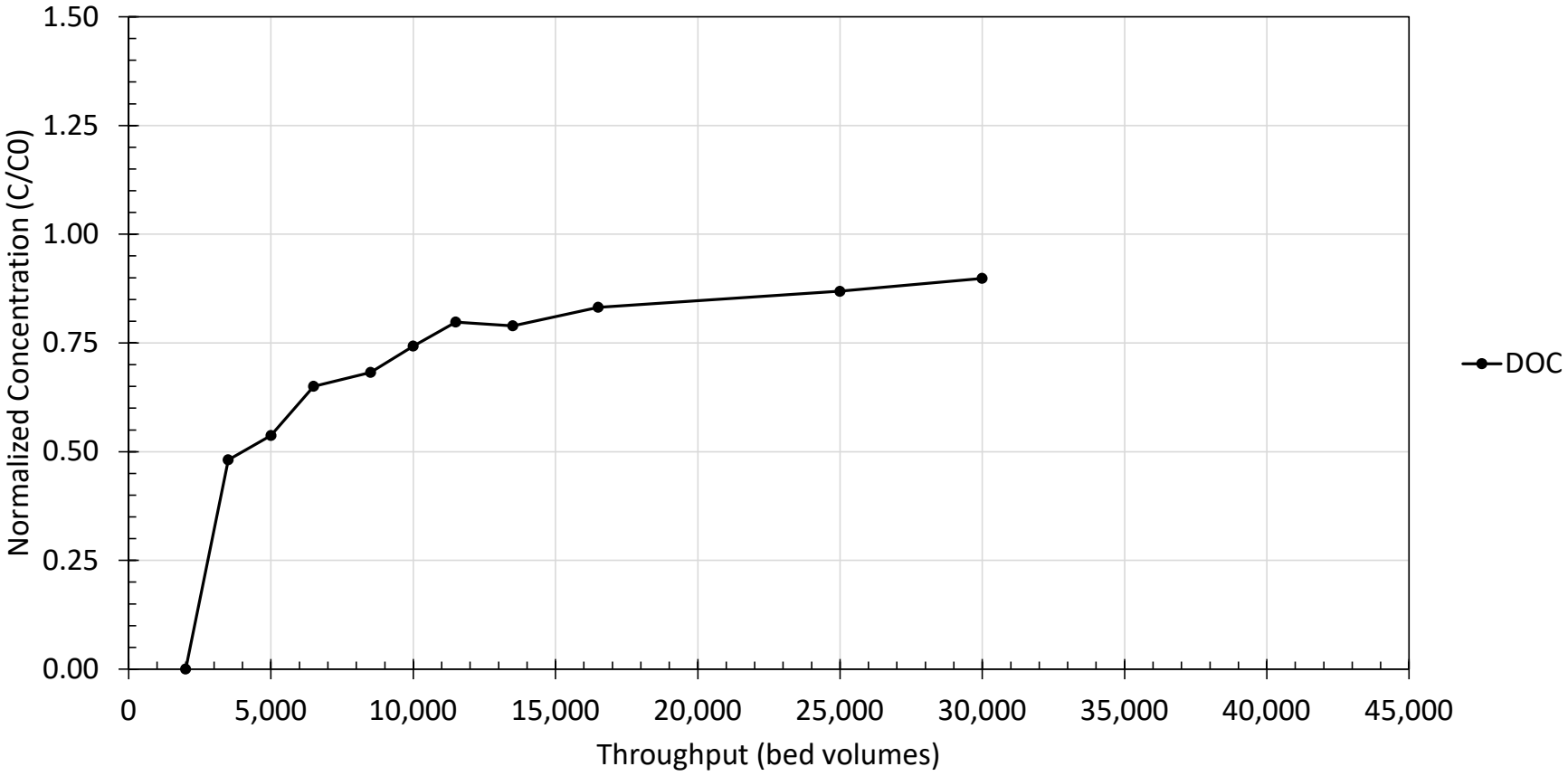
High level indicates WW impacted source

Influent PFAS and DBP precursors

PFAS	GAC Influent Concentration (ng/L)		DBP Precursors	GAC Influent Concentration (ug/L)
PFBS	10		TTHM	75
PFHxA	16		HAA5	26
PFHpA	5		HAA9	60
PFHxS	12		unReg - 36	19
PFOA	12		HAN9	9
PFOS	12		HAL7	4
			HAM7	3
			ITHM	3

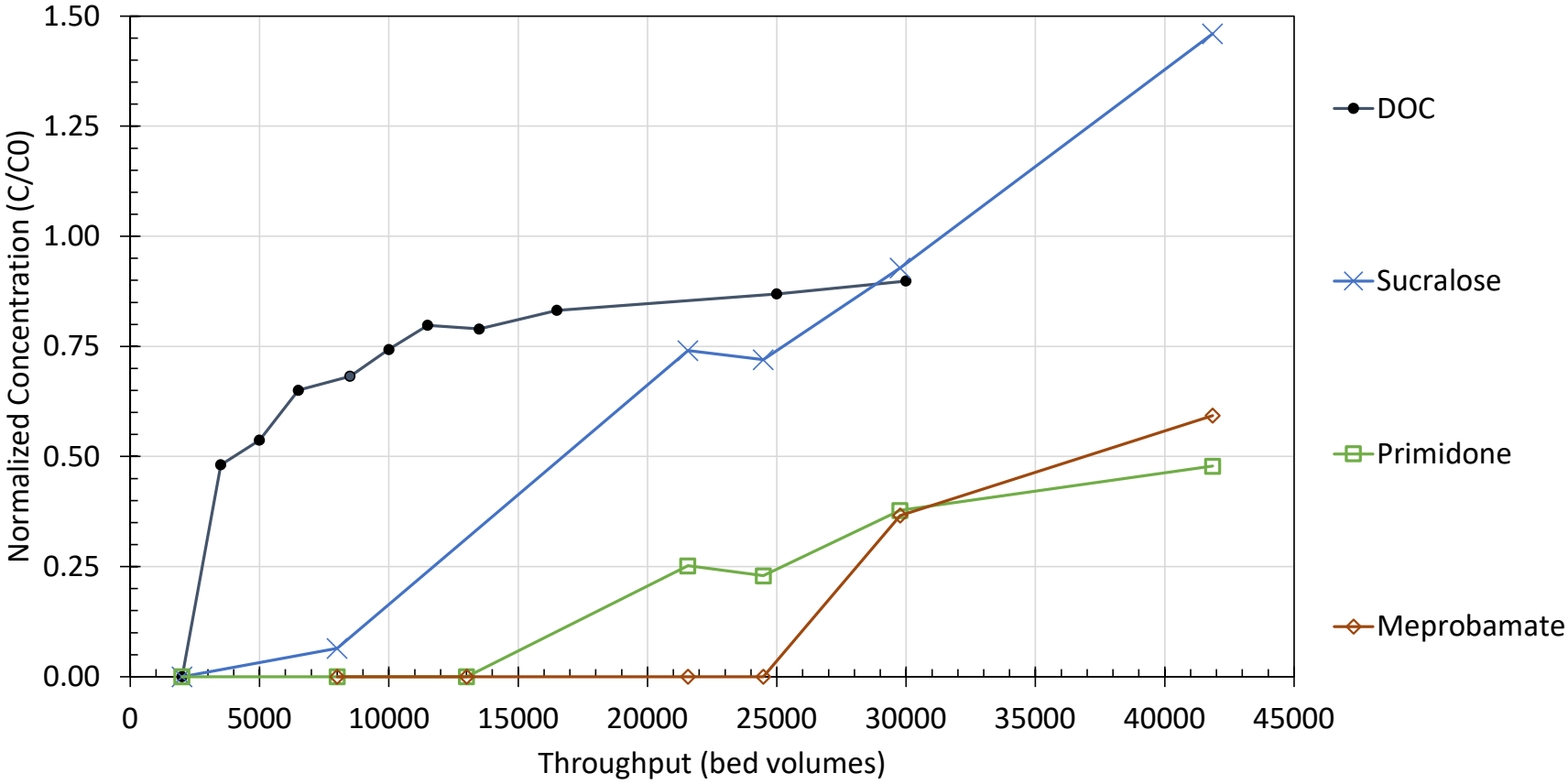
Summers et. al, 2022 AWWA WQTC

TOC



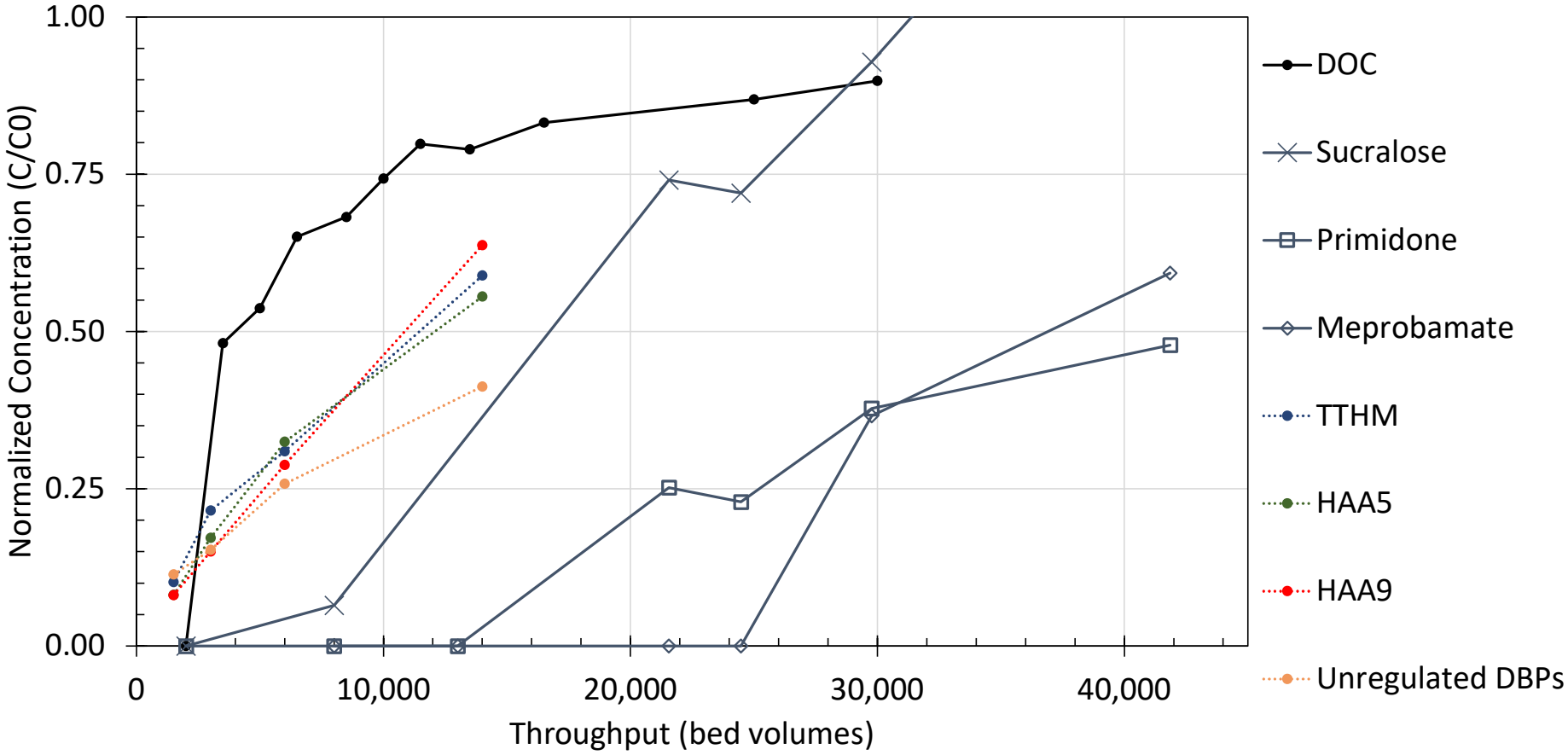
Summers et. al, 2022 AWWA WQTC

PPCPs



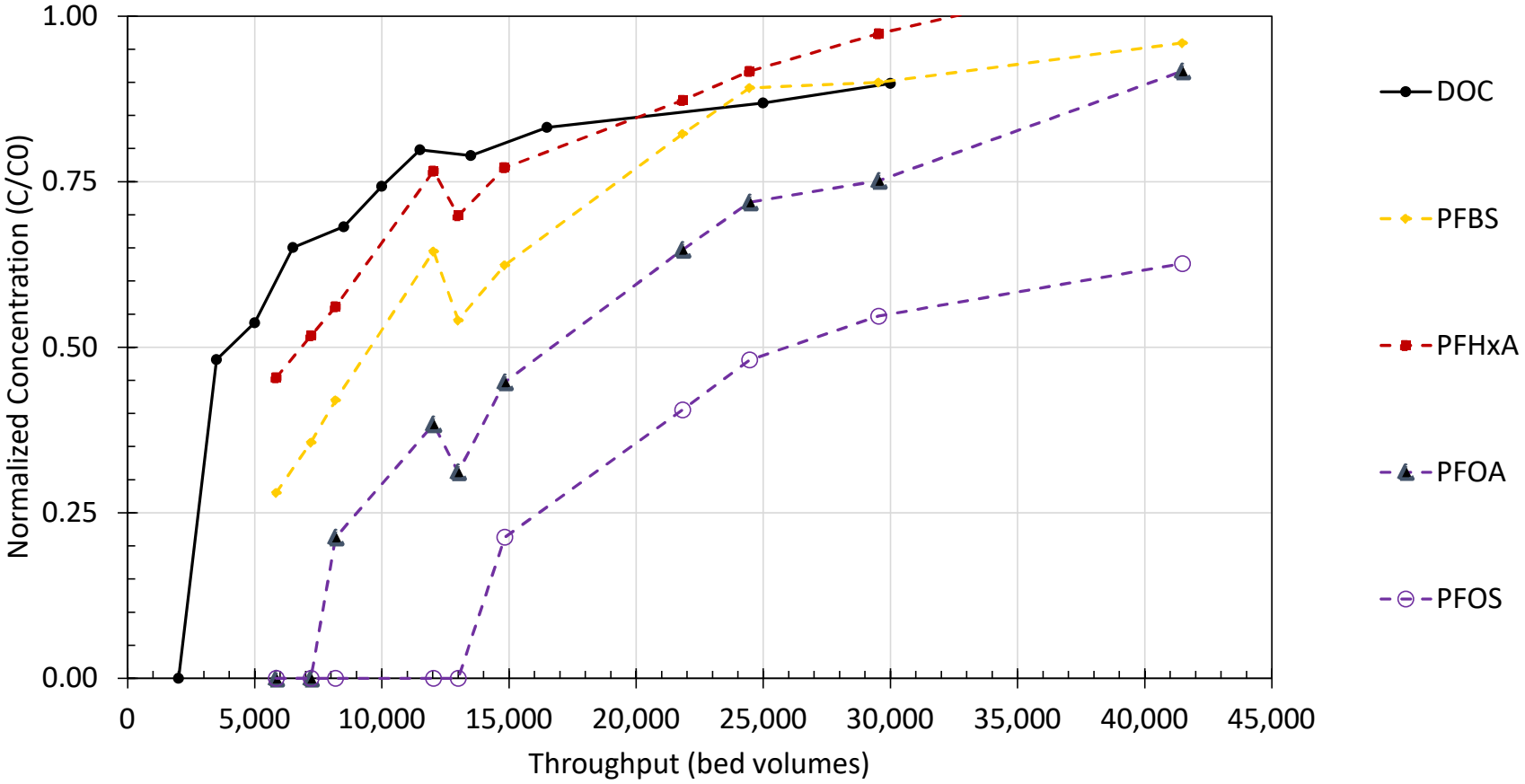
Summers et. al, 2022 AWWA WQTC

DBP Precursors



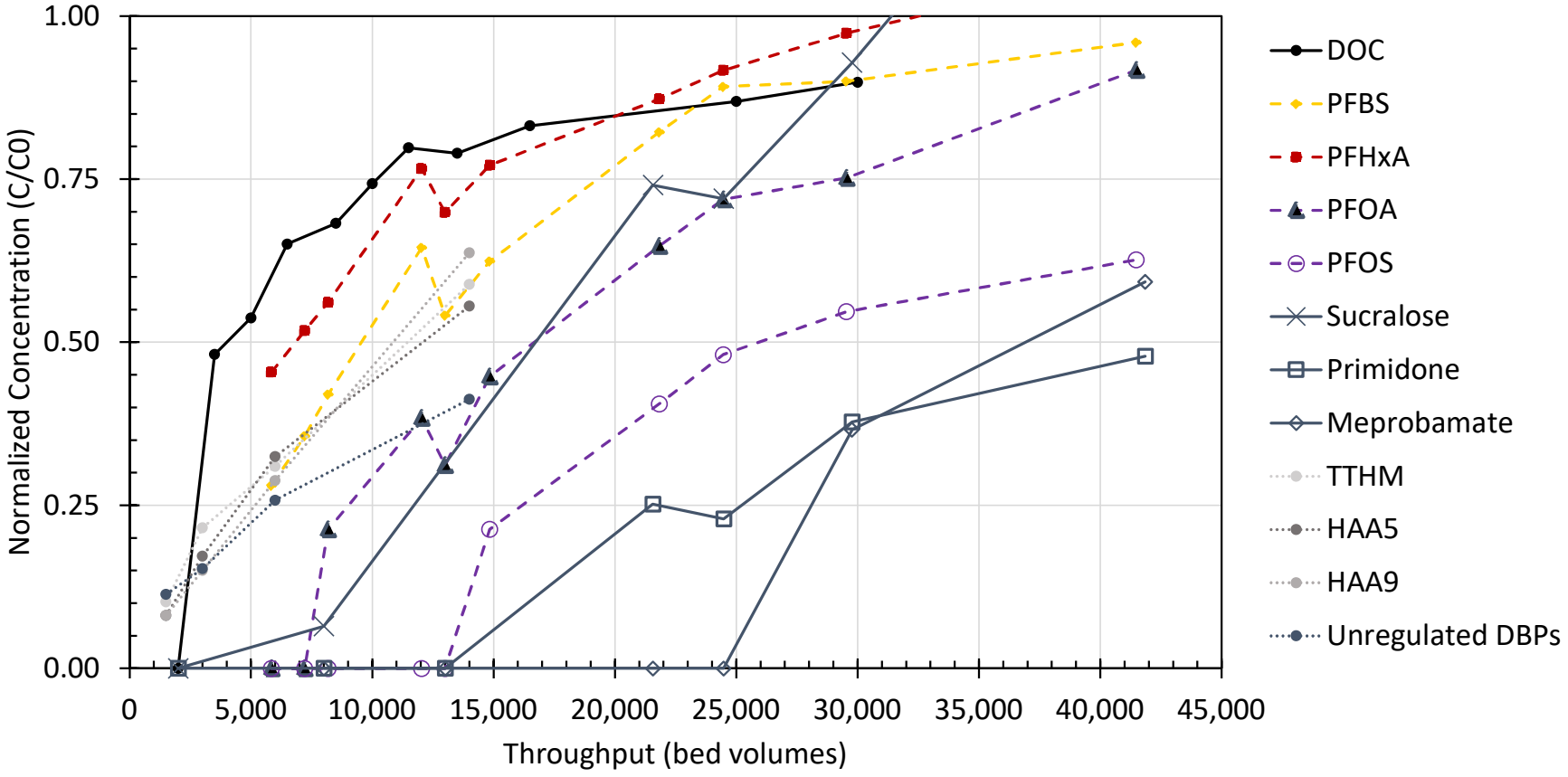
Summers et. al, 2022 AWWA WQTC

PFAS



Summers et. al, 2022 AWWA WQTC

Spectrum



Summers et. al, 2022 AWWA WQTC

Segment 10: Consecutive Systems

June 28, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 10 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) establishing interconnection requirements and 2) preparing improved guidance?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 11: Treatment - Improve Chloramination Practice

June 28, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 11 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) establishing new requirements and 2) preparing improved guidance?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?


45-MINUTE LUNCH BREAK
11:30 – 12:15

Segment 11: Treatment - Improve Chloramination Practice (cont.)

June 28, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 11 Discussion Questions

- What are the strengths and vulnerabilities of the implementation actions related to 1) establishing new requirements and 2) preparing improved guidance?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 12: Source Water – Source Control and Source Water Assessment

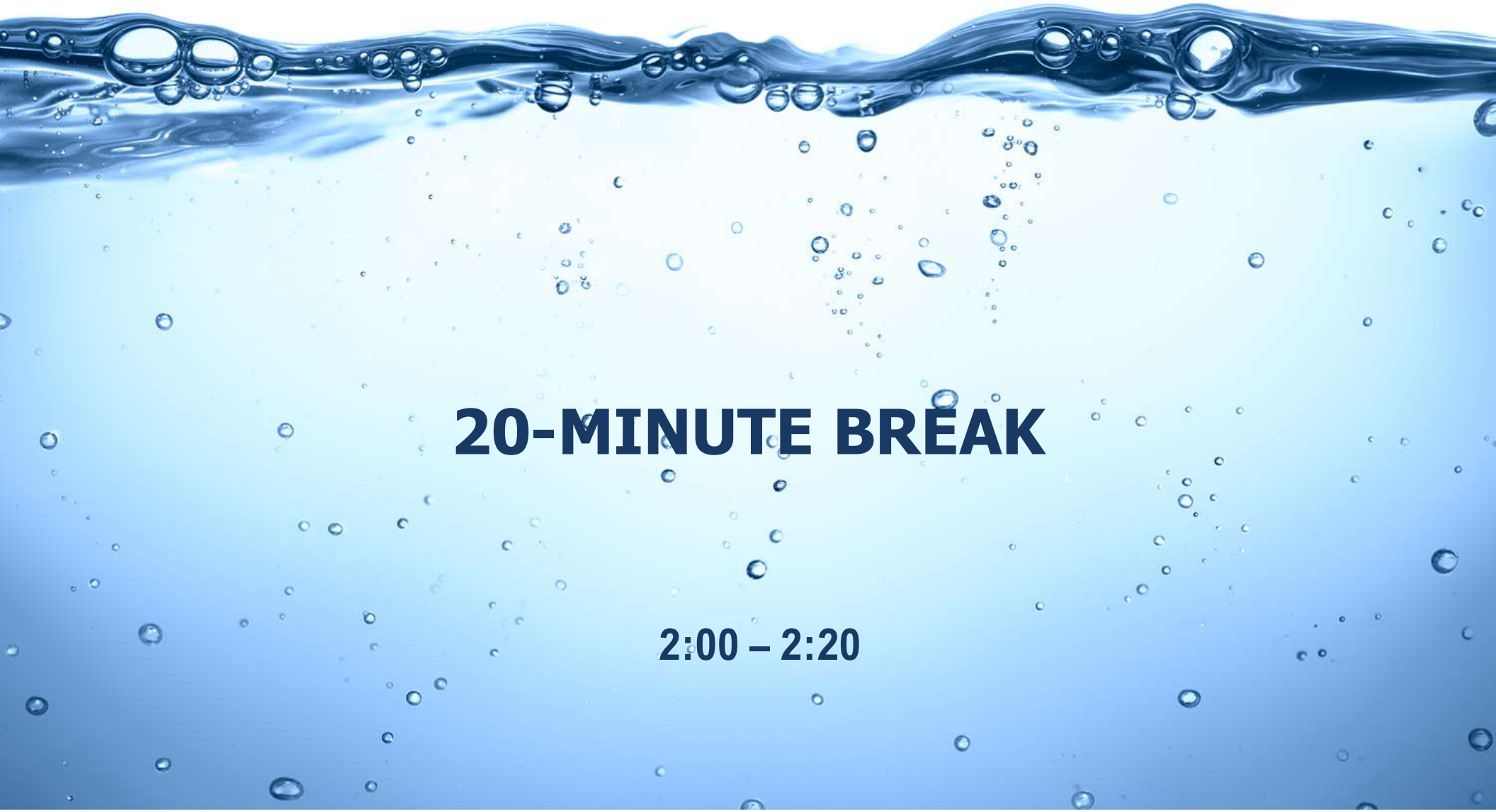
June 28, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 12 Discussion Questions

- What are the strengths and vulnerabilities of the source control implementation actions related to 1) expanding leverage of non-SDWA authorities, 2) encouraging voluntary community efforts, and 3) providing states and EPA with enhanced ability to respond to source water conditions?
- What are the strengths and vulnerabilities of the source water assessment implementation actions related to 1) conducting regular source water assessments and 2) taking a triggered approach to source water assessments?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?


20-MINUTE BREAK
2:00 – 2:20

Segment 12: Source Water – Source Control and Source Water Assessment (cont.)

June 28, 2023

Segment 12 Discussion Questions

- What are the strengths and vulnerabilities of the source control implementation actions related to 1) expanding leverage of non-SDWA authorities, 2) encouraging voluntary community efforts, and 3) providing states and EPA with enhanced ability to respond to source water conditions?
- What are the strengths and vulnerabilities of the source water assessment implementation actions related to 1) conducting regular source water assessments and 2) taking a triggered approach to source water assessments?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 13: Enabling Environment - Technical, Managerial, and Financial Capacity

June 28, 2023

Segment 13 Discussion Questions

- What are the strengths and vulnerabilities of the TMF implementation actions related to 1) enhancing financial and technical assistance, 2) improving operator certification, and 3) making permanent a national low-income household safety net program?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 14: Enabling Environment - State Capacity

June 28, 2023

Segment 14 Discussion Questions

- What are the strengths and vulnerabilities of the state capacity implementation actions related to 1) providing additional resources to oversight programs and 2) revamping the Sanitary Survey Program?
- What are the ingredients of a potential recommendation(s) to NDWAC?
- What are our next steps?

Segment 15: Day 3 look Ahead

June 28, 2023

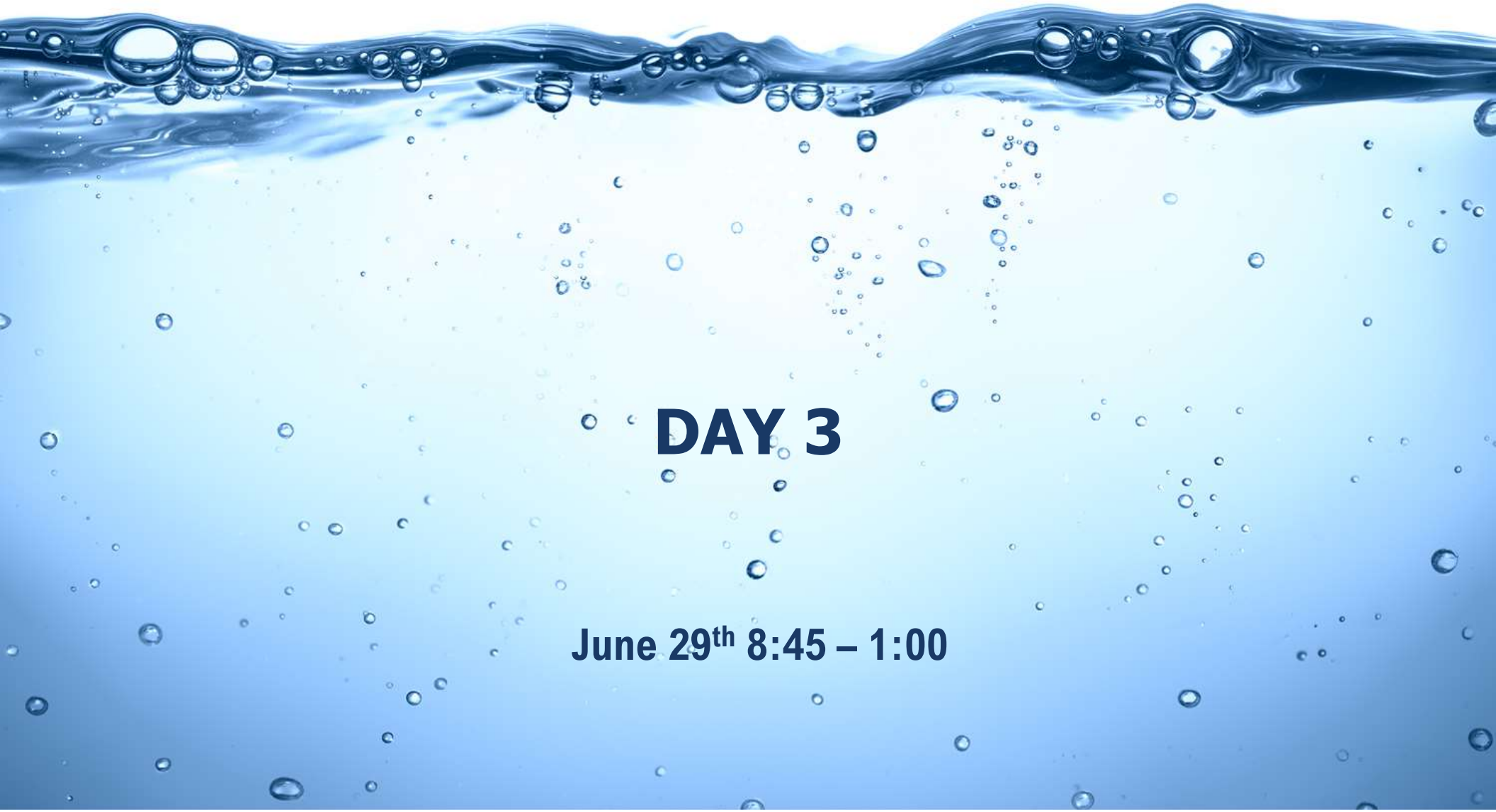
EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Tomorrow's Agenda

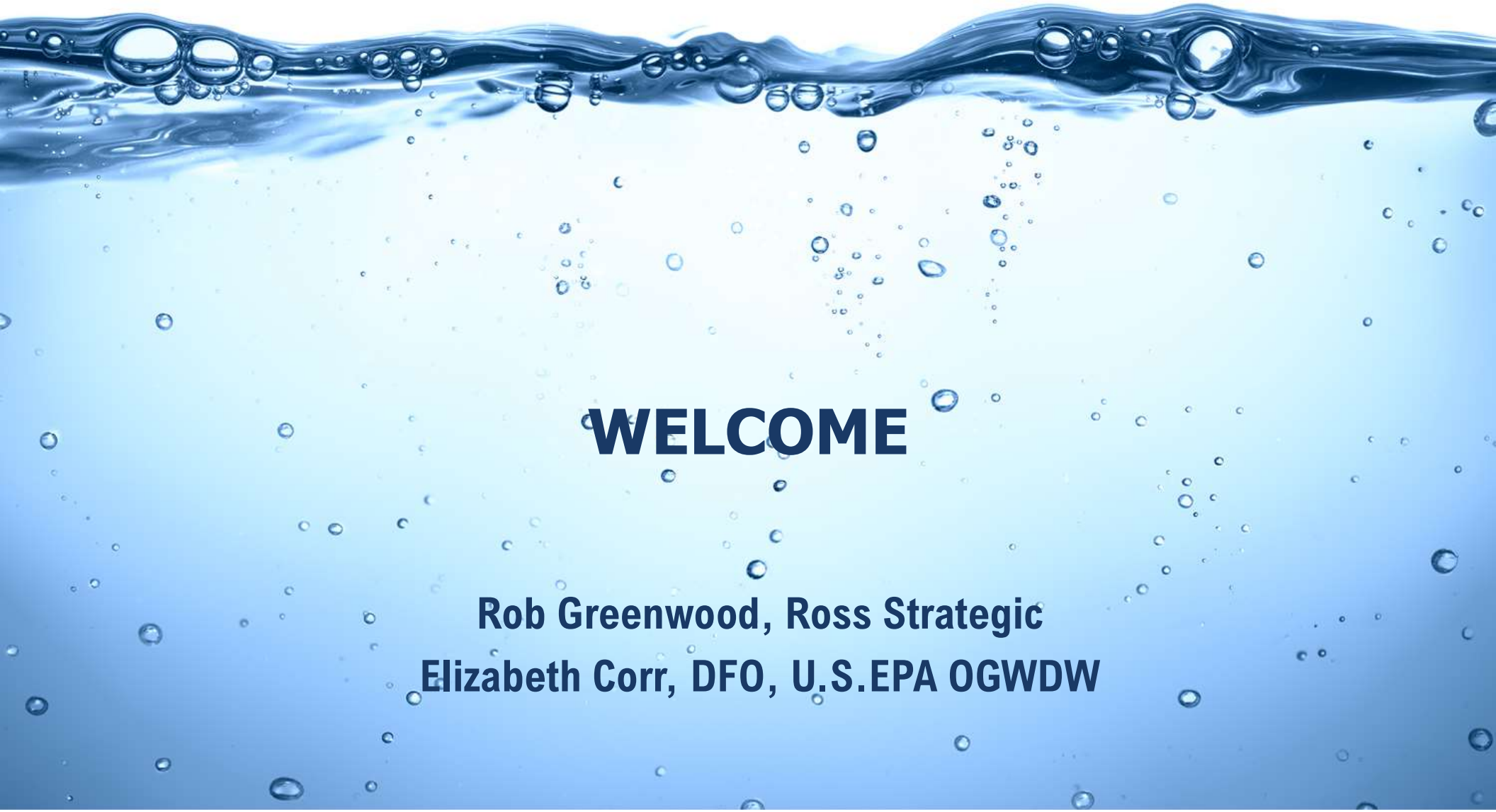
8:45-11:00	• Segment 16: Agenda Review and Meeting Procedures • Segment 17: Taking Stock: Review State of Discussions
	20 Minute Lunch Break (11:00-11:20 pm ET)
11:20-1:00	• Segment 17: Taking Stock (cont.) • Segment 18: Path Forward
	Adjourn


ADJOURN



DAY 3

June 29th 8:45 – 1:00



WELCOME

Rob Greenwood, Ross Strategic
Elizabeth Corr, DFO, U.S.EPA OGWDW

Today's Agenda

8:45-11:00	• Segment 16: Agenda Review and Meeting Procedures • Segment 17: Taking Stock: Review State of Discussions
	20 Minute Lunch Break (11:00-11:20 pm ET)
11:20-1:00	• Segment 17: Taking Stock (cont.) • Segment 18: Path Forward
	Adjourn

Segment 17: Taking Stock: Review State of Discussions

June 29, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 17 Discussion Questions

- What core building blocks do we have for beginning to build out recommendations for NDWAC related to addressing public health concerns caused by opportunistic pathogens and DBPs while balancing risks of microbial control with managing DBP formation (including both MDBP rule revisions and non-regulatory approaches)?
- What are the implications of these building blocks for:
    - Opportunities to address environmental justice (including the role of public notice and electronic reporting update opportunities identified by WG members);
    - Ensuring efficient simultaneous compliance with other drinking water regulations; and
    - Addressing implementation challenges to reduce burden?


20-MINUTE BREAK
11:00 – 11:20

Segment 17: Taking Stock (cont.)

June 29, 2023

EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Segment 17 Discussion Questions

- What core building blocks do we have for beginning to build out recommendations for NDWAC related to addressing public health concerns caused by opportunistic pathogens and DBPs while balancing risks of microbial control with managing DBP formation (including both MDBP rule revisions and non-regulatory approaches)?
- What are the implications of these building blocks for:
    - Opportunities to address environmental justice (including the role of public notice and electronic reporting update opportunities identified by WG members);
    - Ensuring efficient simultaneous compliance with other drinking water regulations; and
    - Addressing implementation challenges to reduce burden?

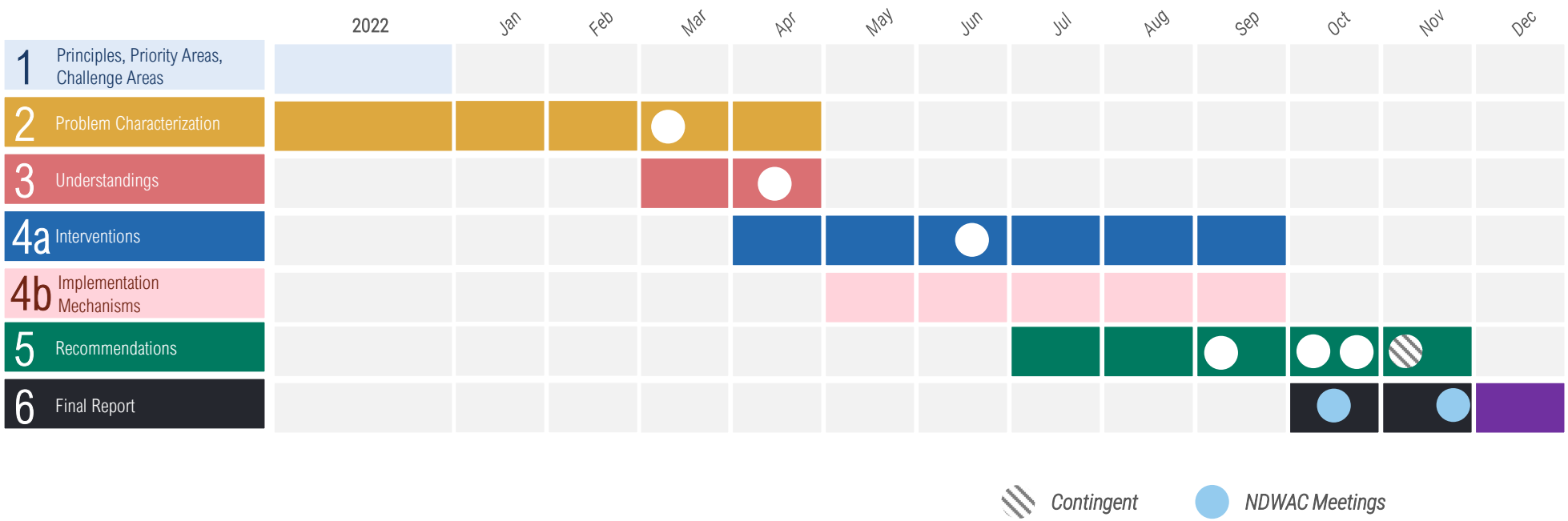
Segment 18: Path Forward

June 29, 2023

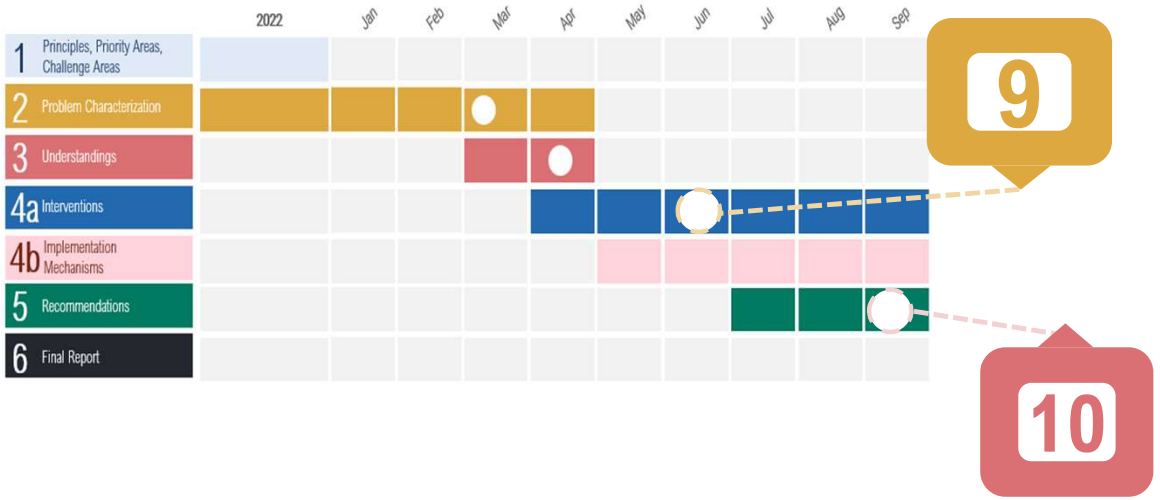
EPA

OFFICE OF GROUND WATER AND DRINKING WATER

Meeting Topics & Timeline



Meeting Topics & Timeline



June 27-29 (Today)

- Review and discuss MDBP WG-generated interventions and implementation actions to form the basis for WG recommendations to the NDWAC.
- Cross-check status of MDBP WG deliberations with the EPA charge to the NDWAC and the NDWAC request for recommendations from the MDBP WG.
- As discussions allow, identify emergent recommendations that hold potential to receive WG member consensus support.

September 14

- Discuss additional topics not addressed during the June meeting.
- Review and refine emergent recommendations.
- Review and discuss outline of WG's final report.
- Discuss purpose and approach to NDWAC October 11 briefing.

Getting from Meeting 9 to 10

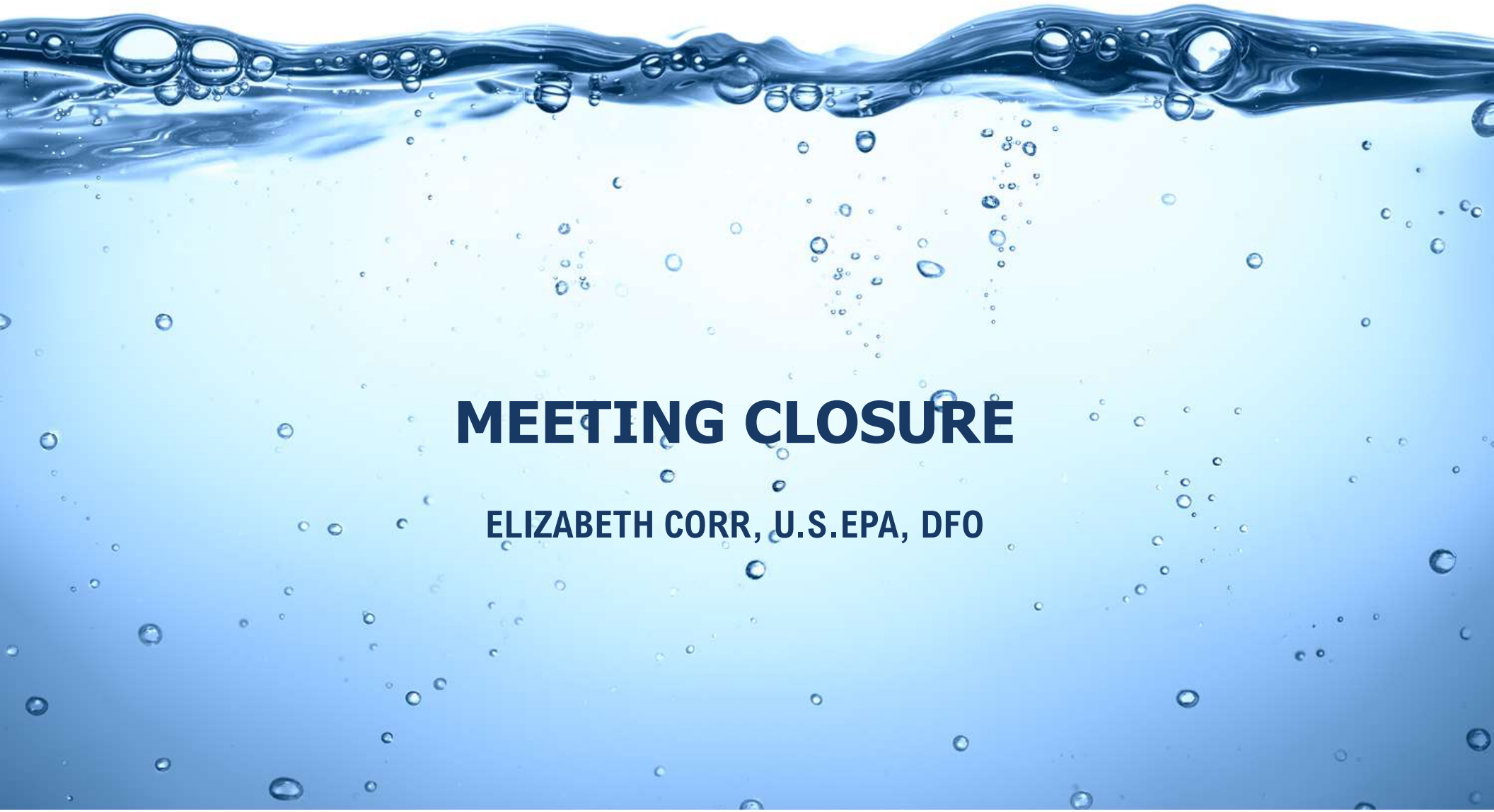
9

10

- Facilitation team compilation & sharing of MDBP WG-generated emergent recommendations to form the basis for WG recommendations to the NDWAC.
- Interim engagement between facilitation team & Working Group members to check in on potential emergent recommendations that hold potential to receive WG member consensus support.
- Interim engagement with technical analysts.
- Identify additional topics not addressed during the June meeting for discussion at the September meeting.

CLOSING REMARKS

Working Group Co-Chairs Andy Kricun and Lisa Daniels



MEETING CLOSURE

ELIZABETH CORR, U.S.EPA, DFO