NDWAC MDBP Rule Revisions Working Group

National Drinking Water Advisory Council (NDWAC)

Meeting 2 Summary

August 17, 2022

Meeting Summary

Background on the MDBP Working Group

The United States Environmental Protection Agency (EPA) has sought public input and information to inform potential regulatory revisions of eight National Primary Drinking Water Regulations (NPDWRs) included in five Microbial and Disinfection Byproducts (MDBP) rules following the third Six-Year Review. EPA hosted an initial virtual public meeting in October 2020 to solicit input on further improving public health protection from MDBPs in drinking water. Throughout 2021, EPA sought input relevant to potential rule revisions through additional public meetings focusing on topics identified through public comments and information.

EPA has now charged the National Drinking Water Advisory Council (NDWAC or Council), a Federal Advisory Committee (FAC) established under the Safe Drinking Water Act (SDWA) of 1974 to provide the agency with advice and recommendations on potential revisions to the MDBP Rules. In addition, to support the work of the Council, EPA asked the NDWAC to form a working group to explore specific issues and identify potential MDBP rule revision options for the Council to consider in making recommendations to EPA. More information on the NDWAC MDBP Rules Revision Working Group meeting schedule and other information about the Working Group (WG) is available at: https://www.epa.gov/ndwac/national-drinking-water-advisory-council-ndwac-microbial-and-disinfection-byproducts-mdbp. EPA is currently providing the public with an opportunity to send written input to EPA via the public docket at www.regulations.gov, Docket ID: EPA-HQ-OW-2020-0486.

Meeting summaries and background documents on each meeting topic are available in the MDBP Rule Revisions public docket at www.regulations.gov, Docket ID: EPA-HQ-OW-2020-0486. More information on the potential rule revisions is available at: https://www.epa.gov/dwsixyearreview/potential-revisions-microbial-and-disinfection-byproducts-rules.

Meeting Purpose

The second WG meeting was held to: create a common understanding of the current regulatory framework related to the Surface Water Treatment Rules (SWTRs); provide an inventory of Public Water Systems (PWS) subject to the SWTRs; establish agreement with the proposed scope and content of overall problem characterization relative to the WG's mission; and begin problem characterization discussions on opportunistic pathogens and disinfectant residuals. An agenda was shared with the WG ahead of the meeting, in addition to the presentation slides, draft regulatory framework and problem characterization tables; two-page documents relevant to opportunistic pathogens and disinfection residuals; and additional background materials and videos. This document provides a summary of presentations and discussions from the meeting on August 17th, 2022. In addition to WG members, approximately 100 observers attended the meeting. See Appendix 1 for the roster of Working Group members and an indication of those attending this meeting. Meeting materials are available at (https://www.epa.gov/ndwac/national-drinking-water-advisory-council-ndwac-microbial-and-disinfection-byproducts-mdbp).

Segment 1: Agenda Review and Meeting Procedures

Elizabeth Corr, Environmental Protection Specialist, Office of Ground Water and Drinking Water (OGWDW), Office of Water, EPA

Robert Greenwood, Principal, Ross Strategic

Ms. Corr opened the meeting. Mr. Greenwood and Ms. Corr welcomed all panelists and observers. The purposes of the meeting were reviewed, with introductions made to EPA staff.

Eric Burneson, Director, Standards and Risk Management Division, OGWDW, Office of Water, EPA

Mr. Burneson provided additional welcome to WG members and panelists and emphasized the importance of consulting with the technical analysts in development of material presented for WG consideration. Mr. Burneson also reiterated the charge to the NDWAC.

Lisa Daniels and Andy Kricun, NDWAC MDBP Rules Revision Working Group Co-chairs

Ms. Daniels and Mr. Kricun shared additional thanks to those who volunteered time for protecting public health. It was shared that this process would emphasize equity-related issues for individuals nationwide.

Segment 2: Regulatory Framework Related to Surface Water Treatment Rules

Mr. Greenwood noted Meeting #2 focuses on the 'Problem Characterization' phase, along with background on the SWTRs, opportunistic pathogens, and disinfectant residuals. He encouraged thorough problem characterization before moving into future steps. Comments from Meeting #1 would be addressed and brought up during their relevant and specific sections. Meetings #3, #4, and #5 are anticipated to continue to focus on 'Problem Characterization' with a pivot planned in early 2023 to discuss 'Interventions', followed by 'Findings and Recommendations'. Mr. Greenwood stated that the team would document all information requests and that there is a process in place to address these requests. Mr. Greenwood reiterated the WG operates on established procedures and that members do not represent their affiliated organizations and as such, are speaking on their expertise and individual points of view.

Richard Weisman, EPA OGWDW, presented an overview of the SWTRs identified in the charge to the NDWAC. He described the applicability of the various rules under consideration for revision. Additional consideration of public health goals, an inventory of PWSs addressed by SWTRs, and considerations for Environmental Justice (EJ) communities, along with key source, treatment, distribution, and premise plumbing were identified for the WG. He briefly covered the treatment requirements of the rules, the anti-backsliding provisions, and available information on the number of consecutive systems.

Mr. Greenwood introduced the discussion topics for Segment 2 which were as follows:

- Are there features or aspects of the SWTR regulatory framework you would like to highlight for WG consideration?
- Are there other aspects of the SWTR regulatory framework you would like to further explore?

EPA and the Facilitation Team compiled feedback based on WG discussions. WG member discussion included the following highlights and points:

- Questions were raised regarding the status and context of compliance with SWTRs and DBPRs. A member stated that establishing a baseline of progress and effectiveness since the initial release of these rules would

allow the group to see what the SWTR and DBPR have accomplished, which would inform potential changes to those rules.

- Another member requested information on the status of the Safe Drinking Water Information System (SDWIS) data reporting system, whether the EPA was auditing state documents, how SDWIS reflects data that was not reported, and what violations are tracked and not tracked in SDWIS. Questions were raised whether significant deficiencies from Sanitary Surveys is a datatype which can be pulled for background.
- A member suggested the group be provided with information related to assessing operational practices and challenges related to maintaining a numerical disinfectant residual level.
- A member noted it would be helpful for everyone to have a common understanding of the guidance provided by EPA on the prevention of waterborne disease and the risk guidelines under which the SDWA operates. *Legionella* is clearly detected in water that is compliant with existing regulations, so some of the assumptions from the original SWTR may no longer be valid. It was also noted that scientific literature will be made available to the WG.
- More information was requested on the monitoring locations for total coliforms and disinfectant residuals. Mr. Weisman noted that samples are collected at coliform monitoring locations throughout the distribution system locations that are supposed to be representative of the distribution system, but locations can be somewhat limited based on use of locations where there is sufficient access to the system.
- Safety and compliance were noted as often highly focused on raw water treatment, though not for further monitoring/treating water in distribution systems. Discussions emphasized keeping this in mind as the raw, treated, and distributed water processes differ greatly. For instance, CT requirements are relevant to source water treatment, not to the distribution system. In the distribution system context, disinfectant residuals are a key consideration for *Legionella* control.
- Regarding compliance, members asked to point out which specific violations will be focused on by this WG. In addition, a high-level summary of reporting requirements was requested, to ensure regulatory requirements are being met and are in place to further ensure the public is notified when PWSs are not complying with NPDWRs.
- Discussion was held on whether more-stringent State requirements are proving to be more effective and to know which States institute stricter drinking water requirements compared to those established through the EPA (with specific comparisons to SWTRs and DBPRs).
- The need to understand considerations in controlling opportunistic pathogens and *Legionella* was noted, including shared responsibility between water systems and building owner/operators. It was also pointed out that not all *Legionella* species are pathogens, and that *Legionella pneumophila* is of most concern. Another member indicated that the risks need to be put into context, and that a presentation on Quantitative Microbial Risk Assessment (QMRA) may achieve this.
- Questions were raised on chlorine detection across distribution systems. Answers were provided on rule requirements, but members requested more specific data on a per region basis, including the monitoring requirements by system size.
- The charge to the WG was noted to be focused on SWTRs and not on ground water systems, and this raised a concern for some members. It was noted that, although outside the charge to the group, summaries of discussions can be mindful of and capture input relevant to ground water systems.
- A presentation on the National Academies of Science, Engineering, and Medicine report on *Legionella* in distribution systems was requested.

Segment 3: Problem Characterization Scope, Content, and Approach

Mr. Greenwood provided a presentation reviewing a 'Problem Characterization' approach for the topics the WG will review. The topics will be characterized within four categories based on the mission of the WG: Public Health; Compliance; Environmental Justice; and Burden/Complexity Cost. For each topic area and category WG members will discuss 1) What is the problem, 2) What are the root causes, 3) What is the magnitude, and 4) What degree of certainty do we have regarding root causes and magnitude? A good capture of problem areas was noted to be important. Mr. Greenwood suggested an approach of utilizing "revealed preferences" in determining what perspective each WG member brought to their assessment of the magnitude of the problem for each topic. Once a magnitude and certainty of magnitude range is determined for each topic, the topics can be grouped into types based on similar magnitude and certainty. This analysis will assist the WG in prioritizing the topics that will move forward to the intervention analysis stage. Mr. Greenwood noted that the types were not a catch-all but instead represented a continuum of issues to be addressed.

Mr. Greenwood further explained the idea is to aim for a problem characterization which will cross into different areas of concern. When moving to the recommendation phase, intervention options will be screened against the characterized problems to look for those that are ready for action and can provide cross-cutting solutions. Clear, productive, and open conversations were stressed as crucial for this WG. The WG was provided with the following discussion topics:

- Do you have additional problem areas to include as part of the problem characterization (Table 2)?
- Which of these problem areas are of most interest to you and why?
- Are there any refinements to the problem exploration approach that will be helpful?

EPA and the Facilitation Team compiled feedback during the engagement. WG member discussion included the following highlights and points:

- Some WG members expressed concern that using *Legionella* as an example in the problem characterization approach presentation may have given the appearance that *Legionella* has more importance than other opportunistic pathogens which could potentially unduly influence some WG members perspectives.
- Need to provide examples of Environmental Justice issues in the problem characterization table under cross-cutting and interdependency concerns. Information on affordability would be helpful as well. Transparency and Public Notification were suggested as further additions to the table.
- Suggestions were made to consider the group agreeing on a definition of magnitude to minimize subjectivity. In response, the facilitator indicated that the "revealed preferences" approach allows individual members to create their own basis for magnitude and to make other WG members aware of this. Such an approach engenders understanding across WG members as to the perspectives and values individual WG members bring to their assessment of magnitude and creates a basis for finding common ground among members.
- Consideration of potential downstream regulatory effects was identified and acknowledgement of Concentration x Time (CT) requirements for treatment facilities, as well as downstream of treatment zones in assessing effects on downstream DBPs.
- Public notification and transparency were raised as a potential problem category.
- WG members suggested seeking simultaneous compliance measures with other existing regulatory requirements that reflect those with which PWSs are already familiar. This would also assist utility systems that must evaluate potential measures for interaction with Lead and Copper Rule measures in their existing workflows (i.e., for those associated with Lead and Copper Rule and corrosion control).
- Emphasis was placed on potential effects to operations, maintenance, and premise plumbing. This should include consideration of finished water storage and the distinction between distribution system and premise

plumbing problems. Additionally, how blended waters from different sources is handled by water systems needs further explanation.

- Certain members encouraged considering wastewater monitoring, following the model of wastewater surveillance for COVID-19, as a potential means to fill certain current microbial data gaps regarding pathogen occurrence and WBD prevalence in society, while other members suggested caution in pursuing the path forward and believed further discussion is needed as to whether *Legionella* sampling would be appropriate and what the results would imply with regard to risks.
- WG members encouraged obtaining additional insight on distribution system water quality conditions and the implications for public health impacts.
- Addressing uneven distribution of resources amongst PWSs was suggested as a goal for the WG to address, specifically with treatment options.
- It was discussed to look at adapting targeted data collection measures in differing points of distribution systems to address water quality variations throughout a distribution system.
- More information was requested on what EPA previously considered for regulating distribution systems and why those efforts did not go forward.
- Include EJ considerations as foundational to determining the magnitude of identified problems. In addition, EJ analyses should consider sub-populations such as the immunocompromised and most vulnerable and marginalized communities, as well as resources available to systems serving such communities. An important consideration in this context is how monitoring requirements align with these communities.

Segment 4: Problem Characterization on Opportunistic Pathogens

Mr. Greenwood discussed the use of technical analysts to support the WG discussions, noting the evolving nature of EPA's Technical Analyst partnership and their role in providing expertise and context for WG member discussions.

Kenneth Rotert, US EPA OGWDW, was introduced and presented on Opportunistic Pathogens of Concerns in Drinking Water Distribution Systems. Mr. Rotert emphasized that *Legionella pneumophila* was specifically of concern. Information was presented on Legionnaire's Disease, along with details of a 2022 study by Holsinger et al. on geographic influence and disinfectant-type relative to reported outbreaks.

Commander Jasen Kunz, Drinking Water Lead in the US Center for Disease Control (CDC) Waterborne Disease Prevention Branch in the National Center for Emerging and Zoonotic and Infectious Diseases, presented on Waterborne Disease Outbreaks, using data from 1971-2014. *Legionella*, *Mycobacterium avium* Complex (MAC), and *Pseudomonas* were reviewed. Discussion was held on emergence of chlorine-tolerant pathogens since the 1970s, and on increases of Non-tuberculosis *Mycobacteria* (NTM). Biofilm was identified as relevant to pathogens and tap water, with potential exposure routes ranging from drinking, recreational, and industrial waters. Notably, CDR. Kunz pointed out that biofilm-associated pathogens are associated with more severe disease-outcomes resulting in worse infectious cases.

Mr. Rotert presented an additional series of slides on occurrence studies, with comparisons drawn from *Legionella* spp., detections in surface water systems using chlorine or chloramines as secondary disinfectants, and in groundwater systems using chloramine as a secondary disinfectant. Mr. Rotert showed studies where *Legionella* presence was notable in waters with low chlorine residuals and pointed out correlations in other studies where *Legionella pneumophila* proliferated in waters with higher temperatures. The presentation also covered summaries of MAC occurrence studies by source water and disinfection types, and detection frequencies in water using culture and molecular methods, with a key takeaway being molecular testing has a much higher positivity rate than culture methods. Mr. Rotert summarized that inadequate disinfectant residuals can contribute to opportunistic pathogen

growth in PWSs as well as other factors including: nutrient availability; sediment accumulation; high water age; and corrosion and infrastructure condition.

Discussion topics provided to the WG included:

- Clarifying questions for technical presenters?
- What additional information will be helpful to further understand opportunistic pathogen-related problems?
- Within the drinking water value chain, what do you believe are the most prominent root causes?
- Given the information in front of you today, how do you perceive the magnitude of the public health concern?
- What degree of certainty do we have regarding root causes and magnitude of the problem?

WG members made the following observations, comments, and suggestions:

- Further clarification on scales of graphs from the CDC-focused presentation was requested, along with input from technical advisors to help further extrapolate and interpret presented data, to narrow out scopes and problem severities where they exist. The real increase in cases is unclear according to one of the WG members. There is also the need to better understand the root causes behind the identified cases and be able to differentiate recreational water cases from drinking water cases, and within the drinking water system what cases are related to the distribution system versus premise plumbing.
- The WG would like to better understand the degree to which it is within EPA's purview to look into premise plumbing. Mr. Rotert responded that there are an unknown number of building water systems providing treatment that could appropriately be regulated as public water systems.
- Members suggested matching molecular studies to *Pseudomonas* found in cases related to drinking water supplies, specifically on molecular matching, and on the effectiveness of culture versus molecular methods.
- There were requests for data on the proportion of water supplied by water systems that is used in aerosol generating activities associated with environmental exposures to *Legionella* from sources including, but not limited to, watering of lawns, gardens, washing of cars, etc. CDR. Kunz responded that the CDC did not have information about overall water use because their investigations are related to case outbreaks, but sprayed water is considered a source in an outbreak investigation.
- Information was requested on endemic diseases compared to waterborne outbreaks and what percentage of cases are being picked up in outbreaks. Specifically, it was asked how additional data could be collected for occurrence of opportunistic pathogens that could be made available to WG members for consideration.
- A member asked which of the factors contributing to opportunistic pathogen growth is the most significant. Mr. Rotert responded that given the limited number of occurrence studies and the complexities and differences in water systems it is extremely difficult to say one factor or another led to a particular result.
- A member asked if there is an increased vulnerability to disease following a case of COVID-19 and, if so, how this could impact the complexion of vulnerable populations in the future.
- State-level data on inactivation and disinfection contact times were requested if readily available. Further information on a comparison of occurrence using molecular versus culture methods was requested. Information on the presence of pathogens detected by molecular methods could inform the risks present in the absence of a residual, according to one member. A question was also raised about how specific molecular methods can be.
- WG members inquired if profiles of distribution system data were ever assessed during an outbreak of infectious waterborne diseases.
- A WG member requested more information about the specific organisms at issue along with the ecology, life-cycles, and composition of source environments where they may most ideally thrive, as those conditions relate to drinking water distribution systems and resistance to disinfection.

- Suggestions were made to look at datasets beyond those typically analyzed in understanding drinking water systems and supplies (e.g., outbreaks). Examples included Medicare and Medicaid filings, to understand the extent of possible infection scenarios.
- Discussion covered the importance of gauging deteriorating infrastructure as a contributor to poor water quality in distribution systems and/or premise plumbing systems. One member questioned whether Drinking Water State Revolving Funding has a mechanism to target systems serving disadvantaged communities.
- Challenges in a study from the Netherlands utilizing carbon to control *Legionella* was discussed as making the study less relevant to the United States, as a secondary disinfectant is not used there.
- Clarification was requested on why microbes were not included as part of UCMR5, given the contribution to burden of disease. A suggestion was made to add *Legionella* to the UCMR effort.
- The existence of a Request for Applications from the US EPA for research on disinfectants, DBPs, and opportunistic pathogens in drinking water distribution systems was highlighted, along with questions about when such data will be available to the WG.
- One member indicated that they believe there is insufficient information at this point in the WG process to support drawing any conclusions relative to problem characterization for opportunistic pathogens.

Segment 5: Problem Characterization – Disinfectant Residuals

In this segment, Mr. Weisman presented on disinfectant residual types, specifically on free chlorine and chloramine. An overview provided estimated inventory information about surface water community systems based on system size and the type of disinfectant residual used. Mr. Weisman noted concerns that an unquantified detectable concentration of disinfectant residual in distribution systems may not be adequately protective of public health with respect to exposure to microbial pathogens. Data identified in the Six-Year Review 3 effort by EPA showed concerns about the potential for false positives when organic chloramines are detected rather than the presence of an actual, active disinfectant residual. EPA's recent addition to approved analytical methods (EPA Method 127) was noted, which can be used to determine concentrations of monochloramine in drinking water. Mr. Weisman presented risk-balancing as an important consideration to the WG. Background was provided on the Six-Year Review 4 of Drinking Water Standards (Information Collection Request). It constituted a voluntary information collection effort which requested primacy agencies to provide EPA with compliance monitoring data for the years of 2012-2019. Eight million records were collected for disinfectant residuals. The information presented included a breakout of disinfectant levels maintained in states requiring systems to maintain a numeric disinfectant residual level versus a detectable level. This information is available on EPA's website, though it is important to note variability amongst systems and states for which compliance monitoring data was provided.

Chad Seidel, President, Corona Environmental Consulting, presented material first shared publicly at the AWWA Water Quality Technical Conference in Fall of 2021. Key observations of this presentation included that disinfectant residual data is not necessarily managed in the same way as other drinking water compliance data in some states. Data was collected from 46 states, but disinfectant residual data available for analysis was limited to PWSs in 23 states. In addition, the data had varying naming conventions for disinfectants, where some are specific, but others are ambiguous. This poses a challenge for creating comparable data sets for use by decision-makers. Because of the data challenges and their impact on the ability to aggregate or compare data across states, his presentation focused on a case study in the state of Colorado. In regard to data management, Mr. Seidel recommends that data management practices need to be standardized and states need to be supported in accomplishing this; he also seconded the Working Group's suggestion that a good effort would be to assess current compliance with the SWTR and DBPR and assess what can be done to improve non-compliance with those standards.

Discussion topics ranged as follows:

- What additional information will be helpful to further understand disinfection residual-related problems?
- How widespread are problems with maintaining disinfectant residual levels that are adequately protective against opportunistic pathogens?
- What is your sense of the importance of problems related to inadequate disinfectant residuals versus other factors that contribute to opportunistic pathogen growth (e.g., accumulation of sediments)?
- Within the drinking water value chain, what do you believe are the most prominent root causes (what challenges exist for PWSs to be able to maintain these levels)?
- How can disinfectant residual data compared to the presence of microbial indicators be used to inform control of opportunistic pathogens while considering other distribution system water quality factors (e.g., differing growth conditions, sediment accumulation, high water age)?

WG member discussion included the following highlights and points:

- One member noted the problems related to disinfectant residuals are a moving target due to so many factors including storage times, water time in systems, and consecutive systems, but that there is a need to establish a minimum residual for free chlorine and chloramine. When asked what a disinfectant residual minimum would accomplish, the member stated that although it is a balancing act to maintain a minimum residual, it would resolve issues with biofilm in the distribution system and emerging contaminants.
- Another member responded that it still was not clear what the problem was that a numeric disinfectant residual would solve, and whether the information about disease outbreak correlates with states with numeric disinfectant residual levels showing a connection between health issues and disinfectant residual levels.
- Suggestions were made to standardize what is defined as a 'measurable residual.'
- Sampling plans are intended to be reflective of the entire distribution system relative to protection from fecal contamination. Members asked if this information is available and verified to be up to date by states.
- One member asked whether there was a clear-cut preferable disinfectant residual type, to which Mr. Weisman and Mr. Seidel responded that this is not the case, since there are many factors that go into determining the appropriate disinfectant for a system. There is no single factor that contributes to positive outcomes.
- A member stated that there is enough data to say we have a serious issue, and the CDC has documented illnesses and outbreaks. The member asked what kind of data we can collect that demonstrates how widespread pathogens are in distribution systems? The member pointed out that the data suggest that maintaining a better residual appears to result in better water quality control, and suggested that more data could indicate how widespread the issues are. Another member asked what fecal pathogen treatment through disinfectant residual means for opportunistic pathogens. Mr. Weisman and Mr. Rotert responded that the relationship between residuals and coliform is widely accepted, and that Total Coliforms and *E. coli* are used as representative of water quality, however those measures do not necessarily indicate water quality in relation to biofilms and opportunistic pathogens. Mr. Seidel agreed that the trend of lower coliform with higher disinfectant residual has been known for some time, but we also do not currently have information as to how many and which water systems are or are not meeting a certain disinfectant residual. Answering that would require looking through multiple iterations of information and differentiation of standards and reporting of standards. It was also noted that opportunistic pathogens are harder to treat than fecal pathogens. At least one WG member asked what the fecal pathogen data mean for opportunistic pathogens.
- Reviewing existing water management plans was raised as a possible item, particularly to understand why certain systems made the decision to disinfect with chlorine or chloramines.
- It was suggested that EPA look at RTCR and DBP compliance data to determine potential unintended consequences from raising residuals. They suggested an evaluation of how systems met the higher residual requirements when states mandated them.

- Regional differences of *Legionella* occurrence due to climate, topographic, and distances between populations and PWSs were pointed out as potential factors to consider when weighing problems. One member suggested that opportunistic pathogens appear to primarily be a premise plumbing issue.
- WG members pointed out that states with groundwater systems are not required to provide disinfection when coliform testing shows negative results; and that this applies to large sections of the country.
- A member highlighted the limitations for using data on treatment efficacy in a water column where pathogens may already be harbored within biofilms (e.g., for *Legionella* which are relatively easily inactivated when dispersed in water but not in biofilms and/or within amoeba where they can be protected from disinfection).
- Sharpening focus on the root causes of *Legionella* within premise plumbing was encouraged.
- Underserved communities were highlighted with suggestions for programs/tools developed (such as the Climate Resilience Evaluation and Awareness Tool), to help systems easily step through options. Technical assistance availability was highlighted through programs such as the Area-Wide Optimization Program.
- Conversations bridged to acknowledging significant variability in design and operation amongst systems. One member indicated that the problems may be more pronounced in oversized systems where water age and other challenges are present.
- Certain members noted that requiring a high level of residual at entry points to the distribution system would not be operationally successful and would likely cause new issues downstream. Alternative suggestions from some members included boosting residuals in the distribution system, flushing the system, and running tanks at lower water levels.
- A member expressed concern regarding over-chlorination, especially in systems that are oversized because a community has experienced population decline. Mr. Weisman noted that over-chlorination is generally only used in emergency situations. Mr. Seidel noted that maintaining a disinfectant residual is a balancing act, and it is possible to maintain adequate disinfection in an oversized system and/or while managing corrosion control and other conditions, but that this requires managerial and technical capacity to reach that balance. Mr. Seidel further noted it is important to look closely at systems where expectations are not being met. Another member noted that monitoring locations are not designed or required to be in places or times where it is hardest to meet the residual level, so issues may be much larger than we know about from just reporting. The member agreed that looking at where there are compliance gaps could be a path for the group towards achieving better overall results for drinking water safety. A member suggested the need to understand operational considerations that could be shared based on successful experiences from PWSs. Another member suggested that operational performance, such as maintaining lower storage tank levels and flushing, can help with maintaining residuals without over chlorination. Water quality monitoring software from EPA is available to PWS who wish to develop a better understanding of disinfectant concentrations throughout their distribution system and at strategic locations within them.
- Learning more (and gaining better clarity) about which specific problem the WG is trying to solve, tied to a specific disinfectant residual, would be helpful in the overall problem characterization process.
- Suggestions were made to devise pros versus cons for specific disinfection residual types and include impacts such as DBPs, or how systems would meet increased requirements, and include whether these impacts would positively or negatively affect distribution systems.

Segment 6: Meeting 3 Agenda and Next Steps

Ryan Albert, **US EPA OGWDW, Chief, Standards and Risk Management Division**, reiterated the interdependence of drinking water regulations in protecting public health, the importance of risk-balancing objectives of the MDBP rules and noted the intention to further engage with technical analysts as this process moves forward. He provided an overview of the tentative plan for Meeting #3 which is to further discussions about opportunistic pathogens and

disinfectant residuals, as well as to start discussion related to selected DBP-related concerns. He requested WG members to provide feedback about the anticipated topics for Meeting #3.

Discussion Topics for Segment 6:

- Do you have additions or refinements to the proposed topics?
- What background materials, presentations, or other resources will be helpful to you to prepare for the Meeting 3 discussions?
- Mindful of time and resource limitations prior to the next meetings, what supplemental technical analyses would you like on the topics to help inform discussions?

WG member discussions included the following highlights and points:

- Members requested if a status on compliance issues for DBPs could be supplied for subsequent meetings. Members suggested compliance data could help inform the WG on items which were done in earlier regulatory processes that serve as lessons learned. This is especially important in consecutive and combined systems given their relatively higher level of health-based DBP violations as compared with non-consecutive systems.
- If available, national-level data on TOC might be helpful while potentially drawing on data strategies utilized from UCMR 4.
- Emphasis was placed on learning more about distribution systems nation-wide.
- One member specifically highlighted the potential impact of new requirements on small systems and asked that their challenges be explicitly factored into WG deliberations. The member suggested that certain small systems may be faced with the choice of providing water, meeting regulatory standards, or not supplying water at all, especially in some consecutive system contexts.
- Addressing other DBPs apart from HAAs was encouraged, especially those that are unregulated. Consideration was also requested on other brominated or iodinated DBPs. In addition, there were requests for information on factors leading to the formation of certain DBP groups, noting their formation may occur for reasons apart from water age, including regional geology and climate.
- One member reminded the group that examining and addressing implementation challenges under the current implementation of SWTRs is both important and an explicit part of the charge to the WG.
- Numerous questions were noted on DBP health effects, and which specific ones could be considered for this WG.
- One member noted how future regulatory outcomes may lead certain utilities to decide between water sources, and it was further noted to the WG to consider how that may disadvantage specific communities or PWS with mixed systems and multiple water sources.
- A member asked if discussions about DBP health effects would focus solely on cancer or additionally address concerns such as mutagenicity and teratogenicity. One member asked if EPA is still using 70 years of exposure to determine risks and asked how chronic sequelae factor into the risk assessment approach.
- The facilitator noted that opportunistic pathogen discussions will be continued in the next meeting, including addressing questions raised during these Meeting 2 discussions.

At the conclusion of the meeting, the Co-Chairs Andy Kricun and Lisa Daniels thanked the WG members for their participation and engagement throughout the day. Ms. Corr closed the meeting.

Appendix 1: MDBP Working Group Meeting Attendance – August 17, 2022

Name	Attendance
Andy Kricun, WG Co-Chair	x
Lisa Daniels, WG Co-Chair	x
Alex Rodriguez	x
Benjamin Pauli	x
Bill Moody	x
Elin Betanzo	x
Erik Olson	x
Gary Williams	x
Jeffrey Griffiths	x
John Choate	x
Jolyn Leslie	x
Kay Coffey	x
Lynn Thorp	x
Lisa Ragain	x
Michael Hotaling	x
Nancy Quirk	x
Rosemary Menard	x
Scott Borman	x