

June 27-29, 2023, Meeting 9 Summary

RUCKELSHAUS CONFERENCE CENTER, EPA HEADQUARTERS
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DRAFT FOR EPA REVIEW

Meeting Summary

Background on the MDBP WG

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 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 WG 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 Rule Revisions WG meeting schedules and other information are available at: <https://www.epa.gov/ndwac/national-drinking-water-advisory-council-ndwac-microbial-and-disinfection-byproducts-mdbp>. EPA is 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 ninth Working Group (WG) meeting was held to 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; and identify emergent recommendations that hold potential to receive WG member consensus support.

This document provides a summary of presentations and discussions from the meeting on June 27-29, 2023. The summary presents the agenda segments in the order that they were discussed in the meeting which may differ from the scheduled order of segments in the published agenda.

The following materials were shared with the WG members ahead of the meeting:

- Problem Characterization Synthesis Document
- Common Understandings Document
- Interventions and Implementation Actions Document

- Responses to WG Member Questions
- Reference Materials

In addition to WG members, approximately 80 observers viewed the meeting, either in person or virtually through an internet broadcast.

Tuesday, June 27, 2023

Segment 1

Agenda Review and Meeting Procedures

Elizabeth Corr, MDBP Rule Revisions WG Designated Federal Officer, Office of Ground Water and Drinking Water (OGWDW), Office of Water, EPA

Ms. Corr thanked all for joining the ninth meeting of the National Drinking Water Advisory Council's, Microbial and Disinfection Byproducts Rule Revisions WG. She noted that the Working Group (WG) is assisting the Council and responding to EPA's November 2021 charge on potential revisions to MDBP rules. She then introduced Jennifer McLain, U.S.EPA OGWDW, Director.

Jennifer McLain, Director, OGWDW, Office of Water, EPA

Dr. McLain thanked all members for their participation and input through the past eight meetings and for their continued engagement. She highlighted that it is important for EPA to collaboratively develop recommendations for the revised MDBP rules. Dr. McLain indicated that the MDBP rules help reduce drinking water health risks and she shared her appreciation for the WG members' commitment in identifying opportunities to revise the rules. She extended thanks to the technical analysts that support the MDBP WG member collaboration process and to the observers that monitor the WG members' discussions.

Lisa Daniels, NDWAC MDBP Rules Revision WG Co-Chair

Ms. Daniels welcomed all to the ninth meeting and expressed continued thanks and appreciation for all of the work to date from the WG members, EPA, and technical analysts. Ms. Daniels was appreciative of seeing the WG members in person and observed that the three-day meeting will offer an opportunity for significant WG work and discussion.

Andy Kricun, NDWAC MDBP Rules Revision WG Co-Chair

Mr. Kricun echoed the Co-Chair's sentiments. He extended thanks to the WG members providing their expertise, EPA and the technical staff for their guidance, and to Ross Strategic and their team for helping to frame discussions.

Robert Greenwood, Principal, Ross Strategic

Mr. Greenwood reviewed the meeting's agenda and the logistics for virtual participants. He noted that the agenda includes reflection time to take stock of each meeting day discussion before addressing additional topics. Mr. Greenwood shared a few reminders, including that active participation from technical analysts is encouraged and that some technical analysts are participating virtually, and observers are in listen-only mode.

Mr. Greenwood noted that two WG members had schedule conflicts and were not in attendance at the meeting, however they were engaged before the meeting and will be updated after the meeting and provided an opportunity to provide their perspectives on the meeting's discussion.

Mr. Greenwood drew WG members' attention to three documents shared in advance to support the meeting discussions: the Interventions and Implementation actions document; the Problem Characterization Synthesis document; and the Common Understandings document. He emphasized that the overall expected outcome from the meeting was to identify emerging recommendations for MDBP rule revisions that the WG members are interested in developing in future meetings.

See Appendix 1 for a roster of WG members and an indication of those in attendance.

Segment 2

Context Setting

Mr. Greenwood reviewed the regulatory background and EPA/NDWAC direction for the WG, which is to provide advice and recommendations on key issues related to potential revisions to MDBP rules. He noted that recommendations may include regulatory and non-regulatory approaches.

Mr. Greenwood reminded everyone of the WG's expected product from this effort, i.e.: to provide group consensus recommendations to the NDWAC where possible and alternatives where consensus is not reached in the time available. Mr. Greenwood added that alternatives will be captured in the final WG product and that WG members also will have an opportunity to submit up to three pages of individual, attributed comments for inclusion in the WG product without modification.

Mr. Greenwood shared the desired meeting outcome and expectations for in-person deliberations. He noted that the objective of the meeting is to gather a sense of emergent recommendations and identify alternatives where consensus cannot be reached. He added that each discussion session focusing on potential intervention areas will include straw polling to understand overall support, but the polling does not represent a firm commitment from WG members. Mr. Greenwood reminded everyone that consensus recommendations will be targeted as a package of elements that work together.

Before each discussion segment, Mr. Greenwood provided context for the conversation using as source material the 'MDBP WG Common Understandings' document; the "MDBP WG Interventions and Implementation Actions Compilation" document; and the "Problem Characterization document, all shared with members before the meeting.

Throughout the meeting, Mr. Greenwood conducted straw polls to understand WG member level of support for implementation actions being discussed. The following framework was used to characterize the level of support and the aggregated WG member perspectives:

- Full: Support from all the present WG members (16 out of 18 WG members were in attendance)
- Substantial: Support from more than 7/8 present WG members
- Strong: Support from more than half the present WG members
- Limited: Support from less than half of the present WG members
- Little: Support from less than ¼ of the present WG members

Segment 3

Premise Plumbing – Improve Building Water Quality

The intervention area on premise plumbing, the related implementation actions, and a high-level summary of the WG discussion can be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

Intervention Area 1: Improve building water quality¹

Premise plumbing systems can encounter issues similar to those found in distribution systems, such as potential for insufficient disinfectant residuals, potential for growth of opportunistic pathogens, infrastructure deterioration, inadequate corrosion control, increasing water age, sediment and biofilm accumulation, and backflow of contaminants through cross connections. Utilities and their operators are limited in their capabilities to affect maintenance of water quality in premise plumbing systems, specifically once water leaves regulated portions of the distribution system piping. Building water quality often falls under the authority of local health agencies and usually only when there is a problem such as a confirmed Legionnaires’ disease or other water quality problem. In addition, treatment added to building water systems can lead to unintended consequences for customers if not properly managed by well trained and certified water operators.²

Implementation Action 1: Make CDC Water Management Program guidelines a requirement

Implementation Action 2: Stand up national building water quality initiative (enhanced partnership among federal agencies)

1. Create model code
2. Enhance community education
3. Create an insurance industry partnership
4. Develop more affordable monitoring

Perspectives shared during WG meeting included:

- Discussion signaled general WG member support to develop a recommendation on premise plumbing to improve building water quality, with members reiterating the need for shared responsibility between public water systems and building plumbing management.
- Discussion indicated interest in the concept of a model code for premise plumbing that could support states and local health departments in their promotion of improved building water management and could be used directly by large buildings (e.g., schools, hospitals) as guidance for planning and implementing their building water management programs. Discussion indicated that states, local governments, and water quality professionals will benefit from a “one-stop-shop” model code backed up with diverse resources from water design to water quality. Members added that there are existing codes and standards that could be leveraged for the model code, and EPA informed the WG of an upcoming release of a voluntary ASHRAE Committee standard on building water systems focused on improving water quality from chemical and physical hazards. Members also gave as an example the CDC model aquatic health code and indicated that, despite being a voluntary code, CDC works with state departments to advance the code. One member suggested

¹ Description of Implementation Areas throughout this Meeting Summary are drawn verbatim from the MDBP WG Interventions and Implementation Actions Document.

² For references for above statements see Problem Characterization Synthesis Document Sections: 2.1 – 2.12; 9.3.2; 10.5.11.

that the EPA regional offices could play a role in promoting the model code for premise plumbing since the offices work closely with states.

- WG members discussed the concept of including in Public Water System sampling and monitoring locations within high-risk buildings with a potential focus on targeting sampling during periods when conditions are more conducive to opportunistic pathogen growth (e.g., periods of warmer temperatures during the summer).
- WG Member discussion explored two potential aspects of a national building water quality initiative. One aspect leaned into building a federal partnership that would promote voluntary efforts designed to elevate building water quality (see model code discussion above). A second aspect leaned into understanding and leveraging Federal partner authorities (outside of those in the SDWA) to expand water quality requirements for building owner/operators beyond those currently in place under the SDWA for buildings that undertake treatment. The WG discussed the need to leverage non-SDWA authorities to frame recommendations for vulnerable buildings and potentially tie them to water safety plans at larger institutions (e.g., nursing homes, universities).
- Discussion also indicated that implementation of requirements under the SDWA for buildings that conduct treatment is variable among states.

Path forward and straw poll support emerging from WG discussion:

Path Forward: Further develop the concept of a national building water quality initiative creating an enhanced partnership among federal agencies. A WG member focused conversation will further explore options that include components such as: model codes, green building certifications that can create challenging water quality conditions, and public education. Options that will be explored include both:

A) Leveraging partnerships with other federal agencies to incentivize and encourage voluntary efforts to improve building water quality; and
Straw Poll Support: Full

B) Leveraging non-SDWA authorities to have requirements for vulnerable buildings.
Straw Poll Support: Substantial

Path Forward: A WG member focused conversation will explore requiring public water systems to monitor water quality related to opportunistic pathogens in higher risk building contexts.
Straw Poll Support: Limited

Segment 4³

Distribution System - Disinfectant Residual, Overall Distribution Water Quality, and Opportunistic Pathogen Benefits

The intervention area on Distribution System – Disinfectant Residual, Overall Distribution Water Quality, and Opportunistic Pathogen Benefits - and the related implementation actions discussed by WG members can

³ This segment summary integrates a discussion that took place during two different time slots at the meeting.

be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

Intervention Area 1: Address the potential for no or low disinfectant residual in distribution systems⁴

The current regulatory framework can result in low or no disinfectant residual in portions of the distribution system. Disinfectant residuals act as an indicator of overall water quality conditions, provide protection from contaminants entering the distribution system, and provide for biofilm control. The current compliance basis can allow for the same portions of a system to have no detectable residual on a repeated basis; residual monitoring locations may not be indicative of all risks; and some locations may never be properly monitored. In addition, monitoring total chlorine in systems using chloramines as a residual can be interfered with by the presence of organic chloramines in the water. These organic chloramines have little to no disinfecting power. EPA has recently approved a monitoring method for monochloramine.⁵

Implementation Action 1: Require minimum numeric residual in DS. Set a required national numeric disinfectant residual level to be met in distribution systems, using EPA approved monitoring methods. Ranges discussed include between 0.1 mg/L to 0.3 mg/L for free chlorine and up to 0.5 mg/L for total chlorine. There is a need to be prepared to offer systems assistance for DBP control in the context of elevated disinfection residual levels.

Perspectives shared during WG meeting included:

- Discussion signaled general WG member support for a required national numeric disinfectant residual to be met in distribution systems. WG members believe that systems obtaining a minimum numeric disinfectant residual level will see improvement not only to disinfectant residual level but overall water quality due to improved distribution system operating conditions. WG members also believe technical assistance for systems needing distribution system optimization is a key component of implementing this type of regulation.
- The perspective was shared that while a numeric residual is a positive development, impacts to changing residual requirements on DBP formation should be weighed and possibly pilot studies should be undertaken. Regarding potential increased DBP formation, the concept of precursor control, discussed in other parts of the meeting, was raised as an opportunity to offset potential increased DBP formation due to increasing minimum disinfectant residual levels throughout the distribution system. Another WG member noted that in states which have recently adopted a minimum numeric disinfectant residual, they did not see appreciable increases in DBP violations because the disinfectant residual was not normally achieved by increasing disinfectant, but more through other water management techniques such as flushing and better management of water age. WG members recognized that in some areas of the country, flushing is not a desirable way to control water age due to water use restrictions.
- WG members expressed support for the potential regulation to be designed to encourage utilities to achieve the minimum residual through distribution system management first rather than increased disinfectant dosing; while acknowledging the challenges for small systems to implement distribution system management and the likelihood of single operator systems increasing disinfectant dosing as a first option.

⁴ MDBP WG Interventions and Implementation Actions Document.

⁵ See Problem Characterization Synthesis Sections: 1.2 - 1.5; 3.1 – 3.4; 3.10; 5.9; 9.3.1, 9.3.2, 9.3.4, 9.4.4.

Path forward and straw poll support emerging from WG discussion:

Path Forward: Develop a recommendation for federally required national numeric minimum for disinfectant residual in the distribution system. Request technical support applying best professional judgment to provide perspectives on a range of numbers that could be the numeric minimum value, along with their understanding of potential consequences of those values. The WG can recommend a range of values to the NDWAC that can be used by EPA in a consequence analysis during a potential rulemaking. Straw Poll Support: Substantial

Implementation Action 2: Revise sampling and monitoring requirements: Revise monitoring plan requirements to better address stagnation zones and other distribution system areas potentially vulnerable to low or no residual. Potential topics for monitoring revisions include locations with a combination of representative (RTCR locations) and maximum residence times, at or near finished water storage tanks, interconnections to consecutive systems, at or near service connections with vulnerable populations, DBP monitoring locations, and in areas that have historically been prone to having difficulty in maintaining residuals or high DBP levels (problem or high-risk areas). In addition to disinfectant, potential additional parameters to monitor include *Legionella* (potentially in response to missing minimum disinfectant residual requirements) and/or other OPs (potentially based on system parameters and repeat testing based on results), and other parameters (e.g., water temperatures, pressure, circulation, water age, other relevant parameters). EPA approval of sampling and analytical methods for OPs will be needed, and requiring currently approved methods (e.g., monochloramine method) could be considered.

Perspectives shared during WG meeting included:

- Discussion signaled general WG member support to revise the sampling structure to obtain water quality sampling from a combination of sampling locations and frequencies, including higher risk areas of the distribution system such as dead ends and low use water areas.
- There was significant discussion around the value of distribution system sampling plans and hydraulic maps to establish all sampling locations and purposes in a single tool. Some members noted that it may be valuable to change the monitoring locations at different monitoring times to ensure appropriate coverage and equitable monitoring throughout the system.
- WG members discussed the perspective that there are many factors within a particular part of a distribution system that may contribute to low disinfectant residual, and there could be value in developing a more comprehensive tool or map that includes not just sampling locations and sample types but other parameters of the distribution system such as pipe material, hydraulic flow, and water age in the sampling plan. The WG also discussed that an approach with more parameters would bring greater cost and burden to the utility, with particular concern for currently capacity constrained utilities to produce the plan.

Path forward and straw poll support emerging from WG discussion:

Path Forward: Given that the current RTCR framework for monitoring disinfectant residual has limitations, move forward with framing a recommendation that reflects a scientifically based sampling and monitoring approach that better characterizes areas of the distribution system that can be prone to no or low residual levels. Straw Poll Support: Full

In support of building out the sampling and monitoring recommendation, engage technical support to further characterize the following:

1. Disinfectant residual only sampling and monitoring approach (elements of an improved monitoring plan designed to understand changes in the presence of disinfectant residual

- throughout the distribution system could include: sampling location and frequency; sampling at or near where water exits a storage tank; approved methods for sampling; data integrity; removing alternative compliance (HPC count); and a system map).
2. Multi-parameter monitoring and sampling to provide for a more complete picture of water quality conditions in the distribution system possibly including, in addition to disinfectant residual, water age, system hydraulics, pipe material, and other parameters.
 3. Integrated Monitoring Plan that brings into one plan all SDWA required distribution system sampling and monitoring requirements.

Implementation Action 3: Revise compliance determination level: Revise the current MDBP rules to be more protective than the current compliance approach that requires the residual disinfectant concentration in the distribution system to not be undetectable in more than 5 percent of the samples for any two consecutive months to requiring this compliance level to be met each month. Potentially tie exceedances of the 5 percent threshold to a problem-oriented compliance approach (referred to at the meeting as “find and fix”). EPA to develop a distribution system toolbox with corrective actions that can be used by systems to address problems that are identified.⁶ This toolbox to include flushing, booster disinfection, water age management, optimizing corrosion control, and other measures.

Perspectives shared during WG meeting included:

- Discussion signaled general WG member support that there can be Environmental Justice implications with the same areas of a distribution system repeatedly not meeting the detectable disinfectant residual level and that the WG would like to consider a range of options that could provide more equitable water quality results.
- WG members discussed whether moving two months to one month could be the new requirement and a problem-oriented compliance structure (i.e., triggered approach) could be considered.

Path forward and straw poll support emerging from WG discussion:

Path Forward: Advance a recommendation for WG member consideration that positions the current disinfectant residual compliance approach as potentially leaving consistent vulnerability in the distribution system. Develop options that narrow or closes that vulnerability (repeat low or no disinfectant residual at the same locations while maintaining compliance) through engaging technical support to present WG members with options that could be built out and incorporated into a recommendation.

Straw Poll Support: Full

⁶ Note that in August 2023 (after Meeting 9) the EPA published the online resource: <https://www.epa.gov/dwreginfo/drinking-water-distribution-system-tools-and-resources>

Segment 5⁷

Treatment and Distribution System - Regulated and Unregulated DBPs

The intervention area on treatment and distribution system – regulated and unregulated DBPs - and the related implementation actions discussed by WG members can be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

The distribution system proposed intervention on addressing unregulated DBPs of concern, addressed on the first meeting day, was discussed in association with the proposed intervention on improving precursor control to reduce DBP formation and microbial growth potential, addressed on the third meeting day.

Distribution System - Intervention Area 2: Address unregulated DBPs of concern.

Disinfection with chlorine or chloramines can lead to formation of a wide range of DBPs (more than 700 in total have been identified to date). The existing DBP rules include MCLs for THM4 and HAA5 along with TOC removal requirements, with the consideration that by controlling THM4 and HAA5 (as surrogates), along with TOC, overall DBP mixtures will be controlled as well. Some of the unregulated DBPs have inorganic precursors that may not be controlled using TOC control methods.⁸

Implementation Action 1: Establish MCLGs and MCLs for HAA9 or HAA6Br (MCLGs would be for specific brominated HAAs).

Implementation Action 2: Acknowledge new evidence, conduct additional data collection, research, and analysis.

Perspectives shared during WG meeting included:

- Members indicated that, based on current research, there could be DBPs that may be more or equally harmful to public health as the ones currently regulated. Members emphasized the limitations to analyzing all the unregulated DBPs and their impacts on drinking water and public health, and suggested to prioritize analysis of those DBPs that could produce the biggest benefits if addressed, including ancillary benefits by reducing other DBPs not addressed.
- Members noted that there are certain DBPs and related precursors that may need better characterization, including iodinated, brominated, and nitrogenated species.
- Some members indicated that some targeting could potentially be done to identify the systems that experience challenges and that could trigger interventions, noting that some challenges are already known. As an example, one member suggested that drinking water systems that have recurrence with source water bromide could potentially monitor for MCLs for HAA6Br.
- Members added that this discussion has connectivity to the 3x3 matrix and suggested that the matrix could be updated to help identify opportunities for precursor removal and incorporate potential suggested adjustments to optimize treatment techniques.

⁷ This segment summary integrates a discussion that took place during two different time slots at the meeting.

⁸ See Problem Characterization Synthesis Sections: 4.1 – 4.12; 5.1 – 5.10; 10.1.

Path forward and straw poll support emerging from WG discussion:

Path forward: With technical input, develop an agenda to address data and analysis gaps designed to provide the type of information needed to make a future determination on MCLGs, MCLs, or Treatment Techniques for DBPs including currently unregulated DBPs such as brominated haloacetic acids.

Straw Poll Support: Full

Treatment - Intervention Area 1: Improve precursor control to reduce DBP formation and microbial growth potential

Current removal levels of organic matter and nutrients leave potential for DBP formation and opportunistic pathogen growth. Finished water TOC from plants meeting the 3x3 matrix can be high (31% and 10% of 3x3 matrix-compliant plants had TOC > 2 and 3 mg/L in finished water, respectively). There is also a lack of requirement for TOC removal from plants other than conventional surface water, which could have high TOC in source water (including ground water), resulting in high TOC in finished water among these plants.⁹

Implementation Action 1: Expand organics removal requirements

Implementation Action 2: Enhanced optimization guidance for DBP control

Implementation Action 3: Require filtration improvements for better turbidity control

Implementation Action 4: Expand requirements to filtration plants to match unfiltered plants

Implementation Action 5: Require chlorinating GW systems to apply 3X3 matrix

To support the discussion and address previous WG questions and requests for more information, Dr. Scott Summers gave a presentation on the control of TOC and the impact on distribution system water quality. The presentation highlighted that high levels of TOC removal can be achieved by GAC, but costs increase with removal using GAC; decreasing influent TOC can extend GAC run time and lower cost. As to coagulation, the TOC removal can be extended by 15-20% beyond the required 3x3 matrix removal. Biofiltration is a function of temperature and 10-15% of TOC removal can be achieved without ozone and 15-20% with ozone. GAC is a function of run time and has a reasonable range of 25-30% additional TOC removal and a maximum range of 75-80% of TOC removal. For context, Mr. Summers indicated that ion exchange is similar to GAC and can achieve 30-75% additional TOC removal, and nanofiltration/reverse osmosis can achieve a high TOC removal (>90%) though both methods are more expensive because of brine treatment.

Perspectives shared during WG meeting included:

- There was full support from members on gathering technical input through the technical analysts to develop an agenda for addressing data collection and analysis, that would be needed to make a future determination on MCLGs, MCLs, or Treatment Techniques for DBPs including currently unregulated DBPs (e.g., iodinated, brominated, and nitrogenated species). Members discussed that the agenda could also help better define the challenges and benefits to be explored through precursor removal techniques, including microbial growth, unregulated DBPs, and reduction of chlorine demand.
- Members discussed the potential of having a binning classification for source waters that would help understand source water conditions and potential issues coupled with a triggering mechanism that recommends further action on precursor control.

⁹ See Problem Characterization Synthesis Sections: 5.9; 6.1 – 6.5.

- Members discussed the relative costs and issues associated with installing precursor removal such as GAC but reiterated the importance of implementing them and exploring their cost-effectiveness, particularly as they could be highly effective and provide multi-benefits in addressing source water conditions including issues such as PFAS.

Path forward and straw poll support emerging from WG discussion:

Path Forward:

1. Engage technical support to elaborate on elements of providing additional precursor control including exploring potential updates to 3x3 matrix, improving biostability, broader use of advanced treatment (e.g., GAC), and setting a numeric maximum for TOC entering the distribution system.
2. Engage technical support to elaborate an approach that characterizes and bins vulnerable conditions in source water based on types and levels of DBP precursors occurring in source water and pairs the bins with potential additional precursor control (with particular emphasis on TOC). (Please note potential overlap with Source Water Intervention Area 2.)

Straw Poll Support: Full support for further elaboration with technical support.

Segment 6

Day 2 Look Ahead

Mr. Greenwood let the WG members know that the second meeting day includes further discussions on potential emergent recommendations. Mr. Greenwood noted that the second meeting day will start with the conversation on finished water storage tanks that was not addressed on the first day due to lack of time.

Wednesday, June 28, 2023

Segment 7

Agenda Review and Meeting Procedure

Elizabeth Corr, MDBP Rule Revisions WG Designated Federal Officer, Office of Ground Water and Drinking Water (OGWDW), Office of Water, EPA

Ms. Corr officially opened the second meeting day.

Robert Greenwood, Principal, Ross Strategic

Mr. Greenwood reviewed the agenda for the second meeting day.

Segment 8

Day 1 Reflection

Mr. Greenwood started the second meeting day with reflection and review of WG member discussions from the previous day. Mr. Greenwood shared the outcomes from the first meeting day and the challenge areas that need to be further fleshed out, for further consideration by the WG members. Mr. Greenwood indicated that the list of challenge areas will be shared with WG members via email before the following meeting day.

As a follow-up from WG member discussions from the first meeting day and to inform future discussions over the next two meeting days, Dr. Scott Summers, technical analyst, presented on the granular activated carbon's (GAC) effectiveness and use for the control of PFAS, PPCPs, and regulated and unregulated DBPs. Dr. Summers described that sucralose is used as an indicator of how much a water source is impacted by wastewater discharges and shared an example of heavily impacted surface water from wastewater in Colorado resulting in pesticides and pharmaceuticals in the surface water influent. Dr. Summers then showed graphics with breakthrough curves for TOC, PPCPs, DPB precursors, and PFAS, and indicated that the breakthrough curve for TOC is used as a reference point for precursors, pharmaceuticals, and PFAS compounds removal. Dr. Summers noted that GAC needs to regularly be replaced or regenerated when exhausted.

WG members observed that GAC could be a good option particularly for heavily impacted waters. One WG member noted that one consequence of short-term use of GAC is increased treatment operations cost and one member added that, in some cases, it may be more efficient to use membrane treatment instead. Overall, WG members remarked that wastewater influent is important as it relates to the Clean Water Act permitting and potential impacts on source water. Dr. Summers's presentation will be shared with WG members after the meeting.

Segment 9

Distribution System - Finished Water Storage Tanks

The intervention area on finished water storage tanks and the related implementation actions discussed by WG members can be found below. Detailed descriptions of each implementation action can be found in the "MDBP WG Interventions and Implementation Actions Compilation" document.

Intervention Area 3: Address storage tank vulnerabilities¹⁰

Finished water storage tanks can have significant impacts on finished water quality in the distribution system. If improperly managed they can create high water age situations, which can lead to the growth of opportunistic pathogens and the formation of disinfection byproducts, as well as the potential for development of breaches which can allow for the entry of fecal contaminants. Currently, finished water storage tanks are examined during sanitary surveys, however, sanitarians may lack expertise to properly assess the structural integrity of the tanks, and limitations on confined-space entry and climbing of tanks may allow for some internal and external integrity and water quality issues to go undetected. A lack of water quality monitoring at or near storage tanks can also be problematic.¹¹

¹⁰ MDBP WG Interventions and Implementation Actions Compilation Document.

¹¹ See Problem Characterization Synthesis Sections: 7.1 – 7.4; 10.5.9.

Implementation Action 1: Require tank improvements.

Implementation Action 2: Require triggered action based on monitoring.

Implementation Action 3: Prepare improved guidance.

Perspectives shared during WG meeting included:

- Discussion signaled substantial WG member support to develop recommendations to address storage tank vulnerabilities, acknowledging the need to balance between water quantity and water quality objectives.
- WG members noted that state oversight of storage tanks monitoring and cleaning operations varies, and they shared examples of diverse approaches, including frequency in monitoring, inspection methods, and ways sanitary survey findings are being used. Discussion indicated that, in states that cannot be more stringent than federal rules, regulators conduct enforcement only for significant deficiencies identified in sanitary surveys, and generally do not define significant deficiencies that do not align with federal rules.
- WG member discussion explored two potential aspects related to tank improvement requirements that received substantial support during the straw polling.
 - o One aspect focused on developing a federal requirement for storage tank monitoring and cleaning (as needed) that enables states to follow-up on identified issues through sanitary surveys; for example, issues such as elevated DBPs, low chlorine residual, or sediment buildup could trigger action. WG members supported triggered action based on monitoring and noted that a problem-oriented approach would be based on a suite of options and potential issues. Members added that the American Water Works Association's (AWWA) standard on storage tank inspections and cleaning could be leveraged as part of this work.
 - o A second aspect focused on developing guidance and best practices for tank operations, with members suggesting that the existing Area-Wide Optimization Program (AWOP) tank tools could be leveraged.
- Members also discussed the tank monitoring and cleaning operations and indicated that systems with new or rehabilitated tanks could implement water age controls (e.g., installing mixers) to ensure water stratification is addressed.
- WG members discussed the potential for monitoring in the distribution system near storage tanks, to understand if there are water quality challenges, and noted that the term "near" will need to be further defined.

Path forward and straw poll support emerging from WG discussion:

Path Forward:

- o Develop a recommendation (with technical support) that articulates a federal requirement for storage tank inspection along with cleaning as needed.
- o Develop recommendation for preparing enhanced storage tank operations and maintenance guidance for striking an effective balance between water quantity and water quality objectives.

Straw Poll Support: Substantial

Path forward: Engage technical support to explore monitoring approaches in the distribution system to obtain insight into water quality conditions in storage tanks (to be addressed as part of disinfectant residual sampling and monitoring in Distribution System Intervention Area 1).

Straw Poll Support: Strong

Segment 10

Consecutive Systems

The intervention area on consecutive systems and the related implementation actions discussed by WG members can be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

Intervention Area 4: Improve consecutive system compliance and water quality¹²

Consecutive water systems can face unique challenges related to potentially higher water age that can impact their ability to maintain disinfectant residuals and control DBPs. Consecutive water systems have higher rates of non-compliance with the Stage 2 D/DBP Rule. Additionally, many consecutive systems have little control over the quality of water received by them from the wholesale systems, and in some cases, are unaware of the water quality they receive. Many consecutive systems are also small and may have challenges related to ensuring their finished water is of sufficient quality and meets regulatory thresholds. Communication limitations and contractual frameworks may also present challenges for some consecutive systems to ensure compliance and the provision of safe drinking water.¹³

Implementation Action 1: Establish interconnection requirements.

Implementation Action 2: Prepare improved guidance – support stronger wholesale/retail partnership.

Perspectives shared during WG meeting included:

- Discussion indicated that there is full support to develop recommendations to improve consecutive system compliance and water quality with WG members noting that retailers are usually small systems that need more mechanisms to understand the water quality provided by wholesalers. To that end, WG members shared that knowledge of water quality at the point of connection is important to communicate as part of the wholesaler and retailer agreement process. Members suggested preparing a recommendation for a model contract for consecutive systems with basic water quality requirements that wholesalers and consecutive systems can use as needed in negotiations. Members highlighted that increased awareness of water quality is important as consecutive systems may also serve disadvantaged communities that are often affected by cumulative impacts.
- WG member discussion indicated that WG technical support should explore what providing a reasonable margin for DBP levels from wholesalers to retailers could look like, to better enable retailers to manage water quality within DBP compliance limits. Members discussed various ranges residing below current MCL levels for DBPs but did not suggest a certain level. Members shared that evaluation of water quality could be required for any new connections of water supply.
- Members noted that a feedback mechanism is needed between wholesalers and retailers to address water treatment changes when water quality issues are identified on the wholesaler or retailer’s side.
- WG members discussed the benefits of consolidation that could give small systems more options to purchase water and manage water quality. Members highlighted that consolidation needs to be considered on a case-by-case basis in coordination with the respective communities.

¹²MDBP WG Interventions and Implementation Actions Compilation.

¹³ Problem Characterization Synthesis Sections: 8.1 – 8.8; 10.1.3.2, 10.5.10, 10.5.14.

Path forward and straw poll support emerging from WG discussion:

Path Forward: Request technical support to explore improving conditions in the consecutive system context including options for evaluating water quality at the point of connection, defining a margin for DBP levels from the wholesaler to the retailer that would facilitate the retailer managing water within DBP compliance limits, and a mechanism to drive water treatment when needed on the wholesaler or retailer side.

Straw Poll Support: Full

Path Forward: Prepare recommendation for consecutive system guidance related to model contracts that can support conditions needed by retailers to enable DBP compliance under water supply contracts.

Straw Poll Support: Full

Segment 11

Treatment - Improve Chloramination Practice

The intervention area on improving the chloramination practice and the related implementation actions discussed by WG members can be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

Intervention Area 2: Improve chloramination practice¹⁴

Switching from free chlorine to chloramines poses some operational and management challenges (e.g., controlling chlorine to ammonia ratios and nitrification in DS) and unintended consequences (e.g., formation of unregulated DBPs). Improving chloramination practice will be beneficial for control of microbial contamination and DBP formation potential, as well as maintenance of consistent water quality within a distribution system. Additionally, the temporary provision of chlorine in chloraminating systems (aka chlorine burn) can create short term increases in DBP concentrations.¹⁵

Implementation Action 1: Prepare new requirements (e.g., Nitrification Action Plans, nitrate monitoring, chlorine/ammonia dose control)

Implementation Action 2: Prepare guidance

Perspectives shared during WG meeting included:

- Certain WG members noted that more technical information and support is needed to understand current chloramination practices and implications for the distribution system, including chlorine burns and nitrification control practices, including how widespread across the states are requirements for nitrification control plans. Members suggested that it may be valuable to review the recent research on chloramination and revisit the research done in the 1990s to understand previous considerations and identify what could be improved in the future. Other members shared

¹⁴ MDBP WG Interventions and Implementation Actions Compilation.

¹⁵ Problem Characterization Synthesis Sections: 3.10.7; 4.2; 5.5; 10.5.5, 10.5.6.

the perspective that there was a lot of guidance in existence and effort was not needed on creating additional information.

- One member shared an example in which a state requires a compliance evaluation for each permit change, so that impacts to the drinking water systems are monitored before and after the change. Additionally, the state requires a nitrification control plan for any system that uses chloramines or purchases chloraminated water.
- Members observed the variations in state guidance and approaches to chloramination. There was full support from members in engaging the technical analysts to describe the gaps and needs in current guidance related to chloramination practice and consider whether an EPA guidance could be helpful.

Path forward and straw poll support emerging from WG discussion:

Path Forward:

1. Request technical support to describe what gaps, if any, there are in current guidance related to chloramination practice that an EPA-issued guidance could fill and be distinguished from existing available guidance.
2. Request technical support perspectives on potential public health issues related to DBP formation during free chlorine burns in chloraminating systems, with particular interest in frequency and duration of chlorine burns, the role of nitrification control plans in avoiding the need for chlorine burns, and the potential for DBP monitoring during chlorine burns lasting longer than one week.

Straw Poll Support: Full support for further elaboration with technical support.

Segment 12

Source Water – Source Control and Source Water Assessment

The intervention areas on source control and source water assessment and the related implementation actions discussed by WG members can be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

Intervention Area 1: Enhance source control efforts to improve raw water quality.¹⁶

Public water systems (PWS) often have limited control over source water conditions. PWSs often are not aware of water pollution sources and often lack control over upstream conditions (point and non-point sources) that may introduce DBP precursor material, such as TOC. Additionally, high bromide in source water can be difficult to remove and may increase formation of brominated DBPs or bromate (if ozone treatment is used). High bromide may result from saltwater intrusion (e.g., in CA and FL) and industrial activities (e.g., release of oil field brines and wastewater from coal-fired power plants).¹⁷

Implementation Action 1: Expand leverage of non-SDWA authorities (e.g., CWA, TSCA, EPCRA) to further reduce DBP precursors and nutrients in source water such as bromide and/or iodide in industrial wastes; WWTP discharges; and nutrients associated with algal blooms.

¹⁶ MDBP WG Interventions and Implementation Actions Compilation.

¹⁷ Problem Characterization Synthesis Sections: 5.7, 5.8, 6.1 – 6.4.

Implementation Action 2: Encourage voluntary community efforts like brownfields remediation and integrated watershed planning to increase emphasis on reducing runoff so that pollutants are not getting into the source water for drinking water plants.

Implementation Action 3: Provide states and EPA with an enhanced ability to respond to source water conditions through improved policy and enforcement tools (e.g., land use restrictions).

Perspectives shared during WG meeting included:

- Overall, there was substantial support from the WG members for source control interventions and potential tools to enhance source control for all sources of drinking water by leveraging non-SDWA authorities, as well as leveraging the SDWA authority to enhance states' ability to protect source water.
- One member noted that there could be low hanging fruit to explore for potentially enhancing source water, including industrial treatment optimization, and addressing issues such as combine sewer overflows and raw sewage.
- Members discussed examples of non-SDWA authorities that could be leveraged, and suggested working with FEMA and DOE to ensure that wastewater treatment plants are resilient in the case of power outages or natural disasters, e.g., ensuring that raw sewage does not contaminate source waters.
- One member noted that, for some source waters, there are multiple state and federal agencies with some oversight and this member was reluctant to increase regulatory burden on utilities.
- One member noted that regionalization and consolidation could be an opportunity to better understand source water conditions.
- Some state members offered examples of their current approaches to source water control. One member noted that their state trains their water utilities on sampling and testing for harmful algal blooms (HABs) and is working to understand how to communicate that information to landowners for clean water protection.
- Overall, members highlighted that there are many regulations and costs that water utilities have to comply with and reiterated that support will be needed for low-income households for any impacts to the water rates from enhanced source water control.

Path forward and straw poll support emerging from WG discussion:

Path Forward: A WG member focused conversation will be formed to frame out a recommendation to address all sources of drinking water focused on leveraging non-SDWA authorities to address problematic drinking water contaminants and DBP precursors (e.g., bromide, iodide, WWTP discharges); and leveraging SDWA authority to provide additional tools to EPA and States to bolster source water protection efforts.

Straw Poll Support: Substantial

Intervention Area 2: Enhance source water assessment practice to better inform proactive treatment management and responsiveness.

Source waters are vulnerable to municipal or industrial wastewater effluents, saltwater intrusion, agricultural runoff, and algal growth. Presence of certain nutrients create conditions for microbial growth. Organic-rich source waters can increase disinfectant demand, reduce disinfectant

residuals, result in relatively high organic levels in treated water, increase biological activity, and increase DBP formation within the DS.¹⁸

Implementation Action 1: Institute requirement to conduct regular source water assessments.

Implementation Action 2: Institute requirement to conduct triggered source water assessments (i.e., a framework where compliance monitoring signals water quality issues exist, and response is guided by an EPA toolbox that supports actions tailored to system-specific challenges).

Perspectives shared during WG meeting included:

- WG Members fully supported developing a recommendation for source water evaluations (note: discussion indicated a need to shift terminology from “source water assessment” to “source water evaluation” to avoid confusion with a previously implemented source water assessment requirement) that would be problem-based and required on a triggered basis, with triggers focusing on distribution system compliance and source water conditions. Members recommended to gather more input from the technical analysts and EPA on potential triggers.
- With regard to the Implementation Action 1 (see above), members noted that usually the large drinking water systems already conduct regular source water evaluations and there was a recognition that this requirement should extend to all the systems, including the smaller systems.

Path forward and straw poll support emerging from WG discussion:

Path Forward: Develop a recommendation related to “Source Water Evaluation” for all source waters that is problem based and required only on a triggered basis, with triggering based on conditions either in the distribution system (e.g., chronic compliance issues), or source water context. The triggers are a starting place for further work by EPA on a rule development process.

Straw Poll Support: Full

Segment 13

Day 2 Reflection/Day 3 Look Ahead

Mr. Greenwood indicated that the list of challenge areas reviewed at the beginning of the second meeting day will be shared with members via email for reference for the following meeting day. Dr. Scott Summers’s presentation will also be shared along with two additional articles on chloramines and DBPs that were referenced by WG members during discussions. Mr. Greenwood noted that two topics on the agenda were not addressed during this meeting day due to lack of time, i.e., the enabling environment topics focused on technical, managerial, and financial capacity, and state capacity. Mr. Greenwood indicated that he planned to review the remaining discussion topics and propose an agenda for the last meeting day.

Mr. Greenwood let everyone know that two members will have to leave the third meeting day at 10:30 am ET before the 1:00 pm scheduled adjournment time.

¹⁸ Problem Characterization Synthesis Sections: 5.7, 5.8, 6.1 – 6.4.

Thursday, June 29, 2023

Segment 14

Agenda Review and Meeting Procedures

Elizabeth Corr, MDBP Rule Revisions WG Designated Federal Officer, Office of Ground Water and Drinking Water (OGWDW), Office of Water, EPA

Ms. Corr officially opened the third meeting day.

Robert Greenwood, Principal, Ross Strategic

Mr. Greenwood reviewed the agenda for the third meeting day and proposed to focus the discussion on three topics that were not addressed in previous meeting days due to lack of time. He noted that the topic of state capacity is not on the agenda, but that WG members interested in this conversation will further coordinate and report back to the WG. Mr. Greenwood shared the outcomes from the second meeting day and the WG member support from the straw polling.

Segment 15

Enabling Environment - Technical, Managerial, and Financial Capacity

The intervention area on enabling environment – technical, managerial, and financial capacity and the related implementation actions discussed by WG members can be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

Intervention Area 2: Elevate TMF Capacity¹⁹

Inadequate technical, managerial, and financial (TMF) capacity can be a significant challenge for some public water systems, especially those in small and underserved communities. A lack of qualified operators can be a common problem for some system sizes. TMF capacity limitations can lead to more difficulty in achieving and maintaining regulatory compliance, as well as managing the drinking water infrastructure.²⁰

Implementation Action 1: Enhance financial and technical assistance capacity for disadvantaged communities.

Implementation Action 2: Evaluate and improve operator certification.

Implementation Action 3: Make permanent a national low-income household safety net program.

Perspectives shared during WG meeting included:

- WG member discussion showed full support for developing recommendations to elevate TMF capacity. Members discussed the perspective that the financial status of a utility or its customers should not be a deciding factor in the quality of drinking water that community consumes.

¹⁹ MDBP WG Interventions and Implementation Actions Compilation

²⁰ See Problem Characterization Synthesis Sections: 9.4; 10.3, 10.4

- Discussion indicated that dedicated support, either through funding or technical assistance, is needed to help disadvantaged communities manage drinking water quality and operations. Members shared examples of existing initiatives that could be leveraged, such as the EPA Technical Assistance Centers or the Infrastructure Investment and Jobs Act that offers 2% technical assistance funds. Members indicated that further discussion with EPA will be beneficial to understand the appropriate funding sources and technical assistance that could be leveraged for TMF capacity. With regards to funding, members noted that disadvantaged communities may also include portions of medium or large sized communities, and therefore funding for technical assistance should not be earmarked and geared towards small or rural communities only. WG member discussion reiterated the importance of shifting incentives and creating structures that focus on fixing identified issues rather than enforcement/penalties.
- Members discussed the need to build the new water workforce and highlighted the importance of having federal operator certification training. One member observed that some non-community systems may have non-certified operators, and shared that, given the workforce shortage particularly impacting small, rural, and disadvantaged systems, public water suppliers could aim to have at least one certified operator. Another member noted that salaries may not be high enough for certified operators and suggested to explore if technical assistance or O&M funding could potentially be used to make salaries more competitive and attract new workforce.
- Members highlighted that good governance equals good water, and TMF should incorporate a clear “governance” emphasis. To that end, WG discussion signaled support for having a federal requirement for drinking water utility boards of directors training to support the spread of best management practices for drinking water systems.
- Discussion signaled that given the limited experience and resources for grant writing, one primary challenge for small and disadvantaged systems is developing and applying for grants. One member added that under the Water Infrastructure Improvements for the Nation Act (WIIN Act) Grant Programs, disadvantaged communities can ask for grant application support from local organizations and suggested that this type of practice could be incorporated in future funding opportunities.

Path forward and straw poll support emerging from WG discussion:

Path Forward: A WG member focused conversation will further develop a recommendation addressing:

1. Enhancing technical and financial assistance with particular emphasis on disadvantaged communities and facilitating transitions needed by any new or revised MDBP rules or related WG recommendations.
2. Evaluating and improving operator certification with specificity on distribution system management to maintain disinfectant residual through distribution system optimization, including storage tank operations, and to reduce risks to public health from microbials and DBP formation.
3. Making permanent a national low-income household safety net program.
4. Developing a federal requirement for drinking water utility boards of directors training.

Straw Poll Support: Full (with one WG member abstention)

Segment 16

Environmental Justice (EJ) (public notification, electronic reporting, and increased transparency)

The intervention area on EJ (public notification, electronic reporting, and increased transparency) and the related implementation actions discussed by WG members can be found below. Detailed descriptions of each implementation action can be found in the “MDBP WG Interventions and Implementation Actions Compilation” document.

Intervention Area 1: Electronic reporting and public engagement²¹ (text below drawn verbatim from the “MDBP WG Interventions and Implementation Actions Compilation” document)

In some communities the public faces challenges accessing prompt information about the quality of their water (e.g., monitoring results) and the state of their drinking water provider (e.g., infrastructure condition). Getting access to water quality information is especially important in situations where water quality degradation and potential public health outcomes may be involved. Challenges in getting this information may include inadequate public reporting mechanisms, trust in the public water system, risk communication problems, language barriers, and ready access to the information by community members. Additionally, limited opportunities may exist for some community residents to engage with the public water system to better understand their water system and instill higher levels of trust.²²

Implementation Action 1: Enhance electronic and uniformity of reporting

Implementation Action 2: Update MDBP Public Notice

Implementation Action 3: Prepare communication guidance for *Legionella* in DS and community water quality management response tools

Perspectives shared during WG meeting included:

- Members supported the need to develop recommendations related to EJ, highlighting that disadvantaged communities are often disproportionately impacted.
- Discussion indicated that electronic reporting could help improve transparency and could provide a way to compare the data across states or different PWS, and certain WG members shared that states are increasingly developing their electronic reporting systems. WG members added that the EPA Drinking Water-SFTIES system is one electronic reporting database that states could leverage as it will integrate the federally reported data on drinking water quality.
- Members emphasized the importance of purposefully building transparency and feedback mechanisms into electronic reporting practices. For example, public water suppliers could be given the opportunity to review their compliance monitoring results before they are made publicly available as part of any effort to improve information transparency. Such review was seen as also critical to improving and maintaining data accuracy. Members also added that, in some cases, private laboratories providing contract testing services to PWS have contractual obligations that dictate the procedures they must follow for reporting compliance-related testing results to state oversight bodies.
- WG members signaled interest in developing a recommendation that elevates the need to increase the MDBP Public Notice timeliness and revise the Public Notice language for clarity. WG members indicated that the Water Research Foundation’s (WRF) related research and survey data could be

²¹ Problem Characterization Synthesis Sections: 9.4; 10.3, 10.4

²² See Problem Characterization Synthesis Sections: 9.3.1, 9.3.3; 9.4.8; 10.2

leveraged to prepare communication guidance for *Legionella* in distribution systems. One member suggested that the communication guidance could address not only MDBP but also SDWA regulated contaminants.

Path forward and straw poll support emerging from WG discussion:

Path Forward: A WG member focused conversation will further develop Environmental Justice opportunities created in the context of the trajectory of other potential MDBP WG recommendations, including: electronic reporting of compliance monitoring results (with opportunity for review and approval by utilities) that is transparent and accessible; revised public notice requirements for compliance monitoring requirements for any potential new requirements (e.g., disinfectant residual), as well as revised notice for DBP exceedances. (Note that discussion at Meeting 9 connected further work on electronic reporting and public notice to also furthering exploration of Environmental Justice opportunities.)

Support: Straw poll not conducted – no objections raised to proposed path forward

Segment 17

Mr. Greenwood shared that an immediate next step will be to document and send WG members the path forward with the intervention areas discussed and the level of support indicated through straw polling. Coordination will continue with the WG members and the technical analysts before the September meeting to develop potential recommendations and implementation actions, with the goal to refine and vet them with the WG in the next two WG meetings.

Ms. Corr extended final thanks to all participants for their contributions. Ms. Corr then adjourned the meeting.

Appendix 1: MDBP WG Meeting Attendance –
June 27-29, 2023

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