I Opening Remarks

Joint Committee (JC) Chairperson Bob Powitz welcomed everyone and called the meeting to order. M. Leslie reviewed the virtual meeting procedures, took attendance of voting members, and read the antitrust statement. M. Leslie provided a membership update. Brook Hatton (CSA Group) has joined the committee under the user interest category. Frank Brigano recently retired from the JC but has been awarded Emeritus status and will remain active as a non-voting member. B. Powitz announced that Frank has agreed to continue to serve as vice-chair until the next meeting in May when nominations will be taken for his replacement. Current membership stands at 10 industry members, 10 public health/regulatory members, and 9 users. M. Leslie stated that due to the requirement for balance, the committee is seeking additional members in the user category. However, applications from industry and public health representatives will be accepted at any time and they will be kept on file for consideration after additional users have been added.

II Review of Agenda

Motion: The October 2020 agenda is acceptable as written with one addition under new business. F. Lemieux motioned; T. Palkon seconded.

Vote: All in favor.

Motion passed.

III Review of May 2020 Meeting Summary

Motion: B. Powitz asked if there were any additions or corrections to the May 2020 Joint Committee on Drinking Water Treatment Units meeting summary. G. Hatch moved to accept the meeting summary as written; S. Ver Strat seconded.

Vote: All were in favor.

Motion passed.

IV Standards Administration

A. Standards update

M. Leslie reviewed the recent and current open ballot issues.
V New Issues / Action Items for multiple standards

A. Air Gaps for Drinking Fountains (DWTU-2020-12)

Motion: Ballot proposed language for product water dispensing outlets under section 6.3 in NSF 42, 53, 55, 58, 62, 244, and 401 T. Palkon motioned; R. Herman seconded.

Discussion: J. Wolff reported that drinking fountain outlets are a subsection of product water dispensing outlets under section 6.3 of the DWTU standards. He noted that there is a requirement, however, that product water dispensing outlets shall be constructed so that the discharge orifice is directed downward, which conflicts with drinking fountains with upward-facing orifices. He recommended that language be added to exclude drinking fountains from this requirement. J. Wolff also reported that the minimum air gap requirement for drinking fountain outlets of 2 inches in the DWTU standards is misaligned with other industry standards and codes. North American standards and codes do not require drinking fountains to have a gap of more than 1 inch. He recommended that the standard requirements be revised from 2 inches to 1 inch.

There was no further discussion on the motion.

Vote: All in favor.

Motion passed.

B. MCLG Study (DWTU-2020-13)

Motion: Form a task group to consider the right approach for minimizing the health risks from drinking water that might have contaminants that exceed the MCLG but do not exceed the MCL. G. Hatch motioned; R. Regunathan seconded.

Discussion: G. Hatch presented a summary of the recent study published by the Water Quality Research Foundation (WQRF) and Corona Environmental Consulting titled “Contaminant Level Occurrence Above the MCLG.” This study summarizes national occurrence of contaminants in the US that have a regulated level above the health-based goal level, including 22 organic chemicals, radionuclides, disinfection byproducts, microbials, and metals such as lead and arsenic.

G. Hatch noted previous concerns from the JC about the issue of low-level health risk to the public when a regulated contaminant associated with adverse health effects exceeds the MCLG, but not the MCL. Though the water meets the USEPA drinking water regulations, it still has a measurable health risk.

G. Hatch and R. Regunathan discussed the role that POUs may play in further reducing the risk of contaminants of concern below the regulated levels. It was noted that protocols for testing and verifying these devices for such capabilities are already in place in NSF/ANSI 53, 58, 62, and 244. Providing such information to the consumers for their own benefit is a worthwhile task.

F. Lemieux raised the question on whether the literature requirement in the DWTU standards already allows for the actual reduction achieved to be claimed. She expressed concern on how one would measure to “0”. F. Lemieux also expressed concern that including an additional claim to the MCLG could lead to a situation of undermining consumer’s confidence on their public water supply. G. Hatch agreed that these are excellent questions for a task group to consider with participation from regulators.
E. Leung agreed with the problem of measuring to “0”. He noted that the performance data sheet shows what the product can actually achieve with the analytical method, however, so customers could look at those results. He stated his belief that it would cause confusion for consumers to add the MCLG claim along with the MCL. E. Leung suggested that in addition to the MCLG, health advisory levels (where no MCL exists) should be addressed. F. Lemieux stated her opinion that the scope may be too large. B. Powitz agreed that a task group should be established to clarify these points. The task group should also define the scope of what should be addressed.

**Vote:** All in favor.

**TG:** Gary Hatch (chair); Regu Regunathan (vice chair); Margaret Bicking; Frank Brigano; Chris Caldwell; Kevin Cox; Andrew Fenwick; France Lemieux; Eugene Leung; Darren Lytle Shannon Murphy; Thomas Palkon; Arvind Patil; Gayatri Prochnow; Becky Tallon; Mark Unger; Steve Ver Strat; Ariel Zoldan; Tina Donda; Kyle Postmus; Michael Schock; Zac Gleason and Eric Yeggy

### C. TOC (DWTU-2020-14)

**Motion:** Ballot revision in the DWTU standards to indicate that protocols that specify a TOC minimum shall achieve the TOC concentration using tannic acid as specified in Annex N-7. T. Palkon motioned; R. Herman seconded.

**Discussion:** T. Palkon stated that TOC does have some effect on a POU’s capacity. He reported that he’s found that some labs are including TOC from adding various solvents. He proposed that language be added to the DWTU standards to use tannic acid as specified in Annex N-7 to get a consistent level of TOC in the starting test water across labs when this can’t be achieved from the natural water.

R. Herman agreed that this is the direction the JC has been going to for some time. Now that there is a method it makes sense to cite this within the body of the standard so that it’s not missed. T. Palkon noted that the method was originally developed for the PFOA and PFOS reduction test in NSF P473.

R. Regunathan stated that he agreed with the general concept but raised the question of whether starting with RO water would be different than what one would expect from natural waters. Does the JC need to conduct further evaluation prior to agreeing with this approach? R. Herman explained that specifying the method using tannic acid will actually help to address this issue. In most cases the TOC water requirement is that it’s supposed to be from a public water supply. This will help to clarify and ensure consistency. T. Palkon agreed.

**Vote:** All in favor.

**Motion passed.**

### VI NSF/ANSI 55

#### A. Annex N-1: MS2 & T1 Phage Procedures (DWTU-2020-16)

**Motion:** Ballot proposed language as written with minor editorial updates (e.g., define acronyms used). R. Herman motioned. R. Regunathan seconded;
**Discussion:** A. Atwain reported that during a review of the methodology for MS2 and T1 phage preparation the NSF lab identified differences between their procedures and what is specified under NSF/ANSI 55. He stated that the lab has been using SBDW water instead of PBS water for MS2 preparation. He noted that there was also a deviation in the media used. A. Atwain reported that the lab conducted a side-by-side comparison for MS2 and T1 page using PBS and SBDW, and with two medias. They found no significant difference between the two reagents and agar media. A. Atwain recommended that the standard be revised to allow for either option.

A. Atwain stated that different dilutions are necessary for influent and effluent samples. Influent samples are usually run at -2, -3, -4 due to influent requirements. Plates greater than -2 should not be countable so running lower dilutions is wasteful. He recommended that rather than specifying specific dilutions, more flexible language be included. He noted that the lab compared other sections of the annex and found other minor improvements.

F. Brigano stated that some of the terms, such as SBDW and PBS, are acronyms and should be defined. M. Leslie agreed to make any necessary editorial updates in the proposed ballot.

**Vote:** All in favor.

**Motion passed.**

**B. Q beta Dose Calculation (DWTU-2020-17)**

**Motion:** Form a new task group to review the Q beta test procedures and determine if any changes should be made. R. Herman motioned; F. Brigano seconded

**Discussion:** J. Pagán reviewed the current Q beta protocol under NSF/ANSI 55. When the protocol was developed it was assumed that there was a consistent UV dose correlation to a 2.14 log reduction of Q beta. J. Pagán reported that collimated beam data compiled from several labs over the past year using low-pressure systems, however, have shown that there is quite a bit of variance (21 mJ/cm² to 29 mJ/cm²). The validation dose could be off by as much as 27%. J. Pagán recommended that the standard reinstate the requirement for a collimated beam calculation. She noted that it should not be necessary to conduct the test on all 7 days, however. She suggested that the test be performed on the first and last day of testing and move to 5 test points instead of 11 in order to simplify the test without impacting to accuracy.

R. Herman clarified that NSF/ANSI 55 moved from a collimated beam test to a straight log reduction of Q beta. If the lamp power is turned down to 70% it needs to achieve a 1.5 log reduction. Otherwise, it would need to achieve a 2.14 log reduction. It wasn’t meant to correlate to 16 mJ/cm², but rather to be within in the range. R. Herman added that the measurement method itself has a lot a variation, and he was not sure how much this relates to organism reduction. The reason the task group chose Q beta was that it is a conservative organism that’s non-pathogenic. He noted that rotavirus was not used in the standard originally because it is pathogenic and very expensive, so the calculated dose was used as a substitute of what it would be at 4 logs. This time the task group decided to directly measure an organism that would be a conservative substitute for rotavirus.

R. Herman stated the task group was also faced with the challenge of testing a large range of wavelengths and they had to take that into account. Now the test is in line with the other DWTU standards (e.g., mechanical reduction in NSF/ANSI 53 is a direct log reduction). J. Pagán agreed that it is easier and simpler to do a direct log reduction but noted that the
method increases the chance of variance between labs. Continuing to perform a collimated beam test would ensure consistency.

Several members stated their support for forming a task group to review the issue further. M. Leslie noted that some of the members on the existing UV task group may be inactive and suggested creating a new task group specifically for this issue. She agreed to send an invitation to the original UV task group to solicit additional members, however.

**Vote:** All in favor.

**Motion passed.**

**TG:** Jennifer Pagán (chair); Rob Astle; Mike Blumenstein; Frank Brigano; Chris Caldwell; Zac Gleason; Tom Palkon; R. Regunathan; Ziqi Wu; Tina Donda; Rob Herman; Ryan Prince; Steve Ver Strat

C. **Interpretation Request**

**Motion:** Ballot to clarify that the mean of all effluent levels for each unit shall be included in the pass/fail requirement for Class A systems. R. Herman motioned; F. Brigano seconded.

**Discussion:** G. Necula stated that in multiple sections of NSF/ANSI 55 the pass/fail criteria is specified as the geometric mean of influent samples minus the mean of all effluent samples. He noted that in the other DWTU standards, however, it is clear that the pass/fail applies to each unit tested. He asked the JC for feedback on whether his interpretation is correct that this should also apply to sections 7.2.2.1, 7.2.2.2, 7.3.1.1 and 7.3.1.2 under NSF/ANSI 55, which currently reference one unit to deliver the specified result.

R. Herman agreed that in almost all cases in the DWTU standards, the acceptance criteria are based on the mean for each unit. Here it appears that the samples for both units are taken together and then calculated for the mean. G. Hatch noted that the way it is written one unit could fail but the overall test would be passing. F. Brigano stated that in NSF/ANSI 244 the units are testing individually. This is also the case for NSF P231. R. Regunathan and B. Powitz both stated that this should be consistent with other DWTU standards, unless there is a reason for the exception.

**Vote:** All in favor.

**Motion passed.**

**Note:** The interpretation will be issued but will not be published in the next edition of NSF/ANSI 55 if the proposed ballot is approved and incorporated into main body of the standard.

VII **Informational**

A. **1,4-dioxane**

**Discussion:** F. Lemieux reported that Health Canada is proposing a maximum acceptable concentration (MAC) for 1,4-dioxane of 50 µg/L in drinking water. 1,4-dioxane is a synthetic industrial chemical that is soluble in water and resists biodegradation. This chemical gets into drinking water from leaks from landfills or wastewater discharges. The MAC is based on based on studies of early events of liver cancers in rats, which is protective of both cancer and non-cancer effects. F. Lemieux stated that 1,4-dioxane can be reliably
measured by available analytical methods, and the MAC is achievable by municipal and residential-scale treatment technologies.

F. Lemieux reported that while there are no POU devices currently certified for the removal of 1,4-dioxane, data suggests that RO and GAC technologies may be effective at removing this contaminant.

It was noted that the EPA already has an MCL that is very low. After further discussion it was clarified that this is for 1,4-dioxin, not 1,4-dioxane.

The question was raised on what the degradation products are and what technologies might destroy them. R. Herman noted that advanced oxidation with UV and hydrogen peroxide or ozone has been effective.

F. Lemieux stated that Health Canada is seeking information from DWTU JC participants on their experience and/or availability and capability of residential-scale systems capable of removing 1,4-dioxane. She asked that members contact her directly if anyone has additional information they could share.

B. California’s Use of POU and POE for Public and Private Water Systems

Discussion: E. Leung provided an overview of California’s regulatory status for POU and POE devices that are used as interim compliance drinking water treatment options for public water systems. He stated that there are many small community systems and private wells that are either out of compliance or at risk of contaminated drinking water sources. They need both short and long-term solutions beyond bottled water.

E. Leung reviewed California’s Safe Drinking Water Act requirements. POUs and POEs must have a PID or automatic shut-off mechanism and be independently certified to applicable ANSI standards. E. Leung noted that some of the challenges, however, are that most units lack built-in mechanical warning devices. Also, although POE systems are covered under NSF/ANSI 53 there are very few certified systems and there is no agreed upon scale-up options. E. Leung presented an overview of a potential approach that could achieve this using a lead-lag configuration of a specific service model and materials evaluation.

Heather Lukacs, Director of Community Water Center, gave a brief overview of an end user’s perspective, and her role in implementing California’s Human Right to Water law. She stated that POUs and POEs are important options for these communities, noting that over 1 million people in California are currently impacted by unsafe water. She stated that some of the main contaminants of concern are nitrate, 123-TCP, arsenic, and PFAS. Most areas of concern are in agricultural regions with a disproportionate percentage of low economic communities.

T. Palkon stated there are certifiers with POE certified products listed for arsenic and other contaminants. He stated that IAPMO has a list of manufacturers who may want to get certified to help with this issue. E. Leung reiterated the need for consistency between certifiers for scaling up.

C. POE Claims (DWTU-2020-15) – discussion moved from agenda item V.

Motion: Form a task group to consider a scale-up approach for evaluating POEs in the DWTU standards. R. Regunathan motioned; R. Herman seconded.

Discussion: R. Regunathan stated that while POE systems are covered under NSF/ANSI 42 and 53, very few have been tested and third-party certified. He noted that this is partly
due to the length and expense of the test for these larger units. R. Regunathan suggested that the industry needs an approach to test smaller units and extrapolate to POE-sized systems for the same contaminant and claim. He stated that he had originally tried to propose this to the JC when the perchlorate protocol was developed. He recommended that the JC revisit this issue to see if there is an effective way to evaluate smaller units to scale up. He referred to an example provided in his issue paper on one possible way to achieve this.

R. Herman agreed that this approach should be considered by the JC. B. Powitz suggested that a separate normative annex could be developed to describe this method. R. Regunathan agreed that this would be a good approach.

**Vote:** All in favor.

**Motion passed.**

**TG:** Regu Regunathan (chair); Anita Anderson; Chin Chew; Tina Donda; Zac Gleason; Gary Hatch; Brook Hatton; Rob Herman; Cindy Klevens; France Lemieux; Eugene Leung; Darren Lytle; Shannon Murphy; Tom Palkon; Arvind Patil; Kyle Postmus; Ryan Prince; Gayatri Prochnow; Mike Schock; Tom Sorg; Becky Tallon; Chris Vizcaino

### VIII Task Group Updates

#### A. Shower filters

**Discussion:** G. Hatch provided a brief overview of the original charge and history of the task group’s activities. The group has been working to resolve the issue of variance in filter performance when testing for free available chlorine (FAC) reduction at different laboratories using slightly different challenge waters. G. Hatch reported that one of the main issues was identifying the key parameters that could affect performance. Multiple studies were completed by the task group and it was determined that alkalinity had a major effect on the outcome of performance. Lower alkalinity resulted in a lower capacity of these products.

G. Hatch reported that an extensive search was completed by the task group and they found data from AWWA and EPA which indicated typical alkalinity levels to be between 60 & 100 mg/L as calcium carbonate. The task group proposed a synthetic challenge water for NSF 177 based on this data and submitted a formal ballot to the Joint Committee in 2019 which did not pass. G. Hatch noted that there were varying responses that were difficult to adjudicate. One of the key requests from the JC was for the task group to gather more data and provide justification on the test water parameters being proposed.

G. Hatch stated that the task group met on October 14th and confirmed that the proposed levels were in line with available occurrence data. He noted that the task group had originally proposed 80 mg/L. The group also found that the EPA disinfection rule for treatment techniques to be no more than 120 mg/L. After further review and discussion the group came to a consensus and is proposing an alkalinity level of 120 ± 15 mg/L and to use the previously agreed on parameters for hardness, TDS, etc. G. Hatch stated that the group will be submitting a new ballot proposal to the JC in the coming weeks.

#### B. Higher Lead Influent

**Discussion:** A. Patil reported that since the last JC meeting in May, a subtask group was formed of participating labs to validate the protocol for lead removal under the conditions of low total dissolved solids and in the presence of orthophosphate. Four sets of laboratory data based on the third draft were discussed during the latest conference call. Conditions
were found by each lab where stable lead particle size distribution was produced. However, the variance in the data was still large enough to further tighten the ranges of several parameters:

- pH 7.0 ± 0.25 (instead of pH 7.5)
- Orthophosphate 3 mg/L as phosphate
- Hardness 20 ± 3 mg/L (instead of 10 – 30)
- Total TDS 20 ± 3 mg/L (instead of 10 – 30)

A Patil stated that a revised draft incorporating the above conditions was created and the participating laboratories are expected to generate data on lead particle size distribution and their stability and present it in a set format during the next conference call in November.

C. PFAS

**Discussion:** A. Patil provided a brief overview of the task group’s charge and activities to date. As reported at the May meeting, a ballot was submitted to the JC to incorporate seven additional PFAS contaminants into NSF/ANSI 53 for activated carbon and anion exchange technologies. The influent challenge mixture would include PFOA, PFOS, PFHxS, PFHpA, PFBS, PFBA, PFNA, GENEX, and PFHxA. The ballot was approved by the JC subject to validation. A ballot to include the above scheme was also approved by the JC to include under NSF/ANSI 58, pending validation. A. Patil stated that the first draft of the validation test plan was recently discussed in July 2020. A second validation protocol draft is being prepared that spells out more details than the first one and will be finalized at an upcoming task group in early November.

D. NSF 244

**Discussion:** R. Astle reported that a task group was formed at the JC meeting in May to consider the addition of a tiered approach for virus and bacteria reduction claims under NSF/ANSI 244. Current requirements in both NSF/ANSI 244 and P231 are 6-log (bacteria) and 4-log (virus) reductions. WHO offers a tiered-level protection (i.e., 3-star and 2-star) and both are considered a comprehensive level of protection. R. Astle stated that the task group held an initial meeting on September 24th to get feedback from participants on what the general approach should be. The group agreed to send out a survey via email so that members could weigh in on their current position, express specific concerns about the task group’s objectives, and report on relevant regulations that would limit the ability to allow a requirement of less than the current 6 log bacteria / 4 log virus reduction, or to make bacteria or virus claims independently. R. Astle reported that the results of the survey were collected on October 23rd and will be reviewed with the task group at the upcoming meeting in November.

E. 1,2,3-TCP

**Discussion:** S. Murphy stated that a task group was formed at the recent JC meeting in May to consider the addition of a 1,2,3-TCP reduction claim under NSF/ANSI 53 and possibly NSF/ANSI 58. The group has held four meetings and has come to a consensus to validate systems that are already certified with VOC and PFOA/PFOS reduction claims using the 95th percentile of occurrence data for the influent challenge level. The group has reviewed occurrence data from California and the EPA UCMR and is proposing an influent challenge level of 300 ppt and effluent level of 5 ppt, which is based on the California notification level. Results of the validation test are expected by mid-November.
F. Microplastics

Discussion: S. Buck stated that this task group was formed in 2018 to develop a protocol for POU and POE devices for the removal of microplastics from drinking water. He reported that the group has held three meetings since the last JC meeting and has completed the following tasks:

- Researched existing global regulatory definitions
- Attempted to develop a definition suitable for drinking water use
- Discussed possible test methods associated with proposed definition

The group reviewed definitions by WHO, NOAA, the state of California, and the European Food Safety Authority (EFSA). S. Buck noted that most definitions identify microplastics as having a size range of 1 – 5,000 μm, and is primarily associated with marine and environmental impacts, rather than associated with drinking water. Based on this information, the task group has developed an initial definition that includes this size range. Particles derived in nature that have not been chemically modified are excluded. S. Buck reported that the task group has also come to a consensus that since microplastics are not currently known to have either a health or aesthetic effect, it would be most appropriate to include this claim under NSF/ANIS 401.

S. Buck stated that the task group has reviewed current protocols in the DWTU standards to determine if there test methods that could also apply to microplastics. The task group has determined that the NSF/ANSI 42 Particulate Class I reduction claim could serve as a conservative surrogate, as it specifies a test particle size range from 0-80 μm and allows for a 0.5-1 μm particulate size claim. S. Buck noted that the test requires 85% reduction for passing results.

F. Lemieux stated that Health Canada just published an informational sheet in early October with guidance on occurrence of microplastics in drinking water. She agreed to forward that to the task group for their review.

IX New Business

A. Commercial Modular Systems

Discussion: J. Smith explained that for each unique model number designation under NSF/ANSI 42 and 53, there is a literature requirement that the product’s capacity or service life claim cannot be greater than the least reduction capacity or service life that has been verified through testing to NSF/ANSI 42 or 53. This provides an extra level of safety for consumers who may not know what specific contaminants are present in the water. He noted that commercial modular systems, however, are produced specifically for food service applications, installed by an authorized plumber or authorized agent of the manufacturer, and not intended for use in residential applications. These systems consist of multiple endpoints using different flow rates, and only address a handful of contaminant reduction claims, such as chlorine, chloramine, and particulate. J. Smith stated that per NSF/ANSI 42 current requirements, only the lower capacity (with the higher flow rate) is allowed in the certification listing. If more of the end points are at the lower flow rates, change outs will happen with the great majority of filter capability left untapped. This forced waste is bad for the environment due to excess solid waste generation. J. Smith proposed that the literature requirements under NSF/ANSI 42 be revised for commercial modular elements (new and replacement) to allow all tested contaminants and their respective certified capacities or life spans at specified flow rates be listed.
E. Leung agreed that there should be a difference in labeling for products managed by a professional versus a homeowner. R. Herman stated that there are possible impacts of the revision, including the presence of a performance indication device (PID). It would preclude that. He added that the reason the JC originally limited a claim to one capacity was to avoid the misrepresentation of a product’s performance using multiple flow rates. G. Hatch and R. Regunathan both stated their opinion that the revision should be limited to aesthetic claims under NSF/ANSI 42. J. Smith noted that these systems typically have aesthetic claims but there are some food industry customers that require cyst claims as well. S. Murphy expressed concern that literature with multiple capacities for claims could cause confusion in the marketplace.

It was suggested that the issue proponent work with the certifiers to draft proposed language for the JC to consider. R. Herman offered to help J. Smith draft ballot language.

X Committee Administrative Issues

The next meeting date was tentatively set for Wednesday, May 12, 2021.

R. Regunathan motioned to adjourn the meeting; F. Lemieux seconded. All were in favor and the meeting was adjourned.
Meeting Participants

Joint Committee Members

Chairperson, Bob Powitz

Public Health/Regulatory

Anita Anderson (MN Dept. of Health)  
Chin Chew (NE Dept. of Health & Human Services)  
Robert Dumancic (Ontario Ministry of the Environment)  
Jeff Kempic (USEPA)  
Cynthia Klevens (NH Dept. of Environmental Services)  
France Lemieux (Health Canada)  
Eugene Leung (CA Waterboard Division of Drinking Water)  
Darren Lyle (USEPA)  
Klaus Seeger (Seeger & Associates)  
Ariel Zoldan (Michigan EGLE)

User

Zac Gleason (WQA)  
Brook Hatton (CSA Group)  
Rob Herman (NSF)  
Frank Kurtz (AWWA)  
Janick Lalonde (National Defense & Canadian Forces)  
Art Lunquist (US Army Public Health Command)  
Tom Palkon (IAPMO)  
Mikail Starostin (Green Mountain Coffee Roasters, Inc.)

Industry

Margaret Bicking (Ecowater Systems)  
Chris Caldwell (Viqua)  
Andrew Fenwick (Jacobi Carbon)  
Sun Yong Lee (Coway)

Shannon Murphy (TST Water)  
Hemang Patel (Cuno, a 3M Company)  
Arvind Patil (Ricura)  
Steve Ver Strat (Access Business Group)  
Joe Wolff (Elkay Manufacturing)

Non-Voting Emeritus Members

Vice Chairperson, Frank Brigano  
Gary Hatch (Hatch Global Consulting)  
Regu Regunathan (Regunathan & Associates)

Joint Committee Members not in attendance

Philip McCrory (Consultant)  
Mikiko Nakayama (Mitsubishi Chemical Cleansui Corp.)

Observers

Rob Astle (KX Technologies)  
Debra Bickers  
Mark Brotman (Kinetico)  
Viviane Choy  
Peter Cook (KX Technologies)  
Tina Donda (IAPMO)  
Dustin Dorsey  
Joshua Elliot  
David Farley (Sprite Industries)  
Kelli Fleishmann (WQA)  
Irina Garbar (UL)  
Jim Godiska (Follett Corp)  
Chris Hughes (Hague Quality Water)  
Alexandra Kallisek  
Jun Kim (Amway)  
Kevin Kons  
Amit Lathia (CSA)  
Oliver Lawal (Aquise Technologies, LLC)  
Kristin Licko (WQA)  
Andrew Lombardo (KX Technologies)  
Richard Martin (RAM Consulting Services)  
Nadia Martinova (Health Canada)  
Chris McDonald  
Jonathan McDonald (Clorox Services Co.)  
Sanjeev Moghe  
Tyler Monko  
Amanda Morgott (Amway)  
P. Osborne  
Stacie Ott
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