



OMSAP Meeting Agenda
March 2, 2022; 12-1:30 PM

Discussion of Contaminants of Emerging Concern (CEC) White Papers and Recommendations

Welcome – Judy Pederson and Matt Liebman

Purpose: Review and accept the three CEC white papers and the Executive Summary.

As usual with OMSAP meetings, Panel members will be given preference to ask questions first and attendees from PIAC and IAAC can participate when recognized.

1. Perspective and overview the purpose of the white papers to examine the pharmaceuticals and personal care products (PPCPs), per- and polyfluoroalkyl substances (PFAS), and microplastics (MPs) discharges from wastewater treatment plants. The focus was to examine what is known about the chemicals and compounds, their transport, fate and effects in the context of MWRA and their permit and ambient monitoring plan. **(10 minutes)**
2. Summary of the White Papers **(30 minutes)**
 - a. PPCPs: Todd Callaghan
 - b. PFAS – Judy Pederson
 - c. Microplastics – Judy Pederson
3. Review of the Executive Summary **(20 minutes)**
 - a. Recommendations
 - Effluent and tissue monitoring of selected CECs
 - Reduction of CECs at source
 - Collaboration on special studies as needed
4. Other Recommendations for Research and Agencies **(20 minutes)**
 - a. Standardized methodologies and approaches
 - b. Identification of key contaminants, *i.e.* those considered harmful to humans and biota
 - c. Assess the contribution of WWTPs compared to other sources
5. Other issues

Next steps, issues and meetings **(10 minutes)**

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Invited: OMSAP, PIAC, IAAC. Public listserv notice was not sent out.

Meeting Notes

Welcome and Intros

- Introduction of Dr. Alexa Sterling (EPA) replacing Matt Liebman in his retirement with the EPA and his role with OMSAP
- Introduction of Dr. Sarah Oktay as Executive Director of the Center for Coastal Studies

Discussion of Contaminants of Emerging Concern (CEC) White Papers and Recommendations

Agenda Item #1: Perspective and overview the purpose of the white papers to examine the pharmaceuticals and personal care products (PPCPs), per- and polyfluoroalkyl substances (PFAS), and microplastics (MPs) discharges from wastewater treatment plants. The focus was to examine what is known about the chemicals and compounds, their transport, fate and effects in the context of MWRA and their permit and ambient monitoring plan.

- Deadline of March 30 for white papers for submission to MIT Sea Grant, which will publish them.
- OMSAP has accepted all 3 white papers (not the MP though?). We also need consensus on recommendations in the Executive Summary
- Any editorial comments on white papers send to Judy Pederson at jpederso@mit.edu as soon as possible

Agenda Item #2: Summary of the White Papers: PPCPs, PFAS, Microplastics

PPCP White Paper – Todd Callaghan (MA Coastal Zone Management)

- Todd Callaghan speaks on PPCP white paper (no presentation slides)
- Todd Callaghan as lead on the PPCP group with Mark Cantwell, Michaela Cashman, Anna Robuck, Peter Burn, and Judy Pederson. Noted that Michaela and Anna were especially helpful
 - Studies show toxicity, but concentrations used in lab experiments were much higher than levels observed in environment
 - Pseudo-persistence = local persistence with a continued input with outfall even when they break down quickly
 - Bioaccumulation of PPCPs have been found, but limited studies (e.g. observations in dolphins)
 - No studies on PPCPs on marine populations, but population collapse shown in freshwater minnow
 - PPCP white paper recommendations
 - OMSAP should do a literature review

- Identify PPCPs that are bioaccumulative, persistent, and important in this region. There are differences in PPCPs of interest by region
- MWRA should monitor influent and effluent to determine removal efficacy
- Continue studies to evaluate passive samplers (discs, mussels) in MA Bay
- Lower priority: Tracer such as sucralose can be used to model transport and fate from the outfall
- Reminder from Todd: Tools can find these chemicals in low levels, but difficult to say what the impact is. But not knowing impact does not mean there is no impact.
- Anderson et al in Southern CA (SCCWRP, or Southern California Coastal Water Resource Project) did not recommend monitoring of any PPCPs in marine waters, but did recommend monitoring 4 other compounds of interest including PFAS
- Todd may recommend looking at estrogen in outfall because Anderson et al found estrogen in freshwater (only PPCP recommended in freshwater)
 - The Anderson et al reference: Anderson, P.D., N.D. Denslow, J.E. Drewes, A.W. Olivieri, D. Schlenk, G.I. Scott, and S.A. Snyder. 2012. Monitoring strategies for contaminants of emerging concern (CECs) in California's aquatic ecosystems. Recommendations of a science advisory panel. Southern California Coastal Water Research Project Technical Report 692 – April 2012.

PFAS White Paper – Judy Pederson

- See presentation slides
- Massachusetts and EPA are requiring monitoring of some PFAS in NPDES permits
- Some PFAS have been found in biosolids
- EPA has developed a strategic plan to review 100s of PFAS to ID “bad actors” in the next year or two
- Update on background of PFAS, impacts (range from plankton, fish, birds, marine mammals, humans), and fate (bioaccumulation/magnification, banned PFAS are still detected in human serum decades later)

Microplastics White Paper – Judy Pederson

- See presentation slides
- Reviewed characteristics of microplastics (MP); they are made from petroleum and natural products, they can degrade to form nanoplastics; they can serve as substrate for other contaminants (PCBs, PFAS), they have additives, and accumulate in humans and marine biota, and found in ocean gyres
- Microplastics are in the air and the water (some studies are contaminated with microplastics from the air) which makes it difficult to assess the scientific literature since there are mixed results and some results may be from contamination
- Secondary treatment removes most (90 - 99%) MPs but microfibers and small particles are still released
- Recommendations focus on need for standardize approaches (QA/QC), well designed experiments, and standards. OMSAP can be a good resource to ID research we need and to bring in experts
- SCCWRP has released MP recommendations

Comments from attendees on this section:

- Peter Burn: How do you define a PFAS “bad actor”? Judy: Ones bad for humans, animals, and the environment first
- Steve Wolf: Question on tracer study, since the PPCPs and PFAS are dilute that could be a successful model. But how does one model microplastics since the transport is likely different? Juanita: MPs layer in the system (float, sink) but with biofilms that changes and difficult to model. Understanding surface inputs and sediments would be the most important. Judy: This is covered in the white paper
- Lorretta Fernandez: Offered a consideration for the PPCP paper, which is the transformations that might occur to some of these compounds when they’re blasted with chlorine before they hit the pipe and then when they enter the seawater with chlorine and bromine. Those chlorinated or brominated forms may be more bioaccumulative or longer lived. Research by David Griffith on chlorinated estrogens from the disinfection process in wastewater treatment plants. This may change their toxicity, and could be investigated in the laboratory. Todd: OMSAP can ask for action on that
- Ginny Edgcomb: Is bioaccumulation (or trophic transfer) of MPs in zooplankton in white paper? Also, the high levels of concentrations of MPs used in lab studies can reach environmental concentrations when MPs bioaccumulate in the environment/organisms
- Todd would recommend that OMSAP asks the MWRA to look at phthalates, nonylphenol, polybrominated diphenyl ethers (PBDEs) and other compounds outside the scope of the white papers – these are other compounds that have been IDed in other wastewater studies in MA
- Judy points out that tire plastics were excluded from the MPs discussion, and may also be of importance to the region/MA Bay
- There was a suggestion to add these other important compounds outside the scope of the chosen CECs in the Executive Summary Follow-up statement from Todd Callaghan re: some of the above statements he made during the OMSAP meeting sent in an email to OMSAP:
 - After reviewing the pharmaceutical and personal care product (PPCP) literature, including the Anderson et al. 2012 recommendations for marine monitoring downstream of wastewater treatment plants by the Southern California Coastal Water Research Project (SCCWRP), PPCPs are most likely not the top tier of chemicals of emerging concern (CECs) that should be of concern to OMSAP (see Table ES-1 in Anderson et al. 2012, attached). The PFAS class of chemicals and microplastics are more important to the question of whether seafood is safe to eat and whether the Mass Bay ecosystem is being affected by CECs discharged from the MWRA’s Deer Island Treatment Plant. In addition, what is missing from the ad hoc group’s three white papers is a review of the importance of phthalates, nonylphenol, and PBDEs. These three chemical classes were recommended by SCCWRP for monitoring in marine waters. At some point, OMSAP should discuss if these CECs should also be the subject of special studies by MWRA.

Agenda Item #3: Review of the Executive Summary Recommendations: Effluent and tissue monitoring of selected CECs, reduction of CECs at source, collaboration on special studies as needed

Review of Executive Summary – Judy Pederson

- See presentation slides
- Banned CECs = microbeads (MPs), Triclosan (PPCP), and other PFAS
- Get ahold of Scott Gallagher for data summary
- Not many standards or data
- Recommendations included on Judy's slides

Comments from attendees on this section:

- Any other PFAS that MADEP are adding to their permits? EPA NPDES has 6 PFAS
- Difficult to suggest measuring PPCPs in organisms/mussels for AMP since they don't have specific PPCP compound to measure, and same for MPs
- Jeff Rosen: Would like to see what the intent of the monitoring is. Suggested making the goals crisper/clearer in the white papers. See below for follow-up email from Jeff on how to frame the proposals to MWRA:
 - Monitoring should be undertaken to characterize the concentrations and distributions both temporally and spatial including in the source water, in the plant effluent (finished water) and near field near the diffusers for each of the CECs. These results can then be compared to concentrations of concern for each CEC species.
- Betsy Reilley provided a statement (emailed to OMSAP after meeting) and made during the OMSAP meeting:
 - MWRA appreciates the efforts of OMSAP members to develop these white papers summarizing issues related to contaminants of emerging concern in the environment. These papers provide suggestions and recommendations for holistic management and monitoring, and encourage state agencies to work together to address these issues and to protect the environment. These issues are not specific to MWRA, but are found throughout the world we live in today. As the largest wastewater discharger into Mass Bay, MWRA continues to support monitoring of its treatment processes and effluent water quality, and as appropriate, monitoring of the environment for contaminants of concern that are consistent with state and Region 1 priorities. MWRA has reviewed the White Papers and the recommendations contained within them, but the "Framework" has not accurately captured those recommendations. In particular, MWRA is concerned with the first recommendation in the Framework for fish and shellfish tissue analysis of CECs from all three categories (PFAS, PPCP, MP), which does not reflect recommendations in the White Papers. In addition, as drafted, that recommendation requests an expansion of existing monitoring indefinitely, but a special study would be more appropriate. The recommendations should incorporate proper context of other monitoring programs, regulatory limits, and understanding of environmental impacts and how the results should be interpreted. As highlighted in each of the white papers, there are many questions and unknowns regarding the environmental effects, the levels that would be a concern, and for MP, sampling and testing methods have not yet been standardized. MWRA is also concerned with the recommendation to add CECs to pretreatment permits (Framework, second recommendation), for which

regulatory limits or guidelines do not exist (except for certain PFAS compounds). MWRA supports the goals of the White Papers and looks forward to working with DEP, EPA, and OMSAP to develop programs that address the recommendations in a manner consistent with MWRA's role and considering the burden on our rate payers.

Agenda Item #4: Other Recommendations for Research and Agencies: Standardized methodologies and approaches, identification of key contaminants, *i.e.* those considered harmful to humans and biota, and assess the contribution of WWTPs compared to other sources

See slides – Judy Pederson

- Continued recommendations on Judy's slide: reducing CECs and collaborative studies
- Other recommendations on Judy's slides for agencies and researchers

Comments from this section

- Matt Liebman summarized that the Executive Summary needs to be more clear and specific (crisper) which was pointed out by other attendees including Betsy and Jeff
- Betsy mentioned in total there's about 12 recommendations in the white papers for several different agencies. Suggested these may change into goals and then moving forward can apply that intent into actions
 - Judy mentions OMSAP provides recommendations and that is their role and then it is up to the agencies of what to do.
- Mark Patterson: Recognizes that MWRA is concerned about increasing burden on rate payers. Pointed out an example he learned about - Vancouver's wastewater partnered with as NGO to look at MPs/microfibers out of the rate payers' laundry machines. He pointed out that from Juanita's presentation ~ 2 years ago, they learned microfibers are especially problematic for organisms. The Canadian study with Ocean Wise found the plant takes out 99% but that the 1% into the ocean is still a huge amount – pointed out ways to talk to the rate payers about how to reduce the load coming into the plant. Attaching values to CECs and what Deer Island is putting into the ocean, and then could reduce load on plant itself from behavioral changes from public
- Lorretta: These are national problems. Seems like study of how much outfall contributes to these CECs in ocean are of national importance. Suggested forming a team to write a one-page pitch to investigate methods to do a large scale source evaluation to send to federal agency program managers so that MWRA and federal funding could be used to complete this study.
 - Judy: Noted in prior meetings, the suggestions of using buoys was discussed, but the consensus was that they did not replace at sea sampling. Looking at new technologies (especially with MPs) as an opportunity
 - Matt: Could MIT Sea Grant also help produce Lorretta's one-pager? Julie: Yes
 - Judy: Would like to develop an outreach plan by sending white papers to agencies, legislators, etc.
 - Todd: Classes of chemicals not addressed by white papers (at least 3 classes). Asks if the 3 CECs chosen are to be included in 1 pager? What is the framework that MA will evaluate CECs and which to focus on? There's the SCCWRP list, and another from Harvard. Maybe move with PFAS and MPs, but also need a

process to ID the chemicals of interest. Recommendation from Todd: create a group to establish the process to ID additional chemicals of interest

- Jeff adds comments:
 - Believes monitoring should happen after understanding what questions to answer
 - Judy points out studies from PFAS and PPCPs transects from outfall by Anna and Mark. They were hoping to have this information for white papers. Scott Gallagher was going to sample MPs for low flows and storms for multiple WWTPs. There are existing data
 - Jeff pointed out he commented on Anna's project design, but received the response that it was a pilot study. Pointed out that we need to know the distributions in order to understand the risk

Agenda Item #5: Other issues

Agenda Item #6: Next steps, issues and meetings

- Matt's summary:
 - Be clearer in recommendations, and distinguish between recommended monitoring versus special studies
 - Todd's point about risk framework, but it is noted that it is difficult to develop a risk assessment if there are no standards or end points.
 - One-pager to pitch to funding agencies
 - In sum – this is our path forward
- Judy – PFAS may be an exception because there's already standards
- Judy would like a meeting with OMSAP to go over whatever changes are made. A working group with only OMSAP.
- Jeff – understands this is bigger than MWRA and for something to work it'll be bigger than MWRA. Judy – points out the previous point and effort for a consortium of all dischargers into MA Bay

Next steps: Working group of OMSAP to refine Executive Summary in the next week or two

Attendees

- Wendy Leo, MWRA
- Todd Callaghan, MA Office of Coastal Zone Management
- Andreae Downs, Wastewater Advisory Committee to the MWRA
- Rich Delaney, Center for Coastal Studies
- Sally Carroll, MWRA
- Vi Patek, Executive Director Nahant S.W.I.M. Inc. (Safer Waters in Massachusetts)
- Steve Wolf, EPA Region 1
- Sarah Oktay, Center for Coastal Studies
- Amy Costa, Center for Coastal Studies
- Dan Codiga, MWRA Environmental Quality
- Dave Wu, MWRA
- Ginny Edgcomb, WHOI
- Jianjun Wanf, MWRA
- Doug Hersh, MWRA

- Jeffrey Rosen OMSAP Member, Corona Environmental Consulting
- Christian Petitpas, MA Division of Marine Fisheries
- Prassede Vella, MassBays & CZM
- Jianjun Wang, MWRA
- Alexa Sterling, EPA Region 1
- Juliet Simpson, MIT Sea Grant
- Matt Liebman, EPA Region 1
- Judith Pederson, MIT Sea grant
- Joe Favaloro, MWRA
- Juanita Urban-Rich, UMass Boston
- Betsy Reilley, MWRA
- Peter Burn, Suffolk University
- Jo Ann Muramoto, Association to Protect Cape Cod
- Jeff Kennedy, MA Division of Marine Fisheries
- Robert Kenney, URI
- Denise Ellis-Hibbett, MWRA
- Mark Patterson, Northeastern
- Michele Barden, EPA Region 1
- Loretta Fernandez, Northeastern
- Betsy Davis, EPA Region 1
- Lucner Charlestra, MWRA
- Ben Haskell, Stellwagen Bank National Marine Sanctuary
- Regina Lyons, EPA Region 1