

**U.S. Environmental Protection Agency  
Science Advisory Board  
Drinking Water Committee**

George Washington University  
Milken Institute School of Public Health  
950 New Hampshire Ave, NW, Washington, DC 20052

**April 29-30, 2015**

**Minutes of the Meeting**

**Attendees:**

Members of the Drinking Water Committee: Kimberly Jones (Chair), Mark Benjamin, Joel Ducoste, Russell Ford, Susan Korrick, Kristina Mena, William Mitch, Eileen Murphy, Stephen Randtke, Lynn Roberts, Kellogg Schwab, Janice Skadsen, Shane Snyder, Craig Steinmaus, Mark Wiesner, Lloyd Wilson, Marilyn Yates (for full details, see Attachment A: Committee Roster)

SAB Staff Office: Stephanie Sanzone (Designated Federal Officer), Chris Zarba, Tom Brennan

Other Attendees: See Attachment B

**Purpose:**

The purpose of the meeting was to review EPA's *Draft Fourth Drinking Water Contaminant Candidate List (CCL4) (February 4, 2015)*.

**Meeting Materials:**

All materials discussed at the meeting are available on the SAB website, at [www.epa.gov/sab](http://www.epa.gov/sab) on the April 29-30, 2015 Meeting page:

<https://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/d3133cd0a4541fc485257de3005f57d9!OpenDocument&Date=2015-04-29>

**Summary of Matters Discussed and Conclusions Reached**

**Convene the Meeting**

The meeting was announced in the *Federal Register*<sup>1</sup> and proceeded according to the meeting agenda<sup>2</sup> as revised. **Ms. Stephanie Sanzone**, Designated Federal Officer, convened the meeting and noted that the Drinking Water Committee is a standing committee of the EPA Science Advisory Board. The SAB is authorized under the Environmental Research, Development and Demonstration Authorization Act (ERDDAA) to provide advice to the EPA on the science supporting agency actions and programs. The SAB and its committees operate under the Federal Advisory Committee Act, which means that meetings are announced in the *Federal Register* and open to the public, all materials presented to and prepared for and by the committee are available to the public, the committee is balanced in terms of scientific expertise and points of view relating to the charge, and the public has an opportunity to provide comments for consideration by the committee. She noted that all meeting materials, including the EPA background materials,<sup>3</sup> the members' pre-meeting comments,<sup>4</sup> and 5 sets of written public comments are available on the SAB webpage for the meeting. Ms. Sanzone also noted that all members of the DWC serve as Special Government Employees and therefore are subject to certain ethics rules and regulations. She summarized the SAB Staff Office determination that the DWC review of the draft CCL4 was a

general matter, rather than a particular matter. She thanked the members for taking their ethics training and noted that all members of the committee are in compliance with ethics rules that apply to them.

**Mr. Christopher Zarba**, Director of the SAB Staff Office, thanked the DWC members for their efforts and welcomed them to the meeting. **Dr. Kimberly Jones**, Chair of the DWC, added her welcome and noted that the DWC had not met in some time. She requested the members to briefly introduce themselves. Dr. Jones then introduced the EPA presenters to give their overview of the CCL4 process.

#### Overview of the CCL4 Listing Process and Draft CCL4

**Mr. Eric Burneson**, Director of the Standards and Risk Management Division of EPA's Office of Groundwater and Drinking Water (OGWDW), gave a brief overview of the statutory context for the CCL. He noted that development of the CCL is the first step in a risk assessment process laid out in the Safe Drinking Water Act (SDWA), as a result of the 1996 amendments. The purpose of the CCL is to identify the subset of all contaminants in drinking water that may require regulation and to target research and information collection efforts. In addition to the CCL, the process includes the Unregulated Contaminants Monitoring Rule (UCMR) which, every five years, identifies contaminants to be monitored, and development of regulatory determinations. The SDWA requires the agency to do these determinations for at least five contaminants from the CCL, and the process involves more in-depth analysis of data on health effects and occurrence to decide whether or not to regulate based on criteria specified in the SDWA. He noted that the statute lays out a lengthy process for evaluating public policy/regulatory actions: e.g., establishment of a Maximum Contaminant Level Goal (MCLG), health risk reduction cost analysis, considering sensitive populations, required consultations (e.g., small system issues, consultation with the SAB), and 6-year review of promulgated regulations. He emphasized that the CCL is an important first step, but that the EPA has to balance resource requirements across all of the required steps in the process. That is why the agency focused on nominated contaminants, and rolled forward contaminants included on the CCL3 list (which had already had a robust process look from NAS and the National Drinking Water Advisory Committee, NDWAC). He acknowledged that the science on contaminants is involving, and that the current decision to carry forward contaminants from the previous CCL is not a permanent position, but noted that the agency feels it has developed a robust set of contaminants. He closed by noting that the agency will consider SAB comments as they finalize the CCL4, and for future CCL's. He introduced the CCL4 Team Leaders, Meredith Russell and Hannah Holsinger, for detailed presentations on the CCL4 process.

**Ms. Meredith Russell, CCL4 Team Leader**, summarized the statutory and regulatory background of the CCL, noting its dual role in identifying priority contaminants for data collection and for potential regulatory determinations (see presentation slides<sup>5</sup>). She noted that development of the CCL3 used a new multi-step process based on recommendations from the National Academy of Sciences and the NDWAC, and that chemical and microbial screening differs because of the different nature of the 2 categories of contaminants. She noted that the support documents and the website had been updated in response to SAB comments on CCL3 requesting greater transparency about the steps leading up to the listing. For the draft CCL 4, the agency carried forward CCL3 (minus those that had regulatory determinations), and evaluated contaminant nominations from the public and contaminants that had previous negative determinations from CCL1 and CCL2 but for which new data were available. Nominations resulted in the addition of manganese and nonylphenol. The 12 microbes are the same as in CCL3. No new information was identified for contaminants that had previously had negative determinations. Five contaminants were removed because of preliminary regulatory determinations, and perchlorate was removed because of the regulatory determination issued in 2011. The resulting draft CCL 4 includes 100 chemicals or chemical groups and 12 microbes. Ms. Russell closed by noting that

Ms. Hannah Holsinger, the CCL4 Microbial Team Leader, could also answer questions from the Committee.

Following the presentation, DWC members asked clarifying questions regarding the extent to which CCL3 contaminants were re-reviewed versus focusing on nominated contaminants; whether data from UCMR 2 or UCMR 3 had been used in the CCL 4 process; whether and how data uncertainty had been considered; whether water treatment was considered in terms of what microbes are likely to be found in finished water; where in the CCL 4 documentation one could look to see the key reason for why a contaminant was listed; details of how classification of contaminants was done; what was meant by data being “retrievable” (e.g., did that mean data in per reviewed articles was not used); and how different weighting schemes for the expert opinion models might affect the results.

In response to a member’s question about how quickly EPA could modify the CCL, e.g., in response to a water-borne disease outbreak, Mr. Burneson noted that the CCL is a primary means of identifying contaminants, but not the only means for EPA to consider concerns (e.g., the recent water contamination in Charleston, WV). He noted that EPA is obliged to set out the CCL on a 5-year cycle, reflecting congressional recognition of the time needed to gather and consider data and move forward with decisions on monitoring requirements, etc.

### Public Comments

Oral statements were provided by five speakers who had registered in advance.

**Steve Via**, provided comments<sup>6</sup> on behalf of the American Water Works Association (AWWA). He noted that EPA had conducted stakeholder outreach and NAS involvement, so CCL4 is improved. He urged the DWC to focus on the purpose of the list to guide regulatory development. With regard to Charge Questions 3 and 4, he emphasized that the drinking water community and the EPA have very limited resources to move a contaminant forward to risk management, and the CCL is the primary tool for doing that. Thus, the CCL list needs to be shorter (maybe 20 to 50 contaminants) so that limited resources can be applied. He noted that his written comments have suggestions for contaminants to add or delete. He also emphasized the need for a more open, collaborative approach for getting the data needed to improve EPA’s future ability to do regulatory determinations.

DWC members discussed the pros and cons of a smaller, more targeted list, including the greater amount of time and data that would be needed to develop a shorter list, as well as potential difficulties with associating health effects with contaminant groups (e.g., disinfectant byproducts, DBP).

**Joseph Cotruvo**, of Joseph Cotruvo & Associates, LLC, provided comments<sup>7</sup> on the CCL4, noting his general agreement with comments provided by Mr. Via. He made some specific suggestions for how to get to a shorter, plausible list of contaminants, and noted that Health Advisories were developed as a means of providing a quick response if there were health concerns about contaminants. He noted that some contaminants on the current list could be dropped based on the occurrence data, because they are already regulated through other regulations, treatment, etc.

In response to a DWC member question, he acknowledged that biofilms and distribution systems are a potential gap in the regulatory system.

**Sahar Osman-Sypher** presented comments<sup>8</sup> on behalf of the American Chemistry Council (ACC) Diisocyanates Panel. She presented the Panel’s view that Toluene diisocyanate (TDI) does not merit listing. She made the following summary points: (1) TDI occurrence is implausible because of its physic-chemical properties, because it hydrolyzes rapidly in water to form insoluble substances. (2) EPA

inappropriately relied on the Toxic Release Inventory (TRI) as the sole reason for listing many chemicals on CCL3. This leads to overly conservative estimates, not based on measured releases. For example, evidence for TDI is from a release for only one outfall, and salinity at that site precludes its use as a drinking water source. The most recent TRI data have no occurrence of TDI. (3) The import of CCL chemicals into the endocrine disruptor screening process is inappropriate. TDI testing in endocrine assays would be irrelevant. (4) Carrying forward CCL3 to CCL4 means EPA is not evaluating the most recent data on those substances. She recommended that EPA evaluate the latest science every 5 years.

A DWC member noted that TDI is clearly toxic, and that reaction products in vivo may be different than those observed in the environment.

**Barbara S. Losey** provided comments<sup>9</sup> on behalf of the Alkylphenols & Ethoxylates Research Council, an industry-based research organization. She provided extensive comments on nonylphenol, questioned a LOAEL value that EPA had used, and noted that additional information is available from risk assessments in the peer reviewed literature, outside the CCL process. In response to a DWC member question regarding whether the endocrine activity used was sufficiently conservative, Dr. Losey noted that the number used to evaluate nonylphenol apparently was from a hard-to-find study, and that EPA should not rely on a secondary report of the data but instead should review the primary study to confirm the number. She noted that additional information was provided in her written comments.

**David McCready**, participating by telephone, provided comments<sup>10</sup> on behalf of the ACC Ethylene Oxide and Ethylene Glycols Panels. He gave a brief summary of the written comments from ACC, noting that ethylene oxide would not be expected to persist in drinking water because it is very volatile. With regard to ethylene glycols, he noted that these compounds biodegrade quickly so, even though they are water soluble, they are unlikely to persist. He further noted that ethylene glycol biodegrades in soils and groundwater, and is not known to occur in drinking water (i.e., is not in the national occurrence database).

#### Discussion of the EPA Charge Questions

Dr. Jones let the Committee through a brief review of the charge questions so that members could ask EPA any clarifying questions about the charge and what the agency was asking the Committee to do in the review. Regarding Question 1, a member asked whether the Committee could recommend improvements for the next CCL, and it was agreed that the Committee could offer suggestions. Another member asked whether the question was about the clarity of the listing approach, versus whether it is possible to follow a contaminant through the process, and EPA agreed that commentary on both aspects of the question would be helpful.

For all Charge Questions, members clarified that the questions should be answered on the basis of sources of information that members are aware of from their research and expertise, and did not imply that the Committee would conduct a comprehensive literature search for each contaminant. Several members asked whether the Committee could offer recommendations for CCL 5 even though there was not an explicit question in the charge, and members agreed that the Committee could offer thoughts on that topic as part of the DWC's recurring reviews of CCL over the years.

## Response to Charge Questions

### **Question 1: Clarity of CCL 4 Support Documents**

The Committee then turned to discussion of responses to the EPA charge questions. Lead Discussants for Charge Question 1, Clarity of the CCL 4 Support Documents, were Drs. Ducoste, Ford, Randtke, Skadsen and Wiesner.

**Dr. Ducoste** summarized his written comments, noting that from a review of the support documents it was difficult to follow which contaminants made it through various steps in the process. The documents were partially clear about exclusion or inclusion, but not clear why some contaminants scored higher than others. He noted that he would have liked to see a master list of the contaminants with scoring and ranking and reasons for inclusion /exclusion on the draft CCL 4. Although there were references to the rubric used, the details were difficult to understand from the PDF documents and it would be preferable to have a web-based source of information next time. With regard to data sources, he noted that it was not clear why some data sources were not used whereas others that did not meet the “retrievability” test but were still included. In the screening document, it was not clear how data variability was accounted for in looking at occurrence and potency. For classification, there was no clear way to see from the tables how scores were combined, how potency and prevalence were combined, etc. He noted that the recent AWWA document, without commenting on whether their resulting list of contaminants is good or bad, had a clear, understandable explanation of why contaminants were included or excluded.

**Dr. Ford** concluded from his review of the documents that it was clear what EPA had done to develop the draft CCL 4. He noted that he had focused more on issues like the sensitivity of models for listing (relates to questions 3 and 4), and that he found it hard to get to that based on the level of information provided. He said he would like to see the Committee offer recommendations about how to do this better in a future round.

**Dr. Randtke** concluded that the description of the approach used by EPA was clear, but that it is hard to understand what was done for specific contaminants based on the support documentation. He noted that he would like to see the summary information for why certain contaminants were listed and others were not to be condensed to one page.

**Ms. Skadsen** noted that it was cumbersome to keep switching back and forth between documentation for the CCL 3 list and the CCL 4 nominations and said a single integrated source of information would have been helpful.

**Dr. Wiesner** noted that the definition of “clarity” of the process depends on where one puts the boundaries. The description of the process was very clear but the discussion of analyses and data resources, methods used to develop values, chemical/physical principles etc. was less clear. He noted that the “behind the curtain” issue is weighting; if the weighting were changed, how would it change the resulting contaminants on the list. The expert system, with a training set, felt like a black box and it was unclear how the results would change depending on how the various factors were weighted.

Following the summary comments from the lead discussants, the Committee discussed the response to the charge question, including the following points:

- Overall, the process was transparent, but information was in lots of different places. It would have been very helpful to have a web-based source so that someone could click on a chemical and find out what information was used, etc.

- The 30,000-ft level discussion was clear, but when it got down to the details it was not very clear. For example, the application of the neural network model was often unclear. It would be helpful to take a few examples of chemicals (some obvious to list, some obvious not to list) and show what criteria came into play to put them on or off the list.
- There was concern that chemicals carried forward from CCL 3 were not examined with respect to any new data.
- Members noted that many of the concerns in the previous SAB report were being expressed for this CCL also and asked EPA if there were institutional reasons why concerns had not been addressed. Lisa Huff from OGWDW replied that EPA had tried to address some of the transparency concerns previously expressed by SAB but that EPA would welcome recommendations on how to further improve transparency for the CCL process. Ms. Russell added that EPA had focused the CCL 4 supports documents on the new nominated chemicals and left the detailed discussion of CCL3 to the CCL3 support documents.
- Several members noted that part of the transparency is to be clear what the CCL process is and is not designed to do (e.g., if only tracking outbreaks of waterborne disease, EPA may miss some information on pathogens; only looking at retrievable data so that is a subset of what might be available; CCL3 data not updated so that may miss new information; will miss health outcomes that don't have quantifiable toxicological benchmarks or noncancer effects) and be clear about the limitations.
- Members asked EPA whether data for CCL3 contaminants were not reviewed because of resource limitations, and EPA replied that the agency did look at some new science for the carried forward contaminants, that some were being looked at as part of the regulatory determination process, or the UCMR 3 process.
- In response to member questions, EPA confirmed that the CCL3 weighting scheme was used for CCL 4, without updating of occurrence or toxicity information, using the same scoring and models.

The Committee broke for lunch from 12:15 to 1:30 p.m. After returning from lunch, Chris Zarba introduced Glenn Paulson from the GW Milken Institute, currently on detail from the EPA. Dr. Paulson welcomed the Committee to the Milken Institute and described the building's LEED Platinum features, including a green roof, water treatment capability, etc.

Dr. Jones then turned the Committee back to final thoughts for responses to Charge Question 1 before turning to discussion of Charge Question 2.

## **Question 2: Additional Data Sources**

Lead Discussants for Charge Question 2 were Drs. Steinmaus and Wilson. (Drs. Alexeeff and Loge also had been assigned to this question, but had been unable to attend the meeting).

**Dr. Steinmaus** stated that, based on the discussions before lunch, it was now clear that data for the CCL3 chemicals were not updated. He asked EPA for clarification on whether a standard literature search had been done for the nominated contaminants, and Ms. Russell replied that a review was done based on the data sources listed for each contaminant, including looking at values in the Integrated Risk Information System (IRIS).

**Dr. Wilson** noted that he appreciated the amount of work involved in the development of the CCL4, and thought the data sources were pretty good. However, he expressed concern about the fact that UCMR 3 data were not used, even though the data are not final yet. EPA replied that UCMR 3 monitoring will continue until December 2015, and then 6 more months will be needed for laboratories to review the

data, followed by a period of time for EPA to double-check and do quality assurance (QA). The bottom line is that final UCMR 3 data are more than a year away. Dr. Wilson also asked EPA whether the National Exposure reports from CDC were used, and EPA replied that NHANES was not used because it provides blood levels of contaminants but does not partition by exposure source.

Following the summary comments from the lead discussants, committee members made the following additional points:

- A member asked about the EPA strategy for the data search process, including were some parameters weighted, if the 12 criteria for pathogens picked up occurrences, was there additional follow-up, etc. EPA replied that the search looked for both health and occurrence data, and that all 12 of the pathogen criteria were weighted equally.
- It was unclear whether EPA relied on EPA databases, or whether peer reviewed literature also was searched. EPA replied that at later stages in the process, the agency did consider some peer reviewed literature, especially if received as part of a public nomination.
- EPA confirmed that it not done special outreach to Water Environment Research Foundation (WERF) or other entities who had relevant data, although these organizations had the opportunity to provide data as part of the nomination process.
- Members discussed other possible sources of information, including more current data sets, possible use of NHANES data, early releases of UCMR 3 data, WHO decision-making and guidance values, etc.

### **Questions 3 and 4: Contaminants That Do Not Merit Listing or That Should Be Added – Pathogens and Toxins**

Lead Discussants for Questions 3 and 4 (as related to Pathogens and Toxins) were Drs. Korrick, Mena, Schwab, and Yates.

**Dr. Korrick** indicated her uncertainty about whether members are providing their idiosyncratic ideas for what to add/delete as opposed to having a systematic way of looking at all listed pathogens. She noted that she is not a microbiologist, and did not try to consider what to remove. With respect to pathogens that might be included, she noted concern with an emerging pathogen, *Clastridium*, historically acquired in hospitals but which now is starting to occur as community-acquired cases. This pathogen is excreted in feces so can be in wastewater and has been detected in source water. She noted that it may have been excluded from consideration because it requires anaerobic conditions. Dr. Korrick asked whether some pathogens had been omitted because they would be dealt with under the Total Coliform Rule, but EPA replied that all microbes could be considered except those already regulated with MCLs. Dr. Yates noted part of the confusion might be that one of the pathogen groups, Heterotrophic Plate Count bacteria, was excluded because of the Total Coliform Rule. Dr. Korrick ask about *Vibrio cholera*, and EPA noted that it had been removed from the draft CCL because the data on outbreaks was from pre-1990.

**Dr. Mena** noted that there is no perfect process for evaluating microbes for listing, but concluded that for Enteroviruses it would be good to have more specificity within that group. She expressed concern that some pathogens could be missed if any of the 12 screening criteria could result in a pathogen being dropped from the list. She also questioned whether the 12 criteria would capture risks from biofilms and other distribution system risks.

**Dr. Schwab** discussed the case of vegetative bacteria that can be reduced to the non-spore forms. Some pathogens will be removed by treatment and in addition molecular detection doesn't mean a health risk.

He noted that carrying forward pathogens from one list to the next is just moving the issue into the future. He agreed with earlier comments on the need for more information on pathogens in biofilms, because the country will continue to provide piped drinking water. A fuller understanding of biofilms may change how we think about treatment, and it is important to take a public health approach to prioritizing chemicals and pathogens for drinking water so that we are not still having this discussion for CCL 7. He also agreed with comments that a more transparent discussion is needed of what is on the list and what is not on, and why, especially as the list of contaminants is carried forward from one list to the next.

**Dr. Yates** noted her agreement with many of the previous comments, and concluded that the process and philosophy is more important for the SAB to consider at this point than what is on the list. She reiterated concerns from her written comments that many decisions were made where the rationale for the decisions is not clear. Small changes in weighting and scoring could affect what gets on the list or not. She had questions about sensitivity analyses, i.e., the influence on score of one health outcome versus another, where the break points are, scores given different things. Without a clear process, SAB comments would just be each person's "favorite organism" etc. and she felt it is important to take the time to understand how the calculations and assumptions are being done.

After the lead discussants made their summary comments, members of the Committee made additional points, including the following:

- Water utilities are concerned about being responsible for pathogens that occur in the distribution system. If EPA goes down that path, it will be critical to consider what will be done because utilities do not have ways to control what is in the pipes. However, many of the outbreaks are associated with distribution systems, and still of concern.
- From a public health perspective, there may be additional pathogens of concern.
- Regarding break points for pathogens, the top 12 were selected and the reasoning behind that decision was not clear. Other natural break points were seen (e.g., the break between 6 and 7 was the same as between 12 and 13) so it would helpful to have a clear rationale for where to draw the line.
- Expert opinion is important in this process and the results from the models are subjected to a second look by experts.

### **Questions 3 and 4, Contaminants That Do Not Merit Listing or That Should Be Added – Chemical Contaminants**

Lead Discussants for Questions 3 and 4 (as they relate to Chemical Contaminants) were Drs. Mitch, Murphy, Roberts, and Snyder.

**Dr. Mitch** summarized his written comments, noting that it is important to be more specific about the goals for the CCL. One objective might be to make the list smaller, but he was not sure what the criteria would be (e.g., how to balance high toxicity versus very low prevalence). On the other side, if a region is interested in potable water reuse, certain contaminants would be of interest to those populations but not broadly applicable elsewhere. One way of thinking about this would be to consider the relative prevalence of a contaminant, e.g., DBPs are very prevalent. Another question is whether the listing requires EPA to have human health data, or whether listing could be based on in vitro toxicity assays.

**Dr. Murphy** concluded that the biggest issue is one of prioritization, rather than the absolute number that should be on the list. In order to pick 5 for regulatory determinations, how does EPA decide which are the top 20 or 50? Other parameters could be used to help prioritize: analytical techniques and

variability, including groups or categories (e.g., DBPs where chemical structures are similar). She was not sure how contaminant groups could be handled with the current process. EPA might decide to have treatment-based MCLs in the future, in which case contaminant groups would be useful. She also voiced concern with relying on public nominations to identify contaminants, even though some states have good programs. She recommended that EPA should be identifying contaminants also. It makes sense to carry forward contaminants from CCL3, but there should be a process to update data on these contaminants. For future contaminants, other perfluorinated compounds as a group might be needed.

**Dr. Roberts** noted that most of her concerns relate to “Question 5” (improvements for future CCLs) but recommended that there be periodic literature reviews. Chemical usage changes over time, occurrence studies change over time as we become aware of other DBPs, analytical techniques change etc. She agreed that it was not sufficient for EPA just to rely on the public nominations to identify issues. Contaminant grouping can be useful, but, e.g., lower weight perfluoro-chemicals may not have the same toxicity as the higher-weight ones, so it is important to understand the toxicology. With regard to ethylene oxide, she noted that it does undergo rapid hydrolysis but she was not sure about the half-life and whether it persists in source waters long enough to pose a health risk. She shared the concerns of some other members about some DBPs that are not on the list (e.g., chloropicrin may pose more drinking water risks as it is used as a pesticide). She also suggested that cyanotoxins merit inclusion.

**Dr. Snyder** agreed that the number of contaminants on the list is quite large and that issuing Health Advisories where there are data is more effective than keeping contaminants on a long CCL list. He noted that estrogenic hormones were not in the draft CCL3, but were in the final CCL3. He expressed surprise at this, noting that he was on an expert panel that looked at CCL3, and estrogenic hormones were not found to be occurring in many drinking water samples (in the UCMR 3 data). With regard to Estradiol, there have been clinical trials for decades, and he was surprised to see a statement in the CCL4 documents that there were not toxicology data for pharmaceuticals.

Additional points raised by Committee members included the following:

- For pharmaceuticals, the data are designed to identify effects when given as therapeutic. This is very different than data that would be associated with low dose exposure to someone not in need of treatment.
- Public perception of concern may be a disconnect with the CCL process. Emerging contaminants, such as nanoparticles, may not have data suggesting toxicity and if there are pulmonary effects that would not be from an ingestion route of exposure
- Although the DWC did not do a literature search on the listed contaminants, the DWC as a group of experts is being asked to provide a reaction to the list.
- Regarding the public comment on ethylene glycol, Dr. Wilson noted that in New York there had been issues with deicing fluids and various glycols. He noted that the public commenter’s testimony mentioned a half-life of several days, and that is enough time to have a concern at a public drinking water supply.

**“Charge Question 5”—articulate some priority recommendations on the next CCL5, versus changes for CCL4.**

The Committee discussed priority recommendations that should be implemented for the final CCL4 as distinguished from improvements recommended for CCL 5.

For CCL4:

- For clarity, provide the equation for the neural network that gives the scores on the summary data sheets.
- Provide a summary table for the CCL4 list that gives the rankings, how things were prioritized, if not the concentration value what was used, if high score but not included, why, etc.
- Add to the website, “why included” with a link to the data sheet (e.g., carryover from CCL3, high toxicity, high occurrence, etc)
- Build out that table, with different criteria for inclusion. Often probably several criteria triggered inclusion on the list, and say what those were and/or give explicit rationale.
- The table in Appendix 5 of CCL3 Universe was very helpful. Maybe add CCL4 results to that table to bring it up to date and comprehensive.

For CCL5 (ways to improve for the next time around):

- If applying a model (or set of assumptions) to the data (could be a half-life, removal, etc.), there is substantial work that could be done to list out the models for transformation etc. and describe these.
- CCL seems to have 2 important goals that are not optimally achieved through the same means: (1) contaminants to be monitored—inclusive, and (2) which to move forward on for regulatory determinations. It is hard to meet both goals with the same process. If PCCL to CCL is to be model-based for efficiency, that process needs to be more robust. Assumptions affect results, so sensitivity analyses are needed. The conceptual foundation of the models is hard to extract from the written materials. For future lists to be whittled down to manageable size, priorities need to be reflected in the process. Automated decision-making can get ahead of clear principles for decision-making.
- CCL5 could be web-based, so that it is possible to click on a chemical and pull up the backup data summary and comments etc. It should be easier to look at this information, understand what rubric was used, and if interested to be able to drill down to the data sources used. The website also could be designed to allow the public to nominate and upload data or peer reviewed articles for the next round.
- EPA should attempt to integrate CCL with other analyses, including what is learned from UCMR. Regarding the 2 objectives of CCL, the goal of picking 5 contaminants for regulatory determinations would be made easier if the list were shorter, but a longer list would be better for driving monitoring. Should there be 2 lists?
- Despite the concerns with the list being too long, occurrence should not be viewed as a static phenomenon. For example, fracking and acrolein are a rising concern. As the list gets longer, it will be even more difficult to do a literature review of listed contaminants. EPA should look for indicators that changes may be occurring that will impact occurrence.
- Consider a tiered list so that EPA keeps a legacy list of contaminants, some of which get reviewed against new data, and a new tier that is being evaluated because of new data (from nominations etc), and prioritize them. Don’t paralyze the effort in the quest for great certainty at the candidate stage.
- As new analytical approaches become available (e.g., for microbials, there is an explosion of new detection methods for genomes) the quandary will be to discern what this means for health concerns. EPA will need to prioritize the techniques—the discovery factor is different than understanding the public health consequences and level of concern.
- Explore the possibility of contaminant groups, e.g., according to chemical structure, according to treatability in water (many contaminants on the list are removable by existing or tweaked

treatment—carbon adsorption can remove contaminants of a certain type). Treatment-based listing was considered in NJ and was not pursued, but might be useful. WHO has looked at treatment-based guidelines, but it is a difficult, resource-intensive approach.

- With any CCL, it is important to document the caveats and limitations. We are assuming that the list generated by the algorithm is conservative, but that may not be true. The data source limitations may be biasing what is being examined for the list and thus it may, or may not, be conservative.

#### Summary of Assignments, Administrative Reminders

Dr. Jones asked Lisa Huff, OGWDW, if she would like to make any remarks to the Committee. Ms. Huff thanked the Committee and noted that she had heard many ideas for the program. She requested some time to think about what she had heard, and asked if she could have a brief opportunity on the following morning to make any remarks. Dr. Jones agreed that Ms. Huff could have time on the agenda the following morning.

Dr. Jones reminded the Committee members to be thinking about “Charge Question 5” and agreed that the Committee would discuss how to organize the responses on the following day before going into the writing session.

Ms. Sanzone announced that the Committee was in Recess at 5:00 p.m.

#### April 30, 2015

The meeting was reconvened by the DFO and Thomas Brennan, Deputy Director of the SAB Staff Office. Dr. Jones then turned the floor over to EPA for brief clarifying remarks.

#### Opportunity for Brief Clarifying Remarks by EPA Staff

**Lisa Huff**, OGWDW, thanked the Committee for a great discussion of the charge questions and made a few clarifying points. She briefly reviewed the list of materials that had been provided to the Committee, and emphasized that the CCL is a means for identifying data needs and monitoring priorities in addition to feeding into the regulatory determination process. She provided additional explanation of where CCL ends and regulatory determination begins, including the more detailed analysis of occurrence data (mostly for finished water), health reference levels, etc. She emphasized that CCL is more of a screening process, which is why it is a long list, whereas the first phase of regulatory determination looks at the availability of additional data for occurrence and health effects.

The Committee asked clarifying questions of Ms. Huff and Ms. Russell and discussed the relationship between the CCL process and the subsequent, more data-intensive process associated with the regulatory determination phase, the timing of each phase in relation to the UCMR process, and other issues. Members discussed whether the Committee could or should provide input on priorities for the listed contaminants, but Dr. Jones cautioned that such a prioritization was not part of charge and the committee might not have the data or expertise to attempt a prioritization. Several members asked whether there were avenues for removing contaminants from the lists other than via regulatory determination, and expressed some concern that the agency not continue automatically to carry forward contaminants from CCL 4 to CCL 5, and asked whether information developed for previous regulatory determination phase had informed the development of CCL 4. Several members were concerned that the list of potential contaminants will only grow and priorities will be more difficult to discern.

## Summary of Key Messages to Include in the DWC Report

After a break, Dr. Jones requested that the Committee summarize key messages from the deliberations that should be included in the DWC's advisory report. She noted that this summary discussion would help inform the writing groups later in the day. Members suggested the following as key messages to include in the response to the charge questions.

### **Question 1: clarity of documents, and DWC recommendations to improve (and Q5 for future)**

- Discuss ways that the CCL documentation can be improved, including a way to follow contaminants through the process, from Universe to draft CCL.
- Make the weighting scheme explicit, including revising tables to show which criterion triggered list/not list, summarize data in one location, better explain the neural network model, and give examples of contaminants that end up being listed or not. Maybe illustrate for one chemical and one microbe.
- Include sensitivity analysis to see what effects list/not list outcomes. Technical issues with availability of potency/prevalence data and whether that trumps the model outcomes, and the need for greater transparency so that refinements to the approach can be made for subsequent CCLs.
- It would have been helpful to see more response in the CCL4 documentation to the previous SAB recommendations.
- Data tables could include the CCL3 chemicals carried forward and some sort of 1-pager for each of the 100 plus contaminants on the draft CCL 4. Possibly provide summary information via an online dashboard, where users can get 4-5 high level issues about each contaminant (including what were the drivers for including it on the list), with hyperlinks to more detailed information.

### **Question 2: Data Sources**

- Consider outreach to states, cities and large utilities to identify data that may be useful.
- Consider using UCMR data even if not fully reviewed because these data are collected using approved methods, etc.
- Consider NHANES data as a source of information on contaminants in blood, even though some evaluation would be required to determine the relative extent of drinking water exposure versus food and inhalation.
- EPA should not rely too heavily on nominations and data submitted by the public, but should more actively seek what research is going on out in the community.
- The Committee recognizes that utilities may not want to share data on contaminants not on the UCMR unless they can be anonymous and there will not be even geographic coverage of utilities collecting this information.
- Consider using more peer reviewed literature on health risks, because outbreak data is too limited to understand waterborne exposures, and reliance on nominations may miss emerging contaminants.
- Water Reuse Association work on potable reuse could be of use (40 to 50 research reports have been done on this), as well as reports by WERF, AWWA etc. EPA could provide feedback to these organizations on how to make the data "retrievable" under EPA's criteria.

### **Charge 3 and 4: Pathogens and Chemicals**

Members discussed whether to recommend removal of ethylene oxide, but several members noted that depending on the half-life it still could pose a concern. Members also discussed whether estrogenic

compounds should be included based on lack of occurrence in the UCMR, and how changes in the use and persistence of pharmaceuticals could be taken into account. There was additional discussion of whether EPA should take the occurrence data from source waters and evaluate the extent to which contaminants would be resolved by treatment. For example, should vegetative bacteria be on the list and what about issues with biofilms in water delivery systems.

One member asked whether the Committee could recommend that EPA take another look at fluoride, a secondary drinking water contaminant with a primary drinking water standard, to see if newer data on neurotoxicity could be used to revise the standard and made it more protective. After some discussion, members concluded that this recommendation was not part of the charge for the CCL 4 review and that the Committee would not try to address such a complex issue in the current SAB review.

The lead writers agreed to compile comments on specific contaminants from the individual member pre-meeting comments so that the full committee could consider potential recommendations in response to charge questions 3 and 4.

### **“Charge 5”: Recommendations for Future CCLs**

At Dr. Jones’ request, Drs. Wiesner and Snyder agreed to pull together the various recommendations that had been discussed by the Committee that related to improvements requested for future CCLs.

Examples discussed included:

- Better integrating the phases of the process (CCL, UCMR, etc.) to create a knowledge based on the contaminants.
- The possible need to step back and consider whether the current CCL process, with its contaminant-by-contaminant approach, is an effect approach to protect public health from drinking water contaminants and whether the current approach will ever allow EPA to “catch up.”
- Suggestions for how to be more proactive in identifying contaminants, including using information from ORD, being less passive and not placing too much reliance on outside nominations, considering whether it is feasible to group chemicals, and considering changing use and production volume of chemicals to get ahead of contaminants coming into the system.
- Consider addressing some contaminants using the Health Advisory approach mentioned by Dr. Cotruvo in his public comments.
- Consider ways to make the listing process reproducible by others, i.e. with greater transparency about sensitivities of the outcome to changes in weighting of criteria, expert models etc.
- Consider other sources of data, including ToxCast and NIEHS high-throughput screening data.

### Writing Session.

The writing teams then broke out to work on drafting text for their assigned charge questions. At approximately 2:00, the groups reconvened to report on status and any concerns that required further discussion by the committee as a whole.

With regard to responses to Questions 3 and 4, the Committee discussed taking the approach of making broader, more global recommendations, and then including specific contaminants as examples. For example, to illustrate the principle that the key motivation for inclusion/exclusion of microbial contaminants should be public health impacts and known efficacy of treatment. A similar approach was adopted for chemical contaminants, i.e., to give broad recommendations and illustrate the points with contaminant examples. Members expressed concern that the committee not try to get in to specifics

about the relative priority of contaminants for inclusion because to do so would require a detailed look at all of the listed contaminants, a task considered not feasible within the time constraints of the review. Instead, members agreed to make broader points about additional possible data sources, the role of health advisories, etc. Several members recommended that the Committee refer the agency to the public comment on nonylphenol and a possible error in translation from the primary data source.

Deadlines and Next Steps: The Chair and the DFO presented the schedule for next steps: write-ups from the writing teams to be provided to the DFO by May 8 (with any emails among the group to copy the DFO); the DFO then will work with the Chair to develop a first, integrated draft by June 8; and a DWC public conference call to be scheduled for mid-July to discuss the draft and reach consensus on a final report.

There being no further discussions, the DFO adjourned the meeting at 2:30 p.m.

Respectfully Submitted:

/s/

Stephanie Sanzone  
Designated Federal Officer

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by Committee members during the course of deliberations within the meeting. Such ideas, suggestions and deliberations do not necessarily reflect consensus advice from Committee members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters or reports prepared and transmitted to the EPA Administrator following the public meetings.

## **Attachment A. Roster, SAB Drinking Water Committee**

### **U.S. Environmental Protection Agency Science Advisory Board Drinking Water Committee 2015**

#### **CHAIR**

**Dr. Kimberly L. Jones**, Professor and Chair, Department of Civil and Environmental Engineering, Howard University, Washington, DC

#### **MEMBERS**

**\*Dr. George Alexeeff**, Director, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Oakland, CA

**Dr. Mark Benjamin**, Professor, Department of Civil and Environmental Engineering, University of Washington, Seattle, WA

**Dr. Joel Ducoste**, Professor, Department of Civil, Construction, and Environmental Engineering, College of Engineering, North Carolina State University, Raleigh, NC

**Dr. Russell Ford**, Global Service Leader - Drinking Water Reuse, CH2M HILL, Parsippany, NJ

**Dr. Susan Korrick**, Assistant Professor of Medicine, Department of Medicine, Brigham and Women's Hospital, Channing Laboratory, Harvard Medical School, Boston, MA

**\*Dr. Frank Loge**, Professor, Department of Civil and Environmental Engineering, University of California-Davis, Davis, CA

**Dr. Kristina D. Mena**, Associate Professor, Epidemiology, Human Genetics, and Environmental Sciences, School of Public Health, University of Texas Health Science Center at Houston, El Paso, TX

**Dr. William Mitch**, Associate Professor, Civil and Environmental Engineering, Stanford, Stanford, CA

**Dr. Eileen Murphy**, Director of Research Development, Office of Research and Economic Development, Rutgers University, Piscataway, NJ

**Dr. Stephen Randtke**, Professor, Department of Civil, Environmental, and Architectural Engineering, University of Kansas, Lawrence, KS

**Dr. A. Lynn Roberts**, Professor, Department of Geography and Environmental Engineering, Johns Hopkins University, Baltimore, MD

**Dr. Kellogg J. Schwab**, Director, Johns Hopkins University Water Institute Program and Center for Water and Health, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD

**Ms. Janice Skadsen**, Senior Environmental Scientist, CDM Smith, Ann Arbor, MI

**Dr. Shane Snyder**, Professor of Chemical and Environmental Engineering, University of Arizona, Tucson, AZ

**Dr. Craig Steinmaus**, Public Health Medical Officer III, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Oakland, CA

**Dr. Mark Wiesner**, Professor, Department of Civil and Environmental Engineering, Director, Center for the Environmental Implications of NanoTechnology (CEINT), Pratt School of Engineering, Nicholas School of the Environment, Duke University, Durham, NC

**Dr. Lloyd Wilson**, Research Scientist IV, Bureau of Water Supply Protection, New York State Department of Health, Albany, NY, United States

**Dr. Marylynn Yates**, Professor of Environmental Microbiology, Department of Environmental Sciences, University of California-Riverside, Riverside, CA

**SCIENCE ADVISORY BOARD STAFF**

**Ms. Stephanie Sanzone**, Designated Federal Officer, U.S. Environmental Protection Agency, Science Advisory Board (1400R), 1200 Pennsylvania Avenue, NW, Washington, DC

\*Did not participate in this review.

## Attachment B. Other Attendees

Other persons who attended the April 29 – 30, 2015 meeting of the SAB Drinking Water Committee or who requested the call-in number to participate by teleconference:

<b>Name</b>	<b>Affiliation</b>
Susan Bowman	Cadmus
Eric Burneson	EPA Office of Water, Office of Groundwater and Drinking Water
Thomas Carpenter	EPA Science Advisory Board Staff Office
David Carrillo	Air Force
Joseph Cotruvo	Joseph Cotruvo and Associates
Heather Galada	EPA Office of Water, Office of Groundwater and Drinking Water
Lane Hochschwender	ACC
Hannah Holsinger	EPA Office of Water, Office of Groundwater and Drinking Water
Lisa Huff	EPA Office of Water, Office of Groundwater and Drinking Water
Julie Javier	EPA Office of Water, Office of Groundwater and Drinking Water
Barbara Losey	APERC
Sahar Osman-Sypher	ACC
Amanda Palleschi	Inside EPA
Russ Perkinson	EPA
Meredith Russell	EPA Office of Water, Office of Groundwater and Drinking Water
Nicole Shao	EPA Office of Research and Development, Office of Science Policy
Lameka Smith	EPA Office of Water, Office of Groundwater and Drinking Water
Clifton Townsend	EPA Office of Water, Office of Groundwater and Drinking Water
Steve Via	AWWA

## Materials Cited

The following meeting materials are available on the SAB website, [www.epa.gov/sab](http://www.epa.gov/sab), at the April 29-30, 2015 meeting page:

<https://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/d3133cd0a4541fc485257de3005f57d9!OpenDocument&Date=2015-04-29>

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<sup>1</sup> Federal Register Notice Announcing the Meeting (80 FR 14130-14131, March 18, 2015)

<sup>2</sup> Meeting Agenda, SAB Drinking Water Committee, April 29-30, 2015

<sup>3</sup> Agency-Provided Background Materials

1. Summary of Nominations for the Fourth Contaminant Candidate List
2. Data Sources for the Contaminant Candidate List 4
3. Screening Document for the Draft PCCL 4 Nominated Contaminants
4. Contaminant Information Sheets (CISs) for the Draft Fourth Preliminary Contaminant Candidate List (PCCL 4) Nominated Contaminants
  - CCL3 Chemicals: Identifying the Universe
  - CCL3 Microbes: Identifying the Universe

<sup>4</sup> SAB Drinking Water Committee member pre-meeting comments (as of 4/23/2015) and ADDITIONAL comments (4/28/2015)

<sup>5</sup> Presentation by Meredith Russell, USEPA Office of Ground Water and Drinking Water, on the Draft Contaminant Candidate List 4

<sup>6</sup> Oral Comments from Steve Via on behalf of the American Water Works Association

<sup>7</sup> Comments from Joseph Cotruvo on the Draft Drinking Water Contaminant Candidate List 4

<sup>8</sup> Comments from the American Chemistry Council's Diisocyanates Panel on the Draft Drinking Water Contaminant Candidate List 4

<sup>9</sup> Oral comments from Barbara Losey on behalf of the Alkylphenols & Ethoxylates Research Council; Comments from Barbara S. Losey, Alkylphenols & Ethoxylates Research Council

<sup>10</sup> Comments from the American Chemistry Council's Ethylene Glycols Panel and Comments from the American Chemistry Council's Ethylene Oxide Panel