Long Term 2 Enhanced Surface Water Treatment Rule: Monitoring Data Analysis, Occurrence Forecasts, Binning, and the Microbial Toolbox Public Meeting

November 15, 2012
EPA East Building, Room 1153
1201 Constitution Avenue, NW
Washington, DC 20460

Overview

The Long Term 2 Enhanced Surface Water Treatment Rule (hereafter known as the Long Term 2 rule): Monitoring Data Analysis, Occurrence Forecasts, Binning, and the Microbial Toolbox Public Meeting was held on November 15, 2012 as a part of the U.S. Environmental Protection Agency's (EPA's) Six Year Review process and Retrospective Review of the Long Term 2 rule. The meeting focused on monitoring data analysis, occurrence forecasts, binning, and the microbial toolbox related to the Long Term 2 rule. The major meeting objectives included the following:

- Provide a brief overview of the Long Term 2 rule's monitoring and binning requirements, and the microbial toolbox;
- Present the Round 1 *Cryptosporidium* occurrence results and binning estimates;
- Present analysis of the effectiveness of using *Escherichia coli* (*E. coli*) as a screen for small system *Cryptosporidium* monitoring;
- Explore differences in results produced by Methods 1623 and 1623.1 and the implications for Round 2 binning outcomes;
- Discuss an occurrence model that may adequately explain Round 1 data, how that model could be used to predict Round 2 results at the national level, and the modeling issues and assumptions; and
- Explore the use of the microbial toolbox tools, challenges in the use of the tools, and the potential of the addition of new tools to the toolbox.

The meeting was open to the public, and attendees participated in person and via an online webinar. This document summarizes the presentations and discussions that occurred during the meeting and generally follows the sequence of the meeting agenda.

EPA requests that anyone having data or information that would further inform the review of the Long Term 2 rule please send it to César Cordero (cordero.cesar@epa.gov) or Kenneth Rotert (rotert.kenneth@epa.gov). EPA has made presentations from this meeting available on the EPA Long Term 2 rule website: http://water.epa.gov/lawsregs/rulesregs/sdwa/lt2/publicmeeting.cfm.

Introduction and Welcome

Philip Oshida, Acting Director of the Standards and Risk Management Division in the Office of Groundwater and Drinking Water, provided opening remarks about the purpose of the meeting and goals of the Six Year Review process. He noted that if EPA determines that there is a need to revise the Long Term 2 rule, revisions will be undertaken in a process separate from the current review

process. The meeting facilitator, Rob Greenwood, then provided an overview of the meeting procedures, ground rules, and agenda.

Presentation 1: *Overview of Long Term 2 Monitoring, Bin Boundaries, and Toolbox Options, and the Six Year Review Process* (Kenneth Rotert, U.S. EPA)

Mr. Rotert gave an overview of the history and basis for the Long Term 2 monitoring, bin boundaries, and toolbox options, and provided a brief overview of the Six Year Review process. Based on an Information Collection Rule and supplemental survey data, the Microbial and Disinfection Byproduct Federal Advisory Committee (M/DBP FAC) recommended that systems with relatively high *Cryptosporidium* occurrence should provide additional treatment. The M/DBP FAC examined a wide range of information during its deliberations, including analytical methods and microbial toolbox tools. The Committee recommended that there should be two rounds of monitoring in order to capture changes in source water quality over time.

The final Long Term 2 rule was published in January 2006 and applies to all public water systems serving at least 25 people or with at least 15 service connections using surface water or ground water under the direct influence of surface water (GWUDI). As recommended by the M/DBP FAC, the Long Term 2 rule takes a targeted approach for addressing systems with higher risks from *Cryptosporidum*. The Long Term 2 rule identifies which filtered systems must provide additional treatment and how much they must provide, and defines the level of inactivation that unfiltered systems must achieve. Mr. Rotert also outlined the bin boundaries. For systems falling into Bin 1, The Long Term 2 rule requires no additional treatment, while requiring additional treatment for systems in Bins 2-4. The Long Term 2 microbial toolbox provides treatment and prevention options for systems in Bins 2-4. Mr. Rotert described the specific monitoring requirements for different types of systems for Round 1 and Round 2. The Long Term 2 rule allows some systems to use grandfathered data to meet these monitoring requirements.

The 1996 Safe Drinking Water Act (SDWA) amendments require that EPA review and revise as appropriate any national primary drinking water regulation at least every six years. Executive Order 13563 published in January 2011, requires each federal agency to develop a plan for reviewing regulations that may be candidates for modification, expansion, or appeal to make the agency's regulatory process more streamlined and less burdensome. EPA determined in August 2011 that it would evaluate the effective and practical approaches to 35 different rules, including the Long Term 2 rule. A provision in SDWA, related to Six Year Review, states that any revisions shall maintain or provide for greater public health protection, also known as the 'anti-backsliding' provision. The Long Term 2 review will examine health and risk, analytical methods, treatment technologies and techniques, occurrence and implementation-related items, with an overall goal of reviewing the technical elements that are the basis for the current regulation to see if the basis has changed and if there are revisions that should be considered. The review will conclude with one of two potential outcomes, 1) determination that no revision is appropriate at this time, or 2) determination that the rule is a candidate for revision. Following his presentation, Mr. Rotert addressed clarifying questions from the audience, as referenced below:

- An attendee asked if the parameters of the Round 2 monitoring could be affected by the Six Year Review findings. Mr. Rotert explained that existing rule requirements will remain in effect during the review process. The outcome of the review can inform potential changes to Round 2 monitoring, and that any rule revision affecting Round 2 monitoring would require a

separate rulemaking process beyond the review effort. Until EPA finalizes any revisions, rule requirements will remain as they are now.

- An attendee commented on the apparent disconnect between the anti-backsliding provision and EPA comments on making the rule 'less burdensome.' The attendee questioned whether it is possible to make the regulation 'less burdensome,' while still providing equal or greater public health protection. Mr. Rotert responded that EPA is approaching the rule in a holistic manner, so the rule as a whole must adhere to the anti-backsliding provision by providing equal or greater protection, but individual sections of the rule may become less burdensome.
- An attendee asked about binning classifications after two rounds of monitoring resulted in different binning outcomes (e.g., lower in Round 2 than in Round 1). Mr. Stig Regli of EPA explained that unless there was an indication of significant changes to water supply conditions between Rounds 1 and 2, the system would be classified as falling into the higher of the two bins.
- An attendee asked whether systems can choose to begin monitoring earlier than the scheduled date of April 2015 for Round 2. Mr. Regli responded that the schedule for the second round of monitoring is described in the rule provisions.

Presentation 2: *Long Term 2 Round 1* Cryptosporidium *Occurrence and Binning Estimates* (Lili Wang, U.S. EPA)

Ms. Wang presented updated *Cryptosporidium* occurrence estimates from Round 1 monitoring, as well as binning outcome estimates since the December 2011 public meeting. The main source of the data outlined is the Data Collection and Tracking System (DCTS), which was designed to support the Long Term 2 rule implementation, and to produce a binning report by calculating the bin concentration. The DCTS also allows utilities to upload documents that show: their intent to use grandfather data or their intent to provide 5.5 log treatment, and the grandfathered data. The Round 1 monitoring dataset includes approximately 2,000 more records than the previous dataset presented at the December 2011 public meeting. Also in the new dataset, data have been flagged for quality concerns, new data fields have been added, and redundant fields were removed. EPA did not use grandfathered data for its occurrence analysis due to processing limitations. Approximately 95 percent of the records in the dataset were collected from filtered systems.

Ms. Wang presented summary statistics, showing the number of systems, facilities, and records for each schedule. The *Cryptosporidium* field summary statistics that she described showed the mean for occurrence and used non-detects as a zero-value. She compared the Round 1 data to historic data. Round 1 data showed lower overall concentrations and a smaller percentage of source waters with mean concentrations of at least 0.075 oocysts per liter.

Ms. Wang also presented binning results, based on DCTS binning reports and non-DCTS sources from the states and regions. These results were separated by system size and bin category. Of the 1,572 systems reporting, 94 fell into an actionable bin (Bins 2-4). Following her presentation, Ms. Wang addressed clarifying questions from the audience:

- An attendee questioned whether EPA has taken variability of data for matrix spikes and reagent water spikes into account when it makes statements about the differences between DCTS and non-DCTS, and whether they are statistically different. Ms. Wang explained that its binning results rely on input from states and regions who verified system bin classifications. If

data became available from the remainder of states after their review for discrepancies, EPA's action bin calculations could change. EPA did not take any other issues into consideration.

- An attendee asked how the non-DCTS denominator could be 352 if there are roughly 800 grandfathered systems. Ms. Wang explained that EPA uses the difference between the 1,733 facilities in the monitoring baseline and the 1,381 facilities for Round 1 monitoring as the denominator for non-DCTS facilities.
- An attendee asked how EPA handles situations in which a system switches its water source on a regular basis (e.g., from flowing stream to reservoir lake). Mr. Regli responded that the system would be placed into whichever category occurred during the first month of monitoring.
- An attendee asked about information on detects (What percentage of the detects were one, two, three, four, or more than four? What is the frequency distribution of the detects?). Dr. Michael Messner of EPA noted that EPA has done such analyses, but did not include the information in the presentation (during the morning break, Dr. Messner presented the information). In general, the most common nonzero number in the *Cryptosporidium* count is one, and the second most common is two.
- An attendee questioned how the Round 2 data will be stored. Mr. Finn responded that utilities will report Round 2 data to their states, who will store it, because DCTS will no longer exist.

Presentation 3: *Long Term 2 Round 1 Monitoring – Data Collection and Tracking System (DCTS) Data and Calculated Bin Results* (Dr. Alexa Obolensky, Obolensky Consulting)

Dr. Obolensky provided an overview of the DCTS data and calculated binning results from Round 1 monitoring, which were originally posted in June 2012. She displayed graphs that showed the distribution of location data characteristics (Any data, Max Annual Average data, and Complete Long Term 2 data) broken down by many variables, including filtered versus unfiltered, schedule, source type classification, and surface water classification.

Dr. Obolensky presented the overall results of her binning calculations, which were slightly different from EPA's results, and were calculated using only complete Long Term 2 datasets (i.e., systems having 24 or more sample data). Dr. Obolensky noted that the binning reports sent out by DCTS seem to lack transparency, partially because she did not know the algorithm used. Without knowing the calculations and parameters for each dataset, analysts find it extremely difficult to make accurate comparisons between datasets and to draw conclusions.

Dr. Obolensky also discussed *E. coli* as an indicator for *Cryptosporidium*, and suggested that sample data collection and handling should be planned from the beginning of a monitoring cycle to better support future analyses. Following her presentation, Dr. Obolensky addressed questions from the audience:

- An attendee asked if it is possible to infer that the bin classifications are performance related, based on the relationship of the lower, middle, and upper recovery efficiency practices to the binning results. Dr. Obolensky responded that this is not a conclusion that can be drawn.
- An attendee questioned if Dr. Obolensky's analysis considered laboratory performance issues in relation to the same data. Dr. Obolensky answered that the information is not a surrogate for laboratory performance indicators. Dr. Obolensky further indicated that she did not have enough data to be informed of source water matrix effects at the locations studied.

- An attendee observed that the matrix recovery data may not be the best data to show a relationship between laboratory recoveries and binning classifications. The attendee asked if reagent spikes should be used instead. Dr. Obolensky responded that she would not be comfortable answering this question.
- An attendee asked if there is a hypothesis to explain the jump in the Cumulative Distribution Function to around 0.075 on Slide 11 of the presentation. Dr. Obolensky explained that the jump is a result of small numbers (there were only fifteen utilities, and 65 percent of these utilities had all zeros).
- An attendee referred to Slide 21 and asked whether there was a difference in the *Cryptosporidium – E. coli* relationships between flowing stream and reservoir lake systems. Dr. Obolensky noted that approximately the same pattern is observed when segregating by flowing streams and reservoir lakes, but the trend is more accentuated for the flowing streams than it is for the reservoir lakes.
- An attendee observed that it is important to point out that water quality associated with lower binning classifications is difficult to analyze, which suggests that *Cryptosporidium* may be missed in these cases.

Presentation 4: E. coli *Effectiveness as a Small System Screen* (Stig Regli, U.S. EPA)

Mr. Regli discussed the implications from Round 1 monitoring data on the accuracy and effectiveness of using *E. coli* as a screen for small systems for Round 2 monitoring. The Long Term 2 rule provides for small systems to use *E. coli* as an indicator to avoid *Cryptosporidium* monitoring while still being protective of public health. Regulatory requirements differ for *E. coli* trigger levels for small systems using reservoir lakes versus flowing streams as source water. The Long Term 2 rule also allows for alternative guidance to be used by the states to inform whether a small system might be able to avoid *Cryptosporidium* monitoring. Since its release in 2010, most states have chosen to utilize the alternative guidance.

To reconcile the shortcomings of the indicator relationship between *E. coli* and *Cryptosporidium*, and to identify a level at which systems may avoid *Cryptosporidium* monitoring, EPA used two measures: 1) the number of systems triggered into *Cryptosporidium* monitoring based on *E. coli* monitoring results, and 2) the number of systems with high *Cryptosporidium* concentrations that would be correctly assigned to a treatment bin. A total of 1,356 plants provided paired *Cryptosporidium* and *E. coli* data, which resulted in 29,741 samples being used for the analysis. The analysis showed that the number of plants triggered into monitoring increases as the trigger level is decreased, and the alternative trigger level (100 cfu/100 ml) is supported by the data collected during the first round of *Cryptosporidium* monitoring. Following his presentation, Mr. Regli addressed questions from the audience, as referenced below:

- An attendee asked if EPA used the average level for the monitoring period in its data analysis when there were high levels of *E. coli* following events like storms. Mr. Regli responded that there were very few high values after events at some plants, and it used the mean value in these cases. During these events, the correlation between *Cryptosporidium* and *E. coli* was poor.
- An attendee asked what kind of information might be gleaned from looking at the relationship between *Cryptosporidium* and *E. coli* at small versus large plants. Mr. Regli responded that based on the DCTS data, he would expect to see higher *E. coli* levels in the small systems.

However, Mr. Regli also added that because of collection biases, it would likely not be productive to look at these comparisons.

- An attendee asked if the *E. coli* trigger would be affected by the use of Method 1623.1 in Round 2. Mr. Regli explained that as long as the *E. coli* occurrence does not change, the number of systems triggered into monitoring should not change either. EPA also expects that it would capture more systems with high *Cryptosporidium* as a result of the enhanced method.
- An attendee asked if EPA will revise the Long Term 2 rule to formally adopt the alternative trigger guidance. Mr. Regli explained that this would involve a separate rulemaking process subsequent to the Six Year Review, but the suggestion would be taken into consideration.
- An attendee asked if it would be possible for Schedule 4 systems to run *E. coli* monitoring concurrently with *Cryptosporidium* monitoring for Schedule 1, 2, and 3 systems. Mr. Regli responded that this would necessitate a change under a separate rulemaking process.

Presentation 5: *Matrix Spike Recoveries* (Carrie Miller, U.S. EPA)

Ms. Miller discussed matrix spike recoveries, and compared Methods 1623 and 1623.1. The matrix spike is performed to identify potential method performance issues when recovering *Cryptosporidium* oocysts from raw water sources. Matrix spike samples are taken at the same time (sequentially or simultaneously) as field samples, and are of the same volume as the field samples. Laboratories count *Cryptosporidium* oocysts for spiking the matrix samples with a flow cytometer and then add them into the sample before processing with either Method 1623 or 1623.1. Analysts compare the number of oocysts detected during examination of the sample, less the number of oocysts found in the unspiked field sample, with the number spiked. Analysts typically provide two matrix spike samples for each source. The limitations of a matrix spike as an indicator include high variability in the method and sporadic matrix interferences by biological and chemical components (e.g., clay or algal excretions).

Ms. Miller presented results for matrix spike recoveries from different laboratories using Method 1623 versus 1623.1. She concluded that matrix spike recoveries with Method 1623.1 should be improved over recoveries with Method 1623, especially in challenging source water matrices. As the Long Term 2 rule stands, laboratories can use either method for Round 2; EPA has approved Method 1623.1 as an alternative method. Following her presentation, Ms. Miller addressed questions from the audience:

- An attendee asked if the higher acceptance criteria with Method 1623.1 for the ongoing precision and recovery (OPR) quality control sample have created a disincentive from the laboratory standpoint. Ms. Miller responded that the statistical modeling that it ran with OPR data showed that laboratory results using Method 1623 have improved over time, meaning that the acceptance criteria could be updated for Method 1623 as well as Method 1623.1.
- An attendee asked about the studies conducted on which the matrix recovery is based. Ms. Miller explained that the single laboratory side-by-side comparison of Methods 1623 and 1623.1 recoveries used samples from nine different public water sources for a total of forty observations. The four-laboratory side-by-side data contain recovery values from source waters from Michigan, Montana, and Ohio. Also, EPA has additional data points from a single laboratory's recovery from artificial matrices. The validation of Method 1623.1 was more rigorous than the validation of Method 1623, with six more public water system sources and 39 more observations.
- An attendee asked about what may have been in the raw water that has affected the matrix spike recoveries, and any efforts that have been made to better understand this. Ms. Miller

answered that clay suspensions have interfered with oocyst recovery (Method 1623.1 yielded better recovery results than Method 1623 in these cases). EPA has also examined a parameter which appears to have been algae-related, and caused a clumping effect, perhaps as a result of metabolite-related excretions.

- An attendee asked what happens to Round 2 samples that do not meet the QA/QC requirements of Method 1623.1. Ms. Miller responded that laboratories must meet the QA/QC requirements of the particular method, whether it be Method 1623 or Method 1623.1, that they are using in order for the results to be considered valid.

Presentation 6: *Cryptosporidium Occurrence Variations and Matrix Spike Recovery* (Dr. Jerry Ongerth, University of Wollongong)

Dr. Ongerth described individual site data and concentration versus number of detects for *Cryptosporidium* occurrence and the risks that water suppliers face when encountering *Cryptosporidium*. Dr. Ongerth believes that it is important to discuss concentrations from a classical standpoint to better understand risk. Throughout his presentation, he used Long Term 2 data, data from a recent doctoral student who he worked with, and relevant comparable data from work in Australia.

In looking at 45,000 records spread over approximately 1,800 sampling sites for utilities serving 10,000 or more, Dr. Ongerth identified roughly 700 sites at which at least one *Cryptosporidium* oocyst was found in at least one of the samples. Of the 700 identified sites, Dr, Ongerth identified high and low values, as well as locations. The data indicate that high and low *Cryptosporidium* readings were distributed relatively evenly in all areas of the United States. Dr. Ongerth described the difficulty in applying 'one-size-fits-all' methods to address these occurrences because of the highly variable watershed conditions in different geographic areas. Dr. Ongerth also suggested that analytical and sampling features may have contributed to the zero readings for the other 1,100 sites.

Matrix spike samples show great variation at the same locations due to annual seasonal cycles. Recovery efficiency also varies greatly when testing multiple times at the same site. These variations with time and location would require consistent matrix spike recovery measurements to inform representative recovery at a given site. Using larger sample volumes and matrix spikes would also help to give representative *Cryptosporidium* data by site. Following his presentation, Dr. Ongerth addressed questions as referenced below:

- An attendee asked Dr. Ongerth if he was recommending that more spikes to field samples are needed. He responded that he would advise utilities to look at the recovery efficiency for the samples that they analyzed, because there is not a one-size-fits-all answer to that question. Dr. Ongerth explained that each individual utility should take responsibility in determining where, when, and how many samples to take.
- An attendee asked Dr. Ongerth to explain the numbers that he presented on the independent variance of matrix spike recoveries. Dr. Ongerth elaborated that he took the Long Term 2 data, which are from 200-300 different locations with different characteristics. Dr. Ongerth used the average for locations with more than two matrix spike values.

Presentation 7: *Predicted Results and Implications for Round 2* (Dr. Michael Messner, U.S. EPA)

Dr. Messner discussed the estimated monitoring and binning outcomes based on Round 2 modeled results using the existing Method 1623, the improved Method 1623.1, and different occurrence assumptions. He explored the implications of the improved method with different assumptions about national occurrence. Key analytical components for this work included DCTS measurement data, interlaboratory study data, and statistical modeling. Dr. Messner used DCTS 'cleaned up' data, which excluded data from unfiltered source waters, Schedule 4 systems, facilities with blended sources and facilities with fewer than 20 *Cryptosporidium* field measurements. The analysis excluded grandfathered data. Dr. Messner conveyed parameter uncertainty using Bayesian Analysis and Markov chain Monte Carlo methods.

When Dr. Messner compared the model simulation of Round 1 binning outcomes using Method 1623 to actual Round 1 binning, model estimates only fell outside of the credible intervals five percent of the time. Other checks showed that the model is functioning accurately. Assuming that average concentrations remain constant, modeled estimates for Round 2 are similar to the observed Round 1 results. Assumed changes in overall occurrence levels result in modeled estimates with expected (increased or decreased) number of facilities in higher bins, with more occurrence in higher bins using Method 1623.1 than with Method 1623. Following his presentation, Dr. Messner addressed questions from the audience:

- An attendee observed that there was a 2-log difference between filtered and unfiltered systems, based on ICR. The attendee asked what the difference between filtered and unfiltered would be based on new information on recovery for the Round 1 observed and Round 2 modeled data. Dr. Messner responded that he has not explored this question; he has only used data from filtered systems in his analysis.
- An attendee asked about the Long Term 2 model that predicted Round 1 results. Dr. Messner answered that the model assumed the recovery was beta-distributed, and EPA did not make any adjustments.
- An attendee asked whether model assumptions will be brought into question if the new model does not make accurate predictions for Round 2. Dr. Messner explained that Round 1 data revealed that less *Cryptosporidium* is present than the model predicted. An additional reduction of *Cryptosporidium* would be indicated, if approximately one percent of systems fall into actionable bins during Round 2.
- An attendee asked if there is a formal copy of Dr. Messner's model publicly available. He responded that there is not one available now, but he hopes that it will be available in the near term.
- An attendee asked about overlap or duplication in components of the model for matrix spike recovery levels and for laboratories. Dr. Messner explained that he included matrix effects on recoveries, and while the components are linked, they are not duplicative. The slides in the appendix of his presentation include a diagram that provides additional detail about the recovery and occurrence models.
- An attendee asked if the samples on slide 6 are paired for reagent water or matrix spike. Dr. Messner responded that the samples represent a variety of water types, including laboratories and matrices. They include reagent and other artificial waters, as well as other source waters.
- An attendee observed that the Bayesian model was used to estimate drinking water associated with illnesses and deaths that would be avoided with implementation of the Long Term 2 rule,

but the sampling methods do not distinguish between harmless and harmful *Cryptosporidium*, resulting in overestimates of the benefits of the Long Term 2 rule. Dr. Messner disagreed with the attendee's observation that the illnesses avoided were overestimated. He noted differences in symptomatic responses to *Cryptosporidium*, and explained that epidemiologic data often do not pick up on reductions of less severe symptoms, though the symptoms are still affected by the Long Term 2 rule.

- An attendee asked about the methods represented in the graph on slide 8. Dr. Messner explained that any time there were data on recovery using both Methods 1623 and 1623.1 on the same matrix, he included the data.
- An attendee asked whether EPA supports switching between Methods 1623 and 1623.1 for different rounds. Ms. Miller explained that Method 1623.1 has updated quality control criteria and the accuracy should improve with Method 1623.1 compared with Method 1623 especially in challenging source water matrices.

Presentation 8: *Microbial Toolbox* (Michael Finn, U.S. EPA)

Mr. Finn discussed the basis for the Long Term 2 rule and the basis for treatment under the rule, gave an overview of the microbial toolbox tools, and made observations about information collected on toolbox tools since the rule was finalized.

SDWA requires the EPA to address risks from *Cryptosporidium*, which resulted in the Long Term 2 rule. Source water monitoring, required under the rule, identifies vulnerable systems, and systems may be required to provide additional treatment based on their *Cryptosporidium* bin assignments. Systems in Bin 1 are not required to provide additional treatment, while those in Bins 2, 3, and 4 are required to provide additional treatment. Systems receive 'removal credits' based on the tools that they select from the microbial toolbox. Mr. Finn provided a detailed overview of the different tools that systems can use to meet Long Term 2 requirements, as well as the removal credits associated with each tool.

Information from 96 different public water systems indicates that the most commonly used toolbox tools are: combined filter performance and individual filter performance, ultraviolet disinfection and membrane filtration. EPA is currently compiling information on the effectiveness and implementation of ozone, alternative source/intake management, membrane filtration, slow sand filters, and chlorine dioxide. Mr. Finn requested that anyone with additional information on tool implementation or effectiveness please provide it to Kenneth Rotert (rotert.kenneth@epa.gov) or César Cordero (cordero.cesar@epa.gov). Following his presentation, Mr. Finn addressed questions from the audience, as referenced below:

- An attendee asked about the basis for the 0.5-log credit for watershed control programs, and why a 1 log credit is not given. Mr. Finn responded that the watershed tool is an important operational issue for systems without performance measures as in other tools; the information available and the lack of performance measures did not justify a 1 log credit.
- An attendee asked for additional information on the Riverbank Filtration study. Mr. Finn elaborated that it included the Sonoma and Kearney studies.

Presentation 9: *Lessons Learned from Use of the Toolbox – A Utility Survey* (Dr. David Cornwell, Environmental Engineering and Technology)

Dr. Cornwell gave an overview of Bin 2 utility experiences using the various microbial toolbox options. Schedule 1 and Schedule 2 utilities have installed their toolbox technologies; Schedule 3 utilities are beginning to consider which technologies to implement; and Schedule 4 utilities have not yet had to make their decisions.

Amongst the utilities contacted, individual filter performance and combined filter performance were the most commonly discussed tools, meaning that utilities were either considering implementing or had implemented those tools. Utilities noted a number of difficulties associated with implementing watershed control programs, and confusion surrounding the guidance document for use of ultraviolet treatment. Overall, the toolbox is helpful for utilities because it offers a range of options for meeting rule requirements, but different binning requirements from state-to-state create confusion. Dr. Cornwell recommended increasing utility access to experts in each of the technologies and revising guidance documents based on lessons learned.

Presentation 10: *Microbial Toolbox Options: Two States' Perspectives* (Jennifer Bunton, Iowa Department of Natural Resources, and Angela Faye Cross, New Mexico Environment Department)

Ms. Bunton and Ms. Cross discussed experiences in Iowa and New Mexico with the microbial toolbox. They noted that difficulties were cited for almost all toolbox tools. They stated that watershed control programs have proven to be too labor-intensive to implement for only a 0.5-log credit. Alternative source/intake management requires that the watershed would have to predict that it would fall in Bin 2 and make the monitoring investment prior to its bin classification. Two plants in Iowa have used a pre-sedimentation basin with coagulation, which requires additional space and capital to implement. Two-stage lime softening is a feasible tool for plants already using two-stage softening, but plants with single-stage softening would require additional space and capital investments. Bank filtration is only applicable to specific systems, depending on conditions, and flooding or erosion may change bank conditions over time. When using combined and individual filter performance, data integrity issues could lead to false conclusions regarding the potential success of these tools, making oversight necessary to ensure the validity of credits over time. Demonstration of performance requires extensive monitoring and a continuing high level of management at the treatment plant, in addition to extensive state review. Second-stage filtration would require large capital investments to treat 100 percent of production, unless a system already had the system in place. The major disadvantage to chlorine dioxide is the requirements for ongoing monitoring, sampling, and analysis.

In the experiences of both states, the tool of choice was ultraviolet light, which requires an initial capital investment and ongoing energy costs, but can generally fit into the utility's existing footprint. Relative to other options, the additional treatment capacity added by ultraviolet light is relatively inexpensive and provides additional public safety. Following the presentation, Ms. Bunton and Ms. Cross addressed questions from the audience:

- An attendee asked if it is possible to differentiate performance between individual systems conducting area wide optimization programs (AWOPs), and give credit based on performance. Ms. Cross and Ms. Bunton responded that the research implies that the credit currently

prescribed in the guidance is appropriate because the main goals of AWOPs are turbidity-based.
- An attendee had heard about high incidence plants in Iowa and asked Ms. Bunton if the plants corresponded to the Bin 2 classifications that she cited in her presentation. Ms. Bunton clarified that these two plants did not correspond to Bin 2 systems in Iowa.
- An attendee asked about small system results for Iowa and New Mexico. Ms. Cross stated that New Mexico had two small systems that were classified as Bin 2, and Ms. Bunton did not have data for Iowa.

Questions and Discussion Session

Following the formal presentations, the meeting transitioned into a more open format of questions and discussion. Audience members posed questions to the day's speakers, which are noted above in the corresponding presentation sections. Other topics of discussion were meant to address the following questions, and are described below.

1. *What additional data analysis/information are you aware of regarding monitoring, occurrence forecasts, binning,* E. coli *as a screen, and the microbial toolbox?*
    a. *Alternative data analyses approaches to inform occurrence and binning forecasts?*
    b. *Alternative microbial toolbox options and associated credits?*
    c. *How to determine credits associated with toolbox options (new or revised for existing toolbox options)?*
    d. *Use of different screen criteria to avoid* Cryptosporidium *monitoring?*

2. *What have we learned about the topics described above from the implementation of the Long Term 2 rule? From other data sources?*
    a. *Long Term 2 Round 1 source water monitoring and binning results?*
    b. *What have been some of the challenges and/or observed effectiveness (i.e. their respective credit allocation) with existing toolbox options?*
    c. *Use of* E. coli *as a screen for small systems* Cryptosporidium *monitoring?*

3. *Taking into account today's presentations and discussions…*
    a. *What is your view on how a model that may adequately explain Round 1 data could be used to predict Round 2 results?*
        i. *What benefits or limitations do you see in using this approach?*
    b. *What do you see as the potential benefits or limitations of using Method 1623.1 for Round 2 binning?*

4. *What are your perspectives on how to proceed with Round 2 monitoring?*

Open discussion topics and audience questions are described below:

- Audience members and EPA staff discussed whether the national concentration of *Cryptosporidium* levels has apparently changed because of better methodology. Participants were concerned about statements about changes in *Cryptosporidium* concentrations over time because methodology changes mean that we are no longer comparing datasets that were collected using the same methodology. Additionally, in the past, fewer labs and fewer tested source waters led to less variation in concentration data.

- EPA was asked to speak to laboratories that are using the IDEXX Filta-Max Testing System in place of the EnviroCheck Gelman Filter because Method 1623.1 was based on use of the Gelman Filter. Ms. Miller responded that Method 1623.1 did not incorporate the Filta-Max Testing System because the vast majority of samples are taken using the Gelman Filter. EPA does not currently have plans to update this portion of Method 1623.1.
- Audience members and EPA staff discussed issues surrounding matrix spike recovery efficiencies and oocyst counts. Concerns related to miscounting of oocysts (either over-counting or under-counting) were expressed. Participants debated whether number of oocysts detected or concentration percentages should be used when identifying *Cryptosporidium* occurrence. Participants also debated what difference an improved analytical method would make on occurrence data.
- EPA was asked if it will recommend that Method 1623.1 be used for Round 2, or if systems can still use Method 1623. Ms. Miller responded that as the rule is currently written either method can be used, as determined by the individual laboratory or system.
- An attendee asked if EPA plans to make Round 2 data publicly available. Mr. Finn responded that systems will be submitting their data to the states, so EPA will not have a centralized database for the data like DCTS.
- An attendee asked why Round 2 data will be collected by the states and not be reported to EPA. Mr. Finn responded that the requirement for electronic data submissions for large systems only applied to Round 1. There will be no requirement for electronic submissions or submission to EPA unless the states choose to do so.
- A participant suggested that he had data on a modification to the Method 1623.1 that had been studied in multiple laboratories in multiple locations. Ms. Miller encouraged the participant to send the data to EPA.
- An attendee asked how alternative trigger levels that require fewer systems to monitor are considered to be 'not backsliding.' Mr. Regli responded that this relates to the desire to lessen the burden of monitoring costs on small systems. The original concept of the rule would be carried forward with additional guidance to allow for reduced monitoring.
- The Long Term 2 rule requires turbidity monitoring. An attendee asked if an analysis had been done between turbidity and *Cryptosporidium*. Mr. Regli responded that EPA has conducted an analysis, but it did not suggest using turbidity as a surrogate for *Cryptosporidium,* and therefore turbidity would not be a basis for *Cryptosporidium* monitoring reduction.
- Participants expressed concern related to apparent 'divestment' by EPA in oversight of laboratories. Ms. Miller responded that it is not 'divesting,' it is integrating a hierarchical oversight approach in the order of: EPA to Regions to States to Laboratories. This shift still provides state oversight of *Cryptosporidium* laboratories.
- Method 1623 does not differentiate between *Cryptosporidium* that is or is not infectious to humans. An attendee asked whether this presents a challenge when defining 'risk.' Mr. Regli acknowledged that this characterization has associated uncertainties, and noted that EPA hopes to refine its understanding of these uncertainties as it learns more.

Wrap-Up and Next Steps

Philip Oshida addressed the audience, thanking them for their participation in the meeting. He reiterated that EPA has not yet made a decision as to whether it will revise the Long Term 2 rule, but that all comments and suggestions made during the course of the meeting will be taken into consideration. Anyone with additional data or information that would inform the review of the Long

Term 2 rule is encouraged to send it to Kenneth Rotert (rotert.kenneth@epa.gov) or César Cordero (cordero.cesar@epa.gov).

The meeting adjourned at 4:45pm.