U.S. Environmental Protection Agency
Total Coliform Rule / Distribution System
Advisory Committee Meeting

January 16-17, 2008

Location:
RESOLVE, Inc.
1255 23rd Street, NW, Suite 275
Washington, D.C. 20037

Meeting Summary

Meeting Objectives/Desired Outcomes:

- *Learn about current cross connection control programs being implemented by states and utilities.*
- *Learn about information collection and research needs for initial four to six topic areas related to potential distribution system risk, and discuss criteria used for initial priorities given.*
- *Review synopses of what the potentials for concern could be in additional topic areas, and provide direction about the scope of the recommendations for information collection and research needs.*
- *Discuss the potential of different approaches to organizing and implementing information collection/research programs, and implications for what should be in the agreement in principle.*
- *Add detail to initial options for revising the TCR and discuss what information for assessing the implications of different options might be helpful to obtain from the technical work group.*

I. Welcome, Introduction, Meeting Objectives and Agenda

Crystal Rodgers-Jenkins, Total Coliform / Distribution System Advisory Committee (TCRDSAC) Designated Federal Officer, opened the meeting and welcomed the meeting attendees and members of the Advisory Committee to this fifth meeting of the TCRSDAC.[1]

Gail Bingham, the facilitator from RESOLVE, announced some changes to the TCRDSAC membership roster. She noted that because the representative from the National Association of Rural Utility Commissioners (NARUC) has been unable to attend any meetings, NARUC has withdrawn its membership from the Committee, though it may remain active and informed in other ways. She also informed the Committee that Beth Messer of the Ohio Environmental Protection Agency will be the new alternate for Patti Fauver, the TCRDSAC member

[1] Please see Attachment A for the Total Coliform Rule/Distribution System Federal Advisory Committee roster. Please see Attachment B for a copy of the meeting agenda. Please see Attachment C for a list of the meeting attendees.

representing the Environmental Council of States. Ms. Fauver's previous alternate will continue to contribute to the Technical Work Group (TWG).

Ms. Bingham then briefly reviewed the objectives of the meeting, the meeting agenda, and the meeting materials. She noted that this meeting would focus on the second part of the Committee's charge, developing recommendations on information collection and research needs.

She informed the Committee that the December meeting summary would not be approved at this meeting to allow more time for comments. She asked that any additional edits be sent in by January 25th to Kathy Grant of RESOLVE.

II. Cross-Connection Control Programs

Vanessa Speight, Malcolm Pirnie, gave a presentation to the Committee on the "Current Implementation of Cross-Connection Control Programs."[2] The objectives of the presentation were to provide background on current cross-connection and control measures; summarize data on types of cross-connection incidents; and provide an overview of codes/statutes currently governing cross-connection control.

In the discussion that followed, several members expressed the view that the weakest link in cross-connection control programs is implementation and follow-up, not the specific elements or requirements in the programs. One member pointed to the failure to conduct follow-up cross-connection surveys in response to changes in ownership or operational procedures in industrial and commercial establishments. Another member stated that the lack of follow-up is also a problem on tribal lands, particularly given the build-up of casinos, hotels, and golf clubs. However, a third member reminded the Committee that even if the state does not review a cross-connection control program, other entities, including utilities do.

Committee members also offered additional information about state cross-connection control programs and raised several issues, including the following:

- Several states may have good intentions with regard to cross-connection control, but lack the legislative authority to require these programs.
- The jurisdiction/authorities listed in slide 18 cover water systems, not the internal plumbing in residences.
- Existing guidance manuals for cross-connection control programs differ in scope (i.e., national versus regional). Regional manuals reflect the variations in the types of protection available, types and intensity of existing hazards, and types of community (commercial versus residential) served.
- An increasing source of cross-connection hazards are residential irrigation systems using reclaimed water and the winter blowout of these systems.

In response to a question about slide 18, Dr. Speight noted that the TWG had the data to differentiate between the backflow incidents and illnesses related to distribution systems versus premise plumbing, but did not have time to perform that level of analysis.

[2] Please see Attachment D for a copy of Dr. Speight's presentation "Current Implementation of Cross-Connection Control Programs.

The Committee asked for the following additional information on cross-connection control programs:

- Differences in cross-connection control programs by state.
- How these programs are being implemented and enforced.

III. Information Collection and Research Needs Topical Presentations

Doug Owen, Malcolm Pirnie, set out the framework for the information collection and research needs presentations from the TWG on six topics related to potential distribution system risk.[3] He noted that each presentation focuses on information that will help the TCRDSAC members prioritize additional data collection and research that informs distribution system contaminant occurrence and associated public health risks.

He stated that each of the presentations: define the topic; explain why the topic is of concern; review the current state of research; describe decision-relevant research and information needs; and identify linkages to related topics and cross-cutting issues. Although there is great overlap among the topics, they are grouped in three main areas: A. hydraulic issues (cross-connections and backflow, pressure, intrusion); B. infrastructure integrity issues (water mains, storage facilities); and C. water quality issues (biofilm, nitrification).

A. Cross Connection, Backflow and Pressure/Intrusion

Melinda Friedman, HDR, Inc., gave the first presentation on behalf of the TWG, on "Information Collection and Research Needs for Cross-Connection, Backflow Prevention and Pressure Intrusion."[4] Following the presentation, Paul Schwartz of the University of Southern California, Foundation for Cross-Connection Control and Hydraulic Research, Gregory Kirmeyer of HDR, Inc., and Les O'Brien of the University of Florida, TREEO Center joined Ms. Friedman for a panel discussion.

1. Cross-Connection and Backflow

During the discussion with Committee members, the panelists made the following points about cross-connection and backflow:

- Main breaks are one example of how pressure in the distribution system may be reduced to a vacuum (i.e., backsiphonage) which could pull contaminants (i.e., bacteriological or chemical) back into the distribution system. Water main breaks happen every day throughout the U.S. (e.g., one panelist indicated that in Florida, 1 per day per 25,000 customers), far exceeding the number cited in the EPA white paper.
- When there is an increase in the velocity of water as a result of a high water demand (i.e., main break, flushing, fire fighting), there may be a resulting reduction in pressure. Backsiphonage potentially can occur upstream and downstream of the high water demand.

[3] Please see Attachment D for a copy of Mr. Owen's presentation "Overview: Information Collection and Research Needs."

[4] Please see Attachment E for a copy of Ms. Friedman's presentation "Information Collection and Research Needs for Cross-Connection, Backflow Prevention and Pressure/Intrusion."

- Increased pressure from a customer premise (i.e., backpressure) can cause backflow even without a loss of pressure in the distribution system. Approximately one third of the cross-connections identified during cross-connection control surveys are classified as direct cross-connection, capable of supporting backsiphonage or backpressure.
- There are several firefighting practices that are a potential source of risk to distribution systems, including: hydrant testing methods, methods for filling pumper trucks; failure to disinfect tanks and trucks after drawing in dirty water; high water pressure boosts; and the use of hard suction rigid hoses at hydrants. Addressing the problem can be difficult, because water quality is a lower priority for fire departments than saving lives and protecting property. Requiring pumper trucks to have an air gap separator would resolve some of the problems.
- There is a greater degree of hazard in the industrial/commercial community versus the residential community, because of the increased numbers of water-using equipment or processes, as well as the higher volume of contaminants that could backflow. However, there are also hazards in the residential community, but they are generally considered a lower degree of hazard.

With regard to research and information collection related to cross-connection and backflow, the panelists made the following points:

- Much is already known about backflow, and there is not a need for extensive additional research.
- Determining the critical elements of an effective cross-connection control program would be relatively easy to do in a short time frame (less than 5 years), because much of the information is already available. Elements of a program have been well established in many of the industry's guidance manuals, as well as the National Academy of Science 2006 report *Drinking Water Distribution Systems – Assessing and Reducing Risks*.

During the discussion with the panelists, the Committee also raised several issues related to cross-connection control programs. One of the panelists pointed to the various types (i.e., system protection, internal protection, combination of internal/system) of programs in operation, as well as the voluntary nature of some. Another stated that water quality would be improved if an agreed upon program could be mandated. In response, one Committee member noted that mandating programs could circumvent local and state legislatures (some do not allow programs more stringent than federal requirements). Another member pointed out that the Committee could consider incentives or a toolbox of options that would provide support at the local and state level without requiring everyone to do the same thing.

2. <u>Pressure transients and Intrusion</u>

During the discussion with the Committee, panelists made the following points about pressure transients and intrusion:

- The age of pipes does not necessarily correlate with the likelihood of intrusion; many older pipes are in better condition than newer ones. External events, such as large pumps turning off due to power failures, are more directly related to problems that can lead to intrusion problems than simply age. Engineering configuration also make systems more/less vulnerable to an event.

- While pressure transient events may last only a minute, the pressure wave will travel through the entire pipeline until it is mitigated. Contaminants potentially could then be drawn into the system anywhere in the piping system where there is a leak or submerged air-vac valve.
- Whenever there is a main break, as opposed to a slow leak, there may be some degree of pressure reduction. However, main break does not mean catastrophic event. A pressure difference may not be observed.
- There is not much known about the frequency of intrusion resulting from the close proximity of sewer and water lines, because there are so many variables. Sewer mains are notoriously leaky, but it is difficult to say how far a leak moves in the trench and how much dilution occurs.
- The Ten State Standards, which have been in place for 50-80 years, recommend minimum horizontal and vertical distances between water and sewer lines, but it is not possible to follow the standards in some places.

During the discussion, one Committee member proposed amending the definition of "intrusion" to encompass the entry of more than just non-potable water into the distribution system.

Another member stated that it is important to remember that there are different definitions of main breaks. For example, some utilities include slow leaks, which may not result in a change in pressure, in their definition.

A member noted that small systems are at greater risk for catastrophic leaks because they may lack the resources to do preventative maintenance and address small leaks.

Another member pointed out that vertical and horizontal separation of water and sewer lines is mandatory in many places, and that other requirements are in place if these requirements cannot be met.

With regard to research and information collection related to pressure transients and intrusion, panelists made the following points:

- It is difficult to apply information about pressure transients within and across the multitude of different water distribution systems. For example, line pressures can differ from pipeline to pipeline, and information from one system may not be applicable to the adjacent system; there is limited data (only microbial from a few systems) on the water quality that could be intruded from a pipe trench environment; and the volume of water predicted to intrude is relatively small, on the order of milliliters to liters, based on surge modeling and pilot-scale systems.
- The 5-10 year estimated timeframe for collecting intrusion occurrence data is related to the fact that several different studies are necessary. First, there is the challenge of understanding leakage rates. Then, studies are needed to understand how many miles of pipe are submerged at different times in the year. Surveys also will have to be done to determine the number and types of appurtenances (such as valve boxes and air-vac valves) are submerged or flooded.

- While it may be possible to characterize contaminants that can be intruded into the distribution system, it is practically impossible to "chase" the contaminant as it moves through the system.
- It may be possible to get a national picture of which systems are more vulnerable to pressure loss. There are also certain types of systems (pumped versus gravity) and topography that are likely more susceptible to intrusion (most systems take this into account in some way). Monitoring stations that can monitor for pressure and water quality parameters could be helpful, but the technology may not be readily available or affordable for some systems.

Criteria for prioritization of information and research gaps: One member gave as a criterion the potential for saving lives. Based on this, the member placed a high priority on the research gap: "pathogen and contaminant occurrence in the vicinity of intrusion pathways."

B. Storage Facilities and New Mains & Repairs

Gary Burlingame of the Philadelphia Water Department gave a presentation that was developed by the TWG on information collection and research needs related to "Water Main Repair and Replacement and Physical Integrity of Finished Water Storage Facilities."[5] Following his presentation, Charlotte Smith, UC-Berkeley/CS&A, and Gregory Kirmeyer of HDR, Inc. joined Mr. Burlingame for a panel discussion.

During the discussion, the panelists made the following additional points about water mains:

- There is tremendous variation in flushing practices for water mains. This variation is due in part to differences in the purpose of, the experiences with, and the availability of water for flushing. There also is not a standard technical definition of "flushing."
- There has not been a study that breaks out the occurrence of contamination in mains versus storage facilities. It is likely that there are more potential contamination events in water mains simply because of the type and frequency of water main activity.
- Water mains generally do not fail simply because of age. If there is an age-related structural failure with mains, it tends to be due to external corrosion. Failure internally may be caused by excessive tuberculation resulting in loss of hydraulic capacity.

The panelists also made the following additional points about storage facilities:

- An AWWA Research Foundation (AwwaRF) research project monitored and modeled storage tanks in the U.S. and U.K. The study found that utilities have different philosophies for addressing water quality in storage facilities. Some have an operational policy to keep the storage full, while others have a policy to fluctuate the level of water.
- Systems have to operate in a way that balances water quality, fire flow, energy management, and emergency storage concerns. Larger systems do this reasonably well, whereas smaller systems may not have the experience, training or capability to operate storage facilities in more dynamic ways.
- A best management practice (BMP) for utilities is to: 1) understand the minimum level of water needed to meet pressure and fire flow and other emergency requirements; and 2)

[5] Please see Attachment F for a copy of Mr. Burlingame's presentation "Water Main Repair and Replacement and Physical Integrity of Finished Water Storage Facilities."

manage the water volume in a tank so that it fluctuates between a level close to that minimum value and a higher level (as opposed to keeping the tank near the high level all the time).

- The mixing of water in storage facilities can be important for chloraminated systems in order to avoid temperature differentials that could promote nitrification and a greater loss in chloramine residual levels.
- The use of baffling in a finished water storage facility to achieve uniform mixing could actually make the problem worse.
- The age of a storage facility does not necessarily correlate with sanitary defects; for example, missing screens or holes in the tank that were not repaired could occur at any time.
- The TCR does not require regular sampling of storage facilities, however monitoring does occur:
    - The industry practice is to sample storage facilities when first installed and disinfected and after cleaning or maintenance.
    - Many utilities sample water exiting the storage facility.
    - Some utilities routinely monitor storage facilities; others only sample after a TC positive sample.
    - Monitoring and facility inspection have increased since 9/11, but there are many challenges, including: the number of storage facilities in a system; safety concerns; hard to access tanks; and the lack of consensus about how to interpret the general water quality data when there are so many various types of chemical and microbiological contaminants that could potentially enter a facility.
    - Various BMPs suggest sampling within storage facilities in addition to sampling the discharge water. However, in tanks that ride on system pressure, it may not be possible to know if one is testing stored water or water entering the tanks.

With regard to research and information collection related to water mains and storage facilities, the panelists made the following points:

- There are cross-cutting information and research gaps, including: barriers to the implementation of BMPs; adequacy of indicators; efficacy of chlorine residuals; and the development of an analytical exposure and risk estimate framework.
- In developing an analytical and risk assessment framework, it is important to take into consideration the fact that some data (for example, occurrence data) may not be available.

One member asked if it is possible to characterize how mixing in a storage facility affects chlorine residual levels. The panel responded that poor mixing leads to a stratified water column or compartments within the storage facility. Either can adversely affect chlorine residual levels.

Another member noted that it is possible to make regulatory decisions based on other vulnerabilities than contaminant occurrence.

A member raised the question of whether sampling of storage tanks should be included in revisions to the TCR. The panel responded that this was a very controversial subject during the writing of the current TCR because the rule language requires that samples be taken from a “free

flowing tap," and an internal sample from a tank would not meet this definition. There is also a question about whether or not the water in tanks is "representative" of a consumer's water.

Criteria for prioritization of information and research gaps: Committee members placed a value on research or information collection that would address multiple gaps in knowledge.

C. Biofilm and Nitrification

Dr. Speight gave the third presentation, developed by the TWG, on information collection and research needs related to "Biofilms and Nitrification."[6] Afterward, Anne Camper of Montana State University, Charlotte Smith, and Jonathan Pressman of U.S. EPA (ORD) joined Dr. Speight for a panel discussion.

During the discussion, the panelist made the following additional points related to biofilm and microbial regrowth:

- Generally, the presence of biofilm is affected by the type of material in a system. Although there has not been a national study of this issue, laboratories support the finding that iron pipes with good corrosion control or pipes made of other materials provide less of a niche for biofilm than corroding iron pipes.
- It is impossible to determine the presence of biofilm through bulk water monitoring.
- Disinfection may help control biofilm, however, even well-disinfected systems have biofilm. Biofilm can be managed but never completely eliminated.
- When cause and effect relationships between water quality, treatment, or operational parameters are sought, most biofilm research is first done in laboratory and pilot studies and then the same effects are sought in the field. This is simply because field systems have so many uncontrolled variables.
- There have been three studies which identified *Helicobacter pylori* in biofilm, but the relative significance of this is still unknown. There is also another small study looking at the concentrations of *H. pylori* in Native American communities.
- There have been outbreaks of *Legionella* that have been traced to drinking water systems, although the perception is that the growth of the organism is in premise plumbing and hot water systems and not specifically in the distribution system. The opportunistic pathogen *Mycobacterium* has been identified in biofilms in distribution systems. Other pathogens have been found to accumulate in biofilms, but there is little evidence for their growth. Since most tests are done in bulk water, it is difficult to determine if the lack of detection means that the organism is not present in the biofilm.
- Research has shown that biofilm can be helpful in that it can both out-compete and trap pathogens. It is not known what biofilms do to hold pathogens and subsequently release them.
- While there is no evidence that biofilm has a direct public health impact, biofilm can be problematic. They are linked to nitrification (see below). They may also contribute to public health problems by releasing opportunistic pathogens (see *Legionella* and *Mycobacteria* comments above) or those that may be trapped.

During the discussion, panelists made the following points related to nitrification:

[6] Please see Attachment G for a copy of Dr. Speight's presentation "Biofilms and Nitification."

- The presence of the microbes that cause nitrification is a function of the quality of the source water quality and the quality of treatment.
- Nitrification is strongly related to chloraminated systems, which tend to be surface water systems. However, a large number of ground water systems have naturally occurring ammonia.
- Once started, nitrification events can be hard to contain.
- There is no evidence that ammonia-oxidizing bacteria or nitrite-oxidizing bacteria are pathogens. The problems resulting from nitrification are due to the loss of chlorine residual, not to the nitrifying bacteria themselves. EPA's Office of Research and Development also has data that show levels of nitrite and nitrate in water above what has been determined to cause health issues.
- Increase in nitrificiation can lead to increase in heterotrophic plate count (HPC).
- Nitrification can be an acute event that may snowball to other issues.

The panelists noted a link between biofilm and nitrification. Studies are ongoing to prove a working hypothesis that nitrification is primarily a biofilm phenomenon. The hypothesis is based on the observation that when bulk water is sampled from the distribution system, the number of organisms found does not account for the amount of nitrification occurring. Nitrifying bacteria also have been identified in biofilm.

With regard to research and information collection related to biofilm and nitrification, the panelists made the following points:

- There is still a lot unknown about biofilm, particularly given the complex inputs into the microbial ecology in water systems. Due to a lack of resources, there has not been a focused effort to study biofilm.
- In order to better understand how to apply disinfectant residuals, it would help to know more about the microbiological relationships within biofilm.
- There is a lack of understanding of the importance of biofilm on the fate and transport of opportunistic pathogens and pathogens that may directly cause disease (frank pathogens) in distribution systems.

When asked about common themes among the information collection and research needs presentations, the panelists suggested:

- Water velocity and direction and how these relate to water quality issues in distribution pipelines.
- Chlorine demand and the resulting loss of residual.

D. Synopses of Additional Issues Related to Potential Distribution System Risks

Dr. Speight then gave a presentation on behalf of the TWG that provided the Committee with a "Synopses of Other Potential Risks Related to Distribution Systems."[7] The objectives of this presentation were to: define the issues; explain potential concerns; describe existing mitigation strategies; and present cross-cutting issues. The issues included in the presentation were

[7] Please see Attachment H for a copy of Dr. Speight's presentation "Synopses of Other Potential Risks Related to Distribution Systems."

permeation, leaching, internal corrosion, contaminant accumulation, water age, loss of residual, and premise plumbing.

In the subsequent discussion about the seven additional issues, Committee members made the following points:

- Once PVC pipes are permeated, they are more vulnerable to further permeation as well as to structural failure.
- On slide 6, the 100 reported incidents of contamination due to permeation took place over approximately 5-10 years, in the early 1990s. (Plastic pipes were more common through the late 1970s and 1980s.)
- The issue of contaminant accumulation was not on earlier lists that summarized priorities of various expert panels. It is a relatively new issue area that was included in the presentation after consultation with industry experts. There is a lot of work to be done to understand what pipe compositions, chemicals, etc. will cause contaminant accumulation.
- The contaminant metals of concern have not been systematically monitored for exposure.
- Processes that change the pH or the oxidation reduction rate are most likely to cause contaminant accumulation.

The TCRDSAC then began the discussion (continued later in the meeting) about the scope of the information collection and research needs recommendations. Members made the following recommendations:

- Focus information collection and research on areas that 1) will have the greatest potential public health impact and 2) can be accomplished in the relatively near future.
- Identify information and research gaps that are covered elsewhere; eliminate any redundancies. Research involving chlorine residual is a possible example of this.
- Consider whether it is practical to attempt to address long-term research efforts.

Ms. Bingham also reminded the Committee of the interest they expressed at earlier meetings to make recommendations for information collection and research needs that have a strong likelihood of actually happening.

IV. Possible Approaches to Implementing the Information Collection/Research Needs Recommendations

Mr. Owen gave a presentation "Possible Approaches to Implementing the Information Collection/Research Needs Recommendations."[8] The objectives of the presentation were to: illustrate the potential of different approaches to organize and implement information collection and research programs; reveal implications for the research plan/language in the Agreement-in-Principle (AIP); and improve upon and apply lessons learned from similar past efforts.

Following the presentation, Committee members made the following points about research plan timelines and funding:

[8] Please see Attachment I for a copy of Mr. Owen's presentation "Possible Approaches to Implementing the Information Collection/Research Needs Recommendations."

- EPA's process for awarding discretionary grants has changed from the process used with the Microbial and Disinfection By-Products research council. The grants must be competed now, and as a result, it probably would be a conflict of interest for EPA to participate on such a research council. Awarding of grants takes at least a year now, if not longer.
- EPA's move toward regulation tends to drive the research agendas of other, non-federal, entities. It would be helpful to identify research needs that would help focus the efforts of these organizations.
- Under the Safe Drinking Water Act, EPA cannot require sampling (as was done in the Information Collection Rule (ICR)) unless there is language in a rule that authorizes it. It can take several years from the time an AIP is signed to the time the first sample is taken.
- Depending on the mechanism the Committee chooses for implementing research recommendations, additional time may need to be added to the TWG's projected timelines.
- EPA cannot rely on congressional earmarks as a mechanism for implementing research.
- EPA has a process for developing a multi-year plan for each major research area. The multi-year plan identifies discreet levels of research. For drinking water, one focus area is distribution systems. Research recommendations from the Committee can become part of the current planning for the next 5-10 year period.

Committee members discussed several aspects of the mechanisms for implementing research and information collection recommendations. Some members noted that "information collection" could refer to collecting samples as was done for the ICR; or it could refer to gathering information that is readily available, such as existing guidelines or BMPs. One member suggested that the latter would be less resource intensive. Another member disagreed noting that the costs are diffuse and borne mainly by utilities. This member emphasized that it is important to only ask for information that actually will be used, and only do research that is relevant to EPA decision-making.

One member, who expressed a preference for a research council approach, asked that EPA think about whether there is a workable way to use this mechanism given current circumstances. Another member noted that the last research council was set up so that a certain research foundation got all of the money then invited others to join them in deciding how to spend it.

Another member suggested that the most successful research implementation processes have been those with: formal mechanisms/structures, rule-making deadlines, clear priorities, drivers/champions, and a specific earmark from Congress.

Some members emphasized the importance of epidemiological studies in determining a public health link, noting that these studies are not necessarily resource intensive.

One member suggested that it might be possible to link revisions to the monitoring provisions of TCR to some of the information collection recommendations.

The Committee also discussed the purpose of the information collection and research recommendations. One member pointed to the goal of protecting public health. Another

suggested that the purpose is to provide EPA with a better understanding of whether or not there are problems in the distribution system that require the Agency's attention.

Some members noted that the Committee could decide that no additional research is needed. Members also suggested that research organizations, rather than EPA, could be the drivers for implementing recommendations. In this instance, the Committee would highlight priorities and provide the information to these organizations for them to factor into their research plans.

V. Elements of Agreement in Principle for Information Collection and Research Needs Recommendations

Ms. Bingham explained to the Committee that as it moves from discussion to decision-making, she will specifically ask if the Committee is ready to make a decision and have the results of any decision recorded in the meeting summaries.

Ms. Bingham summarized the questions the Committee had raised over the course of the meeting that could set a framework for its decisions about an agreement in principle for information collection and research needs recommendations:

- What is the goal or question of the research objective?
- What is the scope? What are the topic areas?
- What is the timeframe?
- How much is feasible?
- What mechanisms should be used?
- Who ultimately pays the costs?

She also reminded the Committee of the objective of the second part of their charge: "…to better inform distribution system contaminant occurrence and associated public health risks in distributions systems..."

The Committee then developed the following list of criteria for prioritizing information collection and research priorities:

- Whether and to what extent the research affects public health.
- Whether the research informs what action to take to better protect public heath, and the relative significance of that public health benefit.
- Whether the research "completes" gaps in an issue area, and enables policy decision.
- Whether the research improves the understanding of the effectiveness of mitigation options.
- Whether the research fills in gaps in multiple issue areas.
- Whether regulatory and policy decisions have already been made in this area (because additional information would then be less likely to be needed than in other issues).
- The efficiency of the research (i.e., can it be done quickly and will it fill a large gap?)
- The (relative) cost of the research. The category of agency that will bear the burden.
- The duration of the research.
- The "do-ability" of the research.

- The applicability of the research to systems. (To all systems? Only some? And if only some, which subset of systems?)

One Committee member expressed misgivings about whether, in fact, any research was needed, and cautioned the group against starting with that assumption. In response, another member asked if research is needed to be sure that the high quality water after treatment is still high quality when it is consumed. Another member stated that a revised TCR that was easier to implement would help solve some of the distribution system issues. Another suggested putting monitoring provisions in the revised TCR to help us better understand distribution systems issues.

The Committee decided to add the topic of contaminant accumulation to the initial six information collection and research topics (1. cross-connections and backflow; 2. pressure transients and intrusion; 3. water main repair and replacement; 4. water storage integrity; 5. biofilm; 6. nitrification), and to ask the TWG to work on just these seven topics.

The Committee asked that the TWG take the following steps:

- Develop additional level of detail for Contaminant Accumulation (i.e., list research gaps).
- Where it is difficult to apply the criteria, break out the three gap categories (exposure/vulnerability, health effect/risk, mitigation strategy) into specific questions as necessary.
- Apply Committee criteria to all issues with gap matrices, and prioritize the gaps.
- Organize the information qualitatively for the Committee (e.g., for each gap highlight which criteria it ranks highest).

VI. Small Group Discussions: Options Development

The small groups that were formed at the last meeting met to further discuss options development.

VII. Technical Work Group Update

Mr. Owen provided the TCRDSAC with a "Conceptual Approach to Options Evaluation" that laid out a proposed methodology, developed by the TWG, to evaluate the different options the Committee develops to revise the TCR.[9] The Committee then discussed what information from the technical work group would be helpful in assessing the implications of different options.

One TCRDSAC member requested a presentation summarizing Colin Fricker's findings on the variability in the analytical methods testing for total coliform and *E. coli*.

During the discussion, the Committee made the following points about evaluating options:

- Take into account the implementation of the Ground Water Rule (GWR) when determining the number of systems that will be triggered to take additional actions.

[9] Please see Attachment J for Mr. Owen's presentation 'Conceptual Approach to Options Evaluation."

- It is important to assess which option components or option packages add value rather than just tying up state resources.
- Determine if there is a metric for health effect impact, other than *E. coli*, that can be estimated for various options.
- Take into account the effect of TCR implementation when estimating the number of systems triggered to take additional actions over time.
- Consider the impact on GWR and other rules.
- Include a rough estimate of the cost (or savings) to the customer.
- Ensure the option captures all systems so that none "fall through the cracks."
- In the benefit analysis, expand the range of activities to include those that might be part of the "incentive" option package.

One member explained that in the Long-Term 2 Enhanced Surface Water Treatment Rule process, EPA used the option evaluation analysis as a basis for the cost/benefit analysis required by the Safe Drinking Water Act. The details related to the calculation of health benefits were worked out after the advisory committee process, but was based on a general understanding EPA had with the committee.

VIII. Public Comment

No members of the public offered comment at this meeting.

XI. Next Steps and Action Items

Mr. Owen noted that the information collection and research task group of the TWG met over lunch to develop a plan for responding to the Committee's requests regarding the prioritization of information and research gaps. He outlined the following steps:

- Apply the criteria on a gap-by-gap basis and prioritize by "high," "medium," and "low."
- Look at gaps, aggregated by specific issues, to determine which if any gaps are most critical to the evaluation of the issue.
- Look at all the issues and, using the Committee's criteria, determine which issues are most likely to provide answers on which to base a determination to take action.

He stated that the TWG would provide the Committee with an explanation of its rankings. He also noted that the TWG will aggregate the information and make recommendations with different endpoints in mind (e.g., regulation, guidance, advice, etc.).

Ms. Bingham passed out a list of the TWG members who currently make up the information collection research needs task group. She asked the Committee to provide Kathy Grant with the names of anyone they wish to add to the task group in order to provide a balanced representation of viewpoints.

Ms. Bingham then reminded the Committee to send her their options development packages by January 31st to allow enough time to send them back out for review by the Committee before the February TCRDSAC meeting. She then reviewed the options development timeline:

- February meeting: The TCRDSAC will note gaps in the options developed, if any; identify attributes that members would like to see in the options; and decide how to organize the options.
- February - April: The TWG will perform the option evaluations for presentation at the April meeting.
- April meeting: The TCRDSAC will discuss the options, informed by modeling of TC and fecal indicator occurrence and estimating cost implications. These analyses will be performed by the TWG.
- May: The TCRDSAC will develop a rough draft of an agreement in principle to circulate to their constituencies for comments.

Ms. Speight reviewed the list of tasks for the TWG. She invited the Committee to submit additional research requests to the TWG if questions arise as they develop option packages.

Mr. Owen closed the meeting by recognizing the extraordinary efforts over the holidays of Gary Burlingame, Steve Via, Ken Rotert, Melinda Friedman, Charlotte Smith, Sean Conley, and Alan Roberson to prepare for this meeting.

The following action items resulted from the meeting:

TASK	WHO	WHEN
Provide summary of 1/16-17 meeting to EPA	RESOLVE	February 1
Review list of technical experts working on TWG Group 10 (Research and Information Collection) and identify any missing perspectives or individuals to Kathy Grant.	TCRDSAC Members	ASAP
Submit comments for the December meeting summary to Kathy Grant	TCRDSAC Members	By January 25
Incorporate comments into the December meeting summary and circulate to the TCRDSAC	RESOLVE	Before February meeting
Send RESOLVE options development language	Options development small groups	By January 31
Send TCRDSAC options development packages	RESOLVE	ASAP following receipt of the packages from the small groups
Send RESOLVE any suggestions for how to structure the February meeting	TCRDSAC members	Before February meeting
Respond to TCRDSAC requests for information	TWG	Ongoing

The TWG will meet on February 19, 2008 in Washington, D.C. The TCRDSAC will meet on February 20-21, 2008 in Washington, D.C.

NOTE: This document was prepared by the facilitators for consideration by the Total Coliform Rule Distribution System Advisory Committee and does not constitute a product of the Committee. The Total Coliform Rule Distribution System Advisory Committee is a federal advisory committee chartered by Congress, operating under the Federal Advisory Committee Act (FACA; 5 U.S.C., App.2). The Committee provides advice to the Administrator of the U.S. Environmental Protection Agency on revisions to the Total Coliform Rule (TCR), and on what information about distribution systems is needed to better understand the public health impact from the degradation of drinking water quality in distribution systems. The findings and recommendations of the Committee do not represent the view of the Agency, and this document does not represent information approved or disseminated by EPA.

Attachments

Attachment A – TCRDSAC roster*
Attachment B – Meeting agenda*
Attachment C – List of meeting attendees
Attachment D – Vanessa Speight's presentation "Current Implementation of Cross-Connection Control Programs"*
Attachment D – Doug Owen's presentation "Overview: Information Collection and Research Needs"*
Attachment E – Melinda Friedman's presentation "Information Collection and Research Needs for Cross-Connection, Backflow Prevention and Pressure/Intrusion"*
Attachment F – Gary Burlingame's presentation "Water Main Repair and Replacement and Physical Integrity of Finished Water Storage Facilities"*
Attachment G – Vanessa Speight's presentation "Biofilms and Nitrification"*
Attachment H – Vanessa Speight's presentation "Synopses of Other Potential Risks Related to Distribution Systems"*
Attachment I – Doug Owen's presentation "Possible Approaches to Implementing the Information Collection/Research Needs Recommendations"*
Attachment J – Doug Owen's presentation "Conceptual Approach to Options Evaluation"*

* The meeting presentations and other documents may be found online at http://www.epa.gov/safewater/disinfection/tcr/regulation_revisions_tcrdsac.html

U.S. Environmental Protection Agency
Total Coliform Rule/ Distribution System
Advisory Committee Meeting
January 16-17, 2008

Meeting Attendees

David Aries, Anne Arundel County, MD
Ali Arvanaghi, U.S. EPA
Zeno Bain, U.S. EPA
David Baird, National Rural Water Association*
Pamela Barr, U.S. EPA*
Valerie Blank, U.S. EPA
Jeremy Bauer, U.S. EPA
Gail Bingham, RESOLVE
Eric Bissonette, U.S. EPA
Frank Blaha, American Water Works Association Research Foundation
Manja Blazer, IDEXX
Ron Braun, IntelliTech
Jeanne Briskin, U.S EPA
Kevin Bromberg, SBA Advocacy
Erica Brown, Association of Metropolitan Water Agencies*
Gary Burlingame, Philadelphia Water Department
Anne Camper, Montana State University
Jimmy Chen, U.S. EPA
James Cherry, City of Virginia Beach Public Utilities
Sarah Clark, HDR
Sean Conley, U.S. EPA
Cesar Cordero, U.S. EPA
Tom Crawford, Native American Water Association*
Cynthia Dougherty, U.S. EPA*
Patti Fauver, Environmental Council of States*
Colin Fricker, ASI
Ron Freeman, National Environmental Health Association*
Melinda Friedman, HDR
Kathy Grant, RESOLVE
Tom Grubbs, U.S. EPA
Yu-Ting Guilaran, U.S. EPA
Trish Hall, U.S. EPA
Maria Hegstad, Inside Washington
Christine Maloni Hoover, National Association of State Utility Consumer Advocates*
Gregg Kirmeyer, HDR
Dawn Kristof Champney, WWEMA
Dan Kroll, HACH Homeland Security Technologies
Maggie Lavay, U.S. EPA
Debbie Lee, RESOLVE

Frank Letkiewicz, The Cadmus Group, Inc.
Audrey Levine, U.S. EPA
Carrie Lewis, American Water Works Association*
Maria Lopez-Carbo, U.S. EPA
Gary Lynch, National Association of Water Companies*
Jennifer Lynette, U.S. EPA
Justin Manns, Anne Arundel County, MD
Sallie McElrath, U.S. EPA
Mike Messner, U.S. EPA
Harvey Minnigh, Rural Community Assistance Partnership*
Russell Navratil, County of Henrico, VA
John Neuberger, Council of State and Territorial Epidemiologists*
Eva Nieminski, Environmental Council of States
Les O'Brien, University of Florida
Darrell Osterhoudt, Association of State Drinking Water Administrators*
Doug Owen, Malcolm Pirnie
Angela Page, U.S. EPA
Jonathan Pressman, U.S. EPA
Jim Purzycki, American Backflow Prevention Association
James Bradford Ramsey, National Association of Regulatory Utility Commissioners
Graciela Ramirez-Toro, CECIA-IAUPR
J. Kevin Reilly, U.S. EPA
Alan Roberson, American Water Works Association*
Crystal Rodgers-Jenkins, U.S. EPA
Ken Rosenfeld, National League of Cities*
Kenneth Rotert, U.S. EPA
Rick Sakaji, East Bay Municipal Utility District
John Scheltens, American Water Works Association
Mike Schock, U.S. EPA
Paul Schwartz, University of Southern California
Nicole Shao, U.S. EPA
Charlotte Smith, Charlotte Smith & Associates
Tim Soward, IntelliTech
Vanessa Speight, Malcolm Pirnie
Anne Spiesman, Washington Aqueduct
Scott Summers, University of Colorado at Boulder
Lynn Thorp, Clean Water Action*
Bruce Tobey, National League of Cities*
Steve Via, American Water Works Association
David Visintainer, Association of Metropolitan Water Agencies*
Paul Whittemore, National Rural Water Association*
Beate Wright, Loudoun County Sanitation Authority
Mae Wu, National Resources Defense Council*
Yvonne Yuen, U.S. EPA

* TCRDSAC Member or Alternate