

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

October 17-18, 2007

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

Draft Meeting Summary

Meeting Objectives:

- *Explore what is and isn't known about public health risks associated with drinking water from a variety of sources, including information about outbreaks and endemic illnesses and a discussion of the data in the context of risk assessment to explore what we know about the microbial public health risks from drinking water.*
- *Review case analyses of outbreaks to generate discussion about how the TCR currently or if modified can help prevent this kind of problem. Explore possible insights from initial exploration of associations between outbreaks and TCR indicators.*
- *Learn more about utility implementation of the current Total Coliform Rule, including a comparison of approaches to monitoring, reporting and public notification by system size and type, and follow up activities to a positive sample.*
- *Review variations in violation and monitoring information by system size, source water, and treatment, with appropriate caveats, initially in an exploratory manner to identify patterns (if any) that suggest directions for additional inquiry.*
- *Learn about sanitary surveys, including various state requirements, what a sanitary survey entails, and what is known about beneficial impacts.*
- *Discuss the relevant provisions of the Ground Water Rule (GWR), what public water systems are covered, and how the GWR links to the TCR, in part to continue discussion of extent to which other rules contribute to objectives in current TCR.*
- *Continue to learn about attributes of some of the possible subject areas for future data collection and research needs.*
- *Explore ideas for possible improvements to the TCR, and discuss process for framing options.*
- *Provide additional direction to technical work group on potential information and analyses to support the advisory committee.*

I. Welcome, Introductions, Meeting Objectives and Agenda

Jini Mohanty, the Designated Federal Officer, opened the meeting and welcomed the meeting attendees and members of the Advisory Committee to this third meeting of the Total Coliform Rule / Distribution System Advisory Committee (TCRDSAC).¹

Gail Bingham, the meeting facilitator from RESOLVE, acknowledged the efforts of the Technical Workgroup (TWG) to prepare for this meeting despite the short amount of time from the last meeting in September. Ms. Bingham then briefly reviewed the objectives of the meeting and the meeting agenda. She outlined the natural cycle of consensus-building: an initial learning stage, followed by and overlapping with the option and idea development stage, and finally the decision-making phase. She noted that it was important for the Committee to begin thinking of transitioning from the first stage to the second by the end of the meeting.

Doug Owen of Malcolm Pirnie briefly outlined the framework for the information TWG had prepared for this meeting in response to requests from the Committee members in previous meetings.

II. Possible Public Health Risks from Drinking Water

Presentation: Overview of Outbreak Information and Implications for Possible Public Health Risks from Drinking Water

Sharon Roy of the Centers for Disease Control and Prevention (CDC) gave a presentation on “Waterborne Disease and Outbreak Surveillance.”² The objective of this presentation was to learn about CDC outbreak data and the distribution of outbreaks by type and size of system, by treatment versus distribution system origin, etc.

The Committee asked clarifying questions and discussed the information presented. In the discussion following Dr. Roy’s presentation, one Committee member noted that the data presented from 1971-2004 listed chemicals as a leading cause of outbreaks. In response, Dr. Roy indicated that the “1971-2004” was data a mixture of data from within and outside of utility jurisdiction and not divided by the new CDC definition of jurisdiction. She stated that she anticipates that many of the chemical outbreaks from the 1971-2004 dataset are related to premise plumbing. The member also noted that the Lead and Copper Rule was enacted in 1991.

A Committee member expressed a concern about the potential for overestimating waterborne disease outbreaks (WBDO) associated with drinking water because everyone who falls ill drinks water. Dr. Roy explained that in the surveillance summary reports,

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.

² Please see Attachment D for a copy of Dr. Roy’s presentation “Waterborne Disease and Outbreak Surveillance.”

each outbreak gets graded on the strength of the epidemiological data and the environmental evidence. If the evidence is too weak to link the outbreak to drinking water, it is not listed as such.

One member mentioned that at an EPA workshop in Nashville participants learned that the screening that most states use for acute gastrointestinal (AGI) outbreaks starts with questions about food. Only if no connection is made to food is water even considered as the cause.

Dr. Roy reminded the Committee that only about two-thirds of WBDOs are AGI, and that there are other illnesses that are even less likely to be linked to water despite that being the main cause.

Presentation: Overview of Endemic Illness Information and Implications for Possible Public Health Risks from Drinking Water

Ms. Bingham introduced Christine Moe of the Hubert Department of Global Health at Emory University. Her research focuses on environmental transmission of infectious agents, specifically waterborne and foodborne disease and the relationship between water, sanitation and health. Dr. Moe gave a presentation on an “Overview of Endemic Illness Information and Implications for Possible Public Health Risks from Drinking Water.”³ The objective of this presentation was to present information on endemic AGI in the U.S.; endemic waterborne AGI; endemic AGI illness associated with distribution systems; and water quality in distribution systems.

After Dr Moe’s presentation, the Committee asked clarifying questions and discussed the information presented. In the discussion, the following points were made:

- For the FoodNet data, there could be bias associated with the people who choose to hang-up and not answer questions, and calling cell phone (for socio-economic reasons). Also, asking people in an unannounced telephone interview to remember if they had diarrhea in the past month may be subject to bias because of the long recall period. This could lead to over-reporting of severe illness and under-reporting of minor illness. Asking about illness history over a shorter time period, such as the past week, would be more reliable.
- There was a difference in the number of households in the before and after community surveys. These are cohort studies where a group of households are enrolled at the beginning of the study and followed over time. However, households may drop out of the study over time – especially if it is a long follow-up period or there are no incentives to encourage the participants to stay in the study.
- In the Atlanta study, there was a significant inverse relationship between water age and the mean chlorine residual found in the water.

³ Please see Attachment E for a copy of Dr. Moe’s presentation “Overview of Endemic Illness Information and Implications for Possible Public Health Risks from Drinking Water.”

One member noted that both Dr. Moe and Dr. Roy had mentioned power supply failure as a cause for pressure loss and asked about requirements for backup power supplies for water utilities. Another member explained that large utilities usually have backup power, and about half of the medium-sized utilities and far fewer small utilities have it. One TWG member said that some states have requirements for backup power supplies, usually for 72 hours, but that there is no federal mandate for this. He also noted that plants may have backup power for some parts of the plant and not others. A Committee member said that a loss of power and pumping may not have an impact on pressure depending on how the system operates its storage facilities.

Presentation: Interpreting the Data in a Risk Assessment Framework and Implications for Possible Public Health Risks from Drinking Water

Ms. Bingham introduced Joseph Eisenberg, an Assistant Professor of Epidemiology from the University of Michigan. His research has focused on the development of a new microbial risk assessment framework that shifts the traditional approach of individual-based static models to population-based dynamic models. Dr. Eisenberg gave a presentation on “Frameworks for Estimating Risks Associated with Drinking Water.”⁴ The objectives of this presentation were to discuss what public health data says about drinking water risks, particularly with regard to distribution systems; whether this data can provide information on the extent to which the TCR is protecting public health; and what can be done to improve the precision of the data.

After the presentation, the Committee asked clarifying questions and discussed the information presented. In the discussion, the following points were made:

- The results from the Davenport, IA study are reported in the paper “*Workshop summary: estimating waterborne disease risks in the United States,*” which is included in the Committee’s binder.
- Dr. Eisenberg’s estimate for AGI outbreaks per year is based on a quantitative risk assessment methodology using source water pathogen concentration and treatment information from the Davenport study.
- There is a gap in the data because all the risk elements appear to be for community water systems (CWS), not non-community water systems (NCWS).

One Committee member made two points about Dr. Eisenberg’s presentation: 1) the various studies were aimed at understanding the risks to drinking water, not at whether the water was safe, and 2) understanding the contributors to risk helps inform how to do better studies in the future.

Expert Panel: What Is and Isn’t Known About Possible Public Health Risks from Drinking Water

Joe Cotruvo of Joe Cotruvo & Associates, an environmental and public health consulting firm, joined Drs. Roy, Moe, and Eisenberg for a panel discussion on possible public

⁴ Please see Attachment F for a copy of Dr. Eisenberg’s presentation “Frameworks for Estimating Risks Associated with Drinking Water.”

health risks from drinking water.⁵ Dr. Cotruvo introduced himself as the former Director of the Drinking Water Standards Division (to 1990) and Toxics Substances Risk Assessment Division at EPA until 1996.

Ms. Bingham asked the panelists the following series of questions:

1. *What is your level of confidence in the existing estimates of AGI (and other) diseases in the US attributable to drinking water; and could additional data affect this confidence?* In answering this question, the panelists made the following points:

- The bounds for each estimate depend on the assumptions that are made.
- Knowing the exact number of disease outbreaks and cases is not necessary from a regulatory standpoint because there is consensus that there are a large number of cases. While additional data should still be collected, the regulatory decisions that are made will not change with additional estimates. The Messner, *et al* estimate⁶ used a very good methodology and future studies will likely be patterned after it.
- It is important to get a good estimate of WBDOs to use as a benchmark to mark progress. For example, Dr. Roy's data showed a downward trend in WBDOs that may be due to implementation of regulation.
- It is important to do due diligence to ensure the estimates are not orders of magnitudes off, because numbers do take on a life of their own.

One Committee member noted that all of these studies, even the community intervention studies, were done in utilities. This member asked the panelists if the studies that collected TC data could help determine the value of TC, fecal coliform, or *E. coli* in predicting health outcomes. Dr. Moe responded that there were very little data in these studies on measured water quality. She was unsure if the right data had been collected in the studies, or in enough detail. Dr. Cotruvo stated from his reading of the reviews prepared by Gunther Craun and others, he would not expect TC to correlate well with waterborne disease outbreaks since TC are not necessarily due to fecal contamination; *E. coli* is a better safety indicator because *E. coli* are actually reflective of recent sanitary/fecal contamination. For that reason several years ago the World Health Organization dropped TC in favor of *E. coli* or thermotolerant coliforms as microbial drinking water quality indicators. He suggested that there was a need for additional indicators, such as MS-2 for viruses and disinfection treatment performance, or bacterial spores (e.g., *B. subtilis*) for filtration process performance for protozoa.

Dr. Cotruvo made the point that the 1976 TCR basically incorporated the existing Public Health Service protocol, and no new information was sought. He suggested that there is an opportunity to take advantage of all the new information that has become available since then. He also noted, however, that US Public Health Service guidelines existed

⁵ Dr. Jeffrey Griffiths, an Associate Professor at the Tufts University School of Medicine, was originally scheduled to be on the panel but was unavailable.

⁶ Messner et al. 2006. An approach for developing a national estimate of waterborne disease due to drinking water and a national estimate model application. *J. Wat. Health* 4 (Suppl. 2), 201-240.

primarily for large systems and interstate carrier supplies, and they were not generally implemented by the states in the majority of water supplies as intensively as occurred after passage of the federal Safe Drinking Water Act and its subsequent regulations.

2. *What fraction of the risks attributable to drinking water is associated with the distribution system; and what characteristics of distribution systems are more associated with risk?* In the discussion that followed, the panelists made the following points:

- Outbreak data indicate that since the expanded implementation of microbial drinking water regulations (late 70's-early 80's) the number of outbreaks has been generally declining, but the distribution-related portion has increased.
- All of the studies, using different methodologies, have shown significant risk, which is compelling evidence that the distribution system is a contributing factor to risk. There is more uncertainty in quantifying the level of risk.
- Based on these studies, the drivers of risk in distribution systems appear to be pressure loss, main breaks and repairs, long residence time, storage, and cross-connections.
- More and better designed studies are needed to determine the best indicators to address these risks.
- Since public water systems were designed for fire-fighting, they are overbuilt and oversized, which creates distribution system risks.

A Committee member noted that in revising the TCR, the Committee's recommendations have to be as protective as or more protective to public health than the current rule. This member asked the panelists if it was possible to know if this requirement is being met.

In answer, Dr. Moe suggested looking at the drivers of the risk and the mechanisms causing the risk. For example, targeted research that helps one understand the mechanisms causing pressure loss, how they impact water quality, and how that translates into public health risk, could also point to ways to mitigate that risk.

Dr. Roy said that she was still hesitant about the link between TCR and public health. She is comfortable saying that the Surface Water Treatment Rule (SWTR) had an impact on public health, because there is surveillance data that shows a noticeable drop in outbreaks associated with surface water or treatment deficiency since the rule was promulgated. She stated that the TCR was not designed to prevent exposure like SWTR, but rather designed to measure an exposure that is already occurring. She concluded that if TCR was modified so that a positive hit triggered a systematic evaluation of the system to find the problem and fix it, then she would expect in ten years to see a drop off in outbreaks associated with the distribution system in CWS.

Dr. Cotruvo agreed and added that TCR is based on the philosophy, similar to that for water safety plans or sanitary surveys, of instituting preventive systems including technology to assure safe drinking water. Non-real-time post-hoc monitoring results are too late because exposure has already occurred. The monitoring is primarily intended to demonstrate whether or not the entire system is functioning properly, rather than to measure risk.

One Committee member stated that she would not expect to see a trend for TCR similar to that for SWTR, because US Public Health Service guidelines were already in place for total coliforms before EPA adopted them for TCR. She asked if there was no TCR monitoring to determine if the treatment in place is working, would one expect no difference in public health outcome?

Another member asked if the Ground Water Rule (GWR) will have the same impact that the SWTR had. Dr. Roy responded that it may, though only time will tell. She noted that the GWR still would not address the distribution system issues.

Dr. Eisenberg noted that 1) TCR provides information about the distribution system, and 2) epidemiology studies provide information on how distribution systems affect public health. Moving forward it is important to link the two to better understand the mechanisms in distribution systems that affect public health and what elements of TCR affect those mechanisms.

One Committee member asked if there were more useful indicators to approach the public health facet of TCR. Dr. Roy responded that there might be a better indicator, but only if there is real-time monitoring, linked to action, will there be changes in public health outcomes.

3. *With regard to the Committee's second charge, what additional research or data collection is needed to inform future public health policy decisions?* In response to the question, the panelists made the following points:

- Indicators are really important, but the question of how they are applied and used is critical. The rule could be adjusted to choose better and more comprehensive indicators for harmful bacteria, viruses, and protozoa, although the application would have to be graduated by system characteristics. Monitoring has a primary role to determine if the entire protective system is functioning effectively.
- It would be useful to learn more about how risk is distributed across sub-populations, source, treatment, distribution, and system types and sizes. More information is needed about secondary transmission, water consumption patterns, and how non-AGI risks parse out among different microbial and chemical elements.
- In order to better understand the mechanisms causing risk, more studies are needed that use models to integrate data and assess what data are more important.

There is a need for data on: how well chlorine residual protects against intrusion and other distribution system issues; whether pressure monitoring data is a better indicator of risk than TC; and how results from grab samples measured for indicators compare to those from composited 100 liter samples.

Over the course of the discussion with the panelists, Committee members suggested the following questions for further consideration by the Committee as it works through issues related to its charge:

- Should the rule be tailored towards reducing the number of systems that have to do detailed monitoring?
- If TC is not an indicator for public health but rather for measuring system integrity, what could we do to make it a trigger for other actions?

III. Insights from Outbreak Case Studies

Charlotte Smith of Charlotte Smith & Associates and a doctoral student at the UC Berkeley School of Public Health gave a presentation on “Waterborne Disease Outbreaks: Lesson Learned.”⁷ The objectives of this presentation were: to review case analyses of outbreaks to generate discussion about how the TCR currently or if modified can help prevent this kind of problem; and to explore possible insights from initial investigation of associations between outbreaks and TCR indicators.

After Ms. Smith’s presentation, the Committee asked clarifying questions and discussed the information presented. In the discussion, the following points were made:

- It is not clear whether GWR could have prevented the South Bass Island outbreak. However, it is possible it could have prevented the Gideon outbreak. The GWR triggers some form of action, such as disinfection, based on a positive TC sample. The choice of which action is up to the state. The requirement for a sanitary survey might also have led to someone climbing the tank and discovering the problem.
- Since TCR monitoring is meant as a way to validate a system, the problems at South Bass Island - cross-connections issues, inspections – should have raised flags. The question is why people did not see the problems and fix them. Follow up actions, along with sanitary surveys, may be more productive.
- Prior to the GWR, it was the state that determined the frequency of sanitary surveys.
- The construction of wells, which can be part of non-community water systems or non-transient non-community water systems, is often sub par and done with very little oversight.
- When conducting a sanitary survey, states may ask if there is a cross-connection control (CCC) program and check for cross connection issues in a treatment facility. They do not look at individual connections or at premise plumbing.
- There are no criteria under the GWR about which systems should be disinfected. A TC positive triggers corrective action which is determined by the state.

IV. Initial Insights from Compliance & Monitoring Information

Mr. Owen gave two presentations: 1) “Initial Insights from Compliance Information”⁸; and 2) “Relative Rates of Incidence of Total Coliform and *E. coli* - Preliminary Analysis

⁷ Please see Attachment G for a copy of Ms. Smith’s presentation “Waterborne Disease Outbreaks: Lesson Learned.”

⁸ Please see Attachment H for a copy of Mr. Owen’s presentation “Initial Insights on Compliance Information.”

for TCR.”⁹ The objectives of these presentations were: to review variations in violation rates by system size, type, source water, and state; to review the relative rates of incidence of TC positive and EC positive in routine samples across system type and size; and to identify patterns (if any) that suggest direction for additional inquiry.

In the discussion that followed Mr. Owen’s presentations, the following points were made:

- In looking at the data on routine EC positives and acute violations (slide 24 of the second presentation), it is important to remember that a routine *E. coli* positive sample is not an acute violation, an *E. coli* positive repeat sample is; and that multiple EC positives can result in only one violation. There are also variations in: implementation and reporting to the federal Safe Drinking Water Information System (SDWIS); the applicability of TCR to different system sizes; the timing of the repeat sample (may be longer for small systems); and the number of samples taken (CWS have to collect far more samples to have the same compliance rate as NTNCWS).
- In the data comparing percent EC positives by system size and source (slide 20 of second presentation), the numbers of positive samples are small. As a result, there may be a point where large changes in percentages mean very small changes in the numbers. The data could also be affected by false positives and the difficulties small systems have with sampling (less educated sampler, etc.). However, the differences in percentages of EC positives for small ground water systems versus large surface water systems probably do have statistical relevance.
- The violation data presented does not include monitoring and reporting violations. Also, where monitoring violations did occur, acute and non-acute violations could be expected to have been higher than reported. This especially appears to be an issue for small systems, transient, and non-community water systems.

During the discussion, Committee members asked for the following additional information from TWG:

- Does repeat sampling result in utilities getting out to look at their systems and taking action?
- What is the likelihood of a TC positive sample leading to an *E. coli* positive repeat sample? How cost effective is it to use TC as a trigger for looking for other things?
- Is it accurate to assume a TC negative sample is also negative for *E. coli*?
- Are there similarities in systems with acute violations; non-acute violations?

During the discussion, the Committee members also raised the following questions for further consideration in the deliberation of their charge:

- Is repeat sampling a cost-effective way to get utilities to take action?

⁹ Please see Attachment I for a copy of Mr. Owen’s presentation “Relative Rates of Incidence of Total Coliform and *E. coli*—Preliminary Analysis for TCR.”

- Is the ultimate goal of revisions to TCR to reduce the number of positive samples, particularly EC positives? If so, what measures is the group going to take to reduce that number?
- Can the implementation burden for small and non-community water systems and states be reduced in order to improve the compliance rates for these systems?

V. Implementation of the TCR by Large Systems and Small Systems

Gary Burlingame of the Philadelphia Water Department and John Scheltens of AWWA gave a presentation on “TCR Compliance Monitoring: Large Systems vs. Small Systems.”¹⁰ The objective of this presentation was to learn more about utility implementation of the current Total Coliform Rule, including a comparison of approaches to monitoring, reporting, public notification, and follow up activities to a positive sample, by system size and type.

In the discussion that followed the presentation, the following points were made:

- Small systems that are not government owned have a different economy of scale and hard decisions to make about how to spend their resources.
- For many TNCWS, such as restaurants, the burden of TCR compliance should be considered a cost of doing business.
- Some small systems have the option of contracting out for services or consolidating with one another to achieve a higher economy of scale.
- Philadelphia assesses its infrastructure through monitoring. When the system sees water degradation, it puts in a request for replacement mains. Once mains are replaced, samples are taken before the mains are approved for service.
- In the context of this process, EPA has an interest in main replacement as it relates to water quality. The infrastructure issue is handled through other high priority efforts emphasizing sustainable infrastructure for wastewater and drinking water.
- In a distribution system, old is not necessarily bad. Older pipes often last longer.
- Just because a system is not government operated does not mean it is not well run.
- Many utilities, especially large systems, do extensive monitoring beyond what is required under the TCR; i.e.; new main sampling or after repairs, distribution storage sampling, HPC and other water quality testing, and special sampling.

During the discussion, the Committee members also raised the following questions for further consideration in their deliberations:

- What options, financial and technological, are available to assist small systems to overcome issues related to economy of scale?
- How should the individual needs of all systems be accommodated within the TCR?
- How do we ensure that all consumers, regardless of whether they are served by small, medium, or large systems, have the same level of public health protection?

¹⁰ Please see Attachment J for a copy of Mr. Burlingame’s and Mr. Schelten’s presentation “TCR Compliance Monitoring: Large Systems vs. Small Systems.”

VI. Sanitary Surveys

Patti Fauver of the Utah Department of Environmental Quality gave a presentation on “The Sanitary Survey.”¹¹ The objective of this presentation was to learn about sanitary surveys, including various state requirements, what a sanitary survey entails, and how they are implemented under different rules.

Following Ms. Fauver’s presentation, the Committee asked clarifying questions and discussed the information presented. In the discussion, the following points were made:

- Sanitary surveys are viewed as a preventive tool, not a reactive tool. They are done through prescheduled visits.
- The safety of staff who conduct sanitary surveys is an emerging issue in several states. For example, many states do not allow their staff to climb elevated storage tanks.
- There are variations in how states perform sanitary surveys. All states are required to look at the eight elements mandated by federal regulation in the Interim Enhanced Surface Water Treatment Rule (IESWTR) and the GWR. Some states do only that; other states do more.
- US EPA offers a voluntary sanitary survey training course through its Drinking Water Academy. Some states are very proactive about getting training in their areas, but it is more typical for states to assign sanitary survey responsibilities to experienced inspectors.
- A number of states have started to use electronic sanitary surveys to automate and standardize the process.
- Over the years, more systems, especially small systems, have incorporated elements of a sanitary survey into their operating plans.
- Some states have fallen behind in the frequency with which they conduct sanitary surveys. The GWR will likely exacerbate this problem.
- Many states have requirements for CCC programs, although there is a lot of variation in how they are implemented. Others are prohibited legislatively from having requirements above and beyond what is federally mandated.

During the discussion, Committee members asked for the following additional information from TWG:

- How might the framework presented on Slide 6 of the presentation be incorporated into consideration of TCR revisions and distribution system issues?
- What are the variations in how states conduct sanitary surveys currently? How is that changing?

During the discussion, the Committee members also raised the following questions for further consideration in their deliberations:

¹¹ Please see Attachment K for a copy of Ms. Fauver’s presentation “The Sanitary Survey.”

- How might sanitary surveys be used to promote proactive action on the part of the systems, particularly small systems?
- Is there value in including observation of sampling procedures and sites during a sanitary survey?

VII. Ground Water Rule (GWR) and Linkages to TCR

Mr. Owen gave a presentation on “The Linkage Between the Ground Water and Total Coliform Rules.”¹² The objectives of this presentation were to discuss the relevant provisions of the GWR, what public water systems are covered by the GWR, and how the GWR links to the TCR to continue discussion of the extent to which other rules contribute to objectives in the current TCR.

Following the presentation, the Committee discussed how best to address cross-connection control. One member suggested that cross-connections were addressed in the GWR’s provisions for sanitary surveys via EPA guidance and may not need further attention in TCR. Two members responded that, although sanitary surveys may include questions about CCC, states may not always do the necessary follow-up on these programs. In tight budget times, states will focus on what is required by federal rule. These members also said that there are a number of states that would like to see federal requirements for CCC because their programs are not as effective as they could be. Another member remarked that there is a difference between having a CCC plan and implementing that plan. He suspects that in many cases CCC plans are implemented casually if at all.

One member noted that GWR requires the eight elements of a sanitary survey, but not what each element entails. The details under each element are included in a non-binding guidance from EPA. The rule also requires the correction of significant deficiencies, but states define these deficiencies. Cross connections are not defined as a significant deficiency.

A member asked if it was possible to change GWR if revisions to TCR altered monitoring requirements significantly. In response, the representative from EPA stated that if the changes were significant enough, the agency would need to discuss what to do with GWR. She noted the challenge of changing GWR during the early stages of implementation and encouraged careful weighing of the importance of suggested revisions that have an impact on GWR.

During the discussion, Committee members asked for the following additional information from TWG:

- A summary of what is and is not happening in the states with regard to CCC.

¹² Please see Attachment L for a copy of Mr. Owen’s presentation “The Linkage Between the Ground Water and Total Coliform Rules.”

- An expansion of the chart on Slide 15 of the presentation to include other drinking water rules and regulations. This expanded chart should be included in the meeting materials of each meeting.
 - Include qualitative pros and cons of how well each rule is meeting each, or part of each, objective
 - Back up these opinions with data where possible
- A compilation of the range of qualitative information and opinions on how well the TCR is meeting its current objectives, possibly via a panel discussion similar to the public health panel from this meeting.
- Anecdotes and real examples of how the TCR is or is not meeting its objectives.
- Information about important TCR accomplishments that are not connected to the original three objectives.

During the discussion, the Committee members also raised the following questions for further consideration in their deliberations:

- Should CCC be addressed through EPA guidance on sanitary surveys or through regulation?
- If routine monitoring for TC is changed substantially how would this affect the GWR?
- How would revisions to the rule impact consecutive systems and their links with other rules?
- Should the objectives of the TCR be ranked so that there are primary objectives and secondary objectives? Should this ranking be more flexible to allow for some objectives to be secondary in some systems?
- Should the objective about indicating fecal contamination be broadened to include all public health issues?
- Are there ways to tailor the rule to fit different types of systems?
- Are there ways to simplify the rule, remove extraneous sections, and make it more clear and precise for those who will implement it? Are there ways to better target resources for TCR – and other rules?
- Are there ways to increase consistency in the implementation of the rule?

VIII. Additional Information on Some Distribution System Elements

Mr. Owen gave a presentation on “Distribution System Issues: Research/Information Needs.”¹³ The objective of this presentation was to present the preliminary elements of a process to evaluate issues and prioritize research needs and data collection.

The members discussed the framework, the “Issues and Attributes Matrix,” presented to them by the TWG. The members agreed that the matrix was a good starting point but that filling it in completely for each issue would take too long. Instead, they asked the TWG to complete the matrix focusing, at a high level, on identifying where there are the greatest public health effects and where there is a lack of data.

¹³ Please see Attachment M for a copy of Mr. Owen’s presentation “Distribution System Issues: Research/Information Needs.”

One member suggested three levels of prioritization for research and information collection: first, give priority to the elements listed as research priorities by the public health panelists; second, rank these elements by what is already known about health effects and occurrence; and third, focus on research where there is an intersection of more than one issue.

Several other members agreed with focusing on the four research areas identified by the public health panelists: cross connection and backflow; pressure transients and intrusion; new and repaired main breaks; and storage facility integrity.

One Committee member emphasized the importance of aging infrastructure. Members of the TWG noted that aging infrastructure was a comprehensive problem related to other issues already listed in the matrix, including water main breaks and storage, but difficult to analyze on its own. Another member stated that if several of the distribution system issues turn out to be related to infrastructure, the Committee could recommend that EPA address infrastructure through asset management rather than through regulations. This member stressed that asset management is good not only for finance but also for public health. The Committee agreed to ask TWG to add a column to the matrix to show the relevance to infrastructure for each element.

The Committee members also suggested adding columns to the matrix for:

- Impacts on public health
- Existing practices from rules
- Need for action (guidance, regulations, more research)

In addition to working on the matrix, Committee members asked the TWG to provide the following information:

- A description of how each distribution issue plays out for different types of systems.
- A characterization of where there are research needs, and potential ways to meet those needs.
- A compilation and prioritization of the research recommendations from the various expert panels.

Several Committee members suggested allowing the TWG to provide recommendations and prioritization, along with its rationale for these judgments, with the understanding that it is the Committee that will make the final decisions.

IX. Framing Options for Improving the TCR

Ms. Bingham reiterated the consensus-building process she had outlined at the beginning of the meeting and noted that in her experience, creative solutions come about when people are thinking collaboratively. She proposed a framework for the Committee to make the shift to developing ideas and options that involve: identifying criteria and constraints for the improved rule; identifying rule elements (concerns and what to preserve); formulating ideas to consider; and assessing and evaluating those ideas. She

noted that the work of the TWG would also shift to gathering information and doing analyses to help the Committee in its evaluation of options. Ms. Bingham emphasized that while the group does not have to agree on the criteria, it is important for each member to understand the criteria others are applying.

The Committee had a discussion about what the objectives of TCR should be. Several members stated their preference to keep all of the current objectives on the table for discussion. Some members suggested that determining system integrity should be the primary objective. One member proposed to explicitly state public health protection as an objective of the rule. Others stated that public health protection is the purpose of all the drinking water rules. A member suggested that the third objective be broadened to include all contamination, not just fecal.

One member asked if any of the benefits from TCR that are not explicitly listed in the objectives rise to the level of either objectives or criteria. In response, other participants offered suggestions, including: TCR helps states and technical assistance providers prioritize among systems; TCR is a driver for systems to better understand their distribution systems; and TCR offers systems an opportunity to do other sampling while they do TCR sampling.

The Committee members listed the following as criteria to consider for revisions to TCR:

- Maintains or enhances public health protection
- Reduces burden
- Cost effectiveness
- Is simpler to implement
- Considers implications and linkages to other rules
- Reflects variations in system type and size
- Recognizes the value of effective operators
- Uses the optimal indicator for each purpose or objective
- Is supported by scientific data

The Committee then discussed elements of the rule that raise the most concerns for them. During the discussion, the Committee identified the following issues for consideration in revising the rule:

- Public notification should be more directly tied to protecting public health.
- Public notification should be more effective and timely so it is more useful to the consumer.
- There needs to be different strategies for different sized systems.
- TC does not fit the maximum contaminant level construct; a treatment technique construct fits TC better.
- TC could trigger action, not an MCL violation.
- Is there value in repeat sampling for a TC positive? Is it the best use of resources?
- Is TC the right indicator for public health?
- What is the follow-up or corrective action when an indicator is positive?

- Corrective action should be determined by states.
- Consider addressing uniqueness of TNCWS by categorizing systems by attributes (e.g., single connections, no distribution system, hand pump).

During the discussion, Committee members requested that the TWG assess the following:

- How TCR objectives are being met by surface water systems versus ground water systems; and
- Are there TCR accomplishments, other than the current objectives, that the Committee should consider as objectives in the revised rule?

X. Public Comment

No members of the public offered comment at this meeting.

XI. Next Steps and Action Items

Ms. Bingham and Mr. Owen noted that the TWG will continue to develop information on the following topics to present to the Committee in future meetings:

- Data on repeat sampling;
- Response to positives for small systems;
- Follow-up on EC and TC positives;
- Monitoring and reporting violations;
- Burden;
- Methods analysis (sensitivity, specificity, new method development);
- Crosswalk between rules and objectives of TCR;
- Analysis of deficiencies associated with outbreaks;
- Indicators and outbreaks (Gunther's work);
- Data on states that require chlorination versus those that do not; and
- Distribution system research needs.

One Committee member requested some time at the December TCRDSAC meeting for caucusing. Ms. Bingham urged the Committee to use the time leading up to the December meeting to begin caucusing via e-mail and phone, as long as no more than eight members participated in any caucus.

The following action items came out of the meeting:

TASK	WHO	WHEN
Provide summary of 10/17-18 meeting	RESOLVE	Early November
Follow-up with TCRDSAC to elaborate on ideas for revisions to TCR	RESOLVE	By December 5-6 meeting
Provide comments to facilitators on the September meeting summary	TCRDSAC members	By December 5-6 meeting
Provide facilitators with additional ideas for objectives, criteria, and issues of concern	TCRDSAC	By December 5-6 meeting
Respond to the TCRDSAC's requests for	TWG	Ongoing

information		
Revise and fill in the Issues and Attributes Matrix according to the requests of the TCRDSAC	TWG	By January 16-17 meeting

The TWG will next meet on November 8, 2007 in Charlotte, NC. The TCRDSAC will next meet on December 5-6, 2007 in Washington, DC.

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 – Meeting Attendees

Attachment D – Sharon Roy’s presentation “Waterborne Disease and Outbreak Surveillance”

Attachment E – Christine Moe’s presentation “Overview of Endemic Illness Information and Implications for Possible Public Health Risks from Drinking Water”

Attachment F – Joseph Eisenberg’s presentation “Frameworks for Estimating Risks Associated with Drinking Water”

Attachment G – Ms. Charlotte Smith’s presentation “Waterborne Disease Outbreaks: Lesson Learned”

Attachment H – Mr. Doug Owen’s presentation “Initial Insights on Compliance Information”

Attachment I – Mr. Owen’s presentation “Relative Rates of Incidence of Total Coliform and *E. coli*—Preliminary Analysis for TCR.”

Attachment J – Gary Burlingame’s and John Schelten’s presentation “TCR Compliance Monitoring: Large Systems vs. Small Systems”

Attachment K – Patti Fauver’s presentation “The Sanitary Survey”

Attachment L – Mr. Owen’s presentation “The Linkage Between the Ground Water and Total Coliform Rules”

Attachment M – Mr. Owen’s presentation “Distribution System Issues: Research/Information Needs”

* 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
October 17-18, 2007
Meeting Attendees***

Henry Anderson, Council of State and Territorial Epidemiologists*
Sarah Bahrman, US EPA
David Baird, National Rural Water Association*
Zeno Bain, US EPA
Pamela Barr, US EPA*
Jeremy Bauer, US EPA
Elin Betanzo, US EPA
Gail Bingham, RESOLVE
Eric Bissonette, US EPA
Manja Blazer, IDEXX
Kevin Bromberg, SBA
Erica Brown, Association of Metropolitan Water Agencies*
Gary Burlingame, Philadelphia Water Department
Jimmy Chen, US EPA
James Cherry, City of Virginia Beach Public Utilities
Sean Conley, US EPA
Cesar Cordero, US EPA
Joe Cotruvo, Joe Cotruvo & Associates
Cynthia Dougherty, US EPA*
Joseph Eisenberg, University of Michigan
Patti Fauver, Environmental Council of the States*
Michael Finn, US EPA
Rich Giani, DC Water and Sewer Authority
Kathy Grant, RESOLVE
Tom Grubbs, US EPA
Yu-Ting Guilaran, US EPA
Trish Hall, US EPA
Curtis Haymore, Cadmus Group
Christine Maloni Hoover, National Association of State Utility Consumer Advocates*
Mary Howell, Backflow Management, Inc.
Dan Kroll, HACH Homeland Security Technologies
Mark LeChevallier, National Association of Water Companies*
Debbie Lee, RESOLVE
Frank Letkiewicz, Cadmus Group
Carrie Lewis, American Water Works Association*
David Lipsky, NYCDEP/Bureau of Water Supply
Gary Lynch, National Association of Water Companies*
Erica Martinson, Inside EPA
Mike Messner, US EPA
Harvey Minnigh, Rural Community Assistance Partnership*

Christine Moe, Emory University
Jini Mohanty, US EPA
Ed Moriarty, US EPA
Russell Navratil, County of Henrico, VA
Eva Nieminski, Environmental Council of the States*
John Neuberger, Council of State and Territorial Epidemiologists*
Darrell Osterhoudt, Association of State Drinking Water Administrators*
Doug Owen, Malcolm Pirnie
Michèle Prévost, Polytechnique Montréal
Jim Purzycki, American Backflow Prevention Association
Lisa Ragain, Center for Risk Science and Public Health, George Washington University
Graciela Ramirez-Toro, CECIA-IAUPR
Stig Regli, US EPA
J. Kevin Reilly, US EPA
Alan Roberson, American Water Works*
Mark Rodgers, US EPA
Ken Rosenfeld, National League of Cities*
Kenneth Rotert, US EPA
Sharon Roy, Centers for Disease Control and Prevention
Rick Sakaji, East Bay Municipal District
Tom Schaeffer, Association of Metropolitan Water Agencies
John Scheltens, American Water Works Association
Nicole Shao, US EPA
Charlotte Smith, Charlotte Smith & Associates/UC Berkeley
Vanessa Speight, Malcolm Pirnie
Anne Spiesman, Washington Aqueduct
Scott Summers, University of Colorado at Boulder
Tamara Thies, NCBA
Lynn Thorp, Clean Water Action*
Bruce Tobey, National League of Cities*
Steve Via, American Water Works Association
Bob Vincent, National Environmental Health Association*
David Visintainer, Association of Metropolitan Water Agencies*
Paul Whittemore, National Rural Water Association*
Beate Wright, Loudoun County Sanitation Authority, Virginia
Mae Wu, Natural Resources Defense Council*
Yvonne Yuen, US EPA

* TCRDSAC Member or Alternate