M/DBP Stage 2 Federal Advisory Committee (FACA2) Distribution Systems & ICR Data Analysis (12 months)

MEETING SUMMARY

Meeting #6

October 27-28, 1999
Washington, DC

December 27, 1999

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I Introduction

On October 27-28, 1999, EPA held the sixth meeting of the Stage 2 Disinfection Byproducts and Long-Term 2 Enhanced Surface Water Treatment Rules (MDBP) Federal Advisory Committee (FACA). This meeting included presentations by the Technical Work Group (TWG) on twelve months of ICR data, overviews of distribution system issues and non-ICR data collection, and substantial time spent in caucusing and conversation among FACA Committee members. [See Attachment I.a for a list of meeting participants.]

After introductions, mediator Abby Arnold, RESOLVE, reviewed the objectives of this meeting:

- Present analyses of 12 months of ICR data on DBPs and pathogens

- Provide overview of non-ICR data collection
- Provide an overview of management practices for maintaining water quality in distribution systems
- Describe the risks associated with cross connections and characterize backflow prevention programs

The Committee approved the agenda as proposed [See Attachment I.b.] The afternoon of October 27 consisted of caucus time in which FACA members met among themselves. This meeting report summarizes the presentations and plenary discussions, and proposed next steps from this meeting.

II TWG Presentation to FACA Committee - Analysis of 12 Months ICR Data

Michael McGuire, MEC, and Michael Messner, EPA, presented the TWG's report to the FACA committee. The TWG has completed initial analysis of 12 months of ICR data. McGuire and Messner reminded FACA members that their presentations were developed by the TWG and that in presenting this information they would be acting as reporters from the TWG to the FACA. Information presented represents the consensus opinion of TWG members.

Microbial Contaminants

Messner began by presenting the analysis of microbial data from the ICR and Supplemental Surveys, identification of indicator relationships and trends in the data, and next steps for the Microbial Contaminants TWG Subgroup [Attachment II.a.] The Subgroup is focusing on the following microbial contaminants: coliforms, viruses, and protozoa (*Cryptosporidium* and *Giardia*). In response to a question, Messner explained that surveys for protozoa use a visual microscopy technique to identify protozoa in samples. The low recovery rate of this technique is attributed to lost oocysts or unseen oocysts. There is disagreement among subgroup members regarding the accuracy of the method and how to best correct for recovery. Viruses are identified using a cell culture technique that uses larger sample sizes than protozoa. Messner also explained that the subgroup has focused on raw water data only.

Twelve months of ICR and six months of Supplemental Survey data are now available and data analysis has begun. In response to a question, Messner explained that the Supplemental Survey used only five or six labs, a tighter filter and other enhanced factors (as compared to the ICR method) for detection of microbes. The Survey included 47 ICR, 40 medium sized and 40 small sized systems. Protozoa data were not collected for small systems. Messner presented graphics on the subgroup's analysis of these data and noted the following trends:

- Both ICR and Supplemental Survey data indicate somewhat more microbial pathogen occurrence for flowing streams than for reservoirs and lakes. In response to a question, Messner noted that confirmation of a trend and possible explanations have not yet been discussed by the Subgroup. Though this appears to be a trend, some reservoirs and lakes have occurrence means (individual source water averages for 12 months) that compare to the highest means for flowing streams.
- ICR Pathogen occurrence levels are lowest for virus and greatest for *Giardia* (not recovery-adjusted).
- Regarding ICR protozoa data, the Subgroup expects to see fewer source waters (plants) that produce all zeros for 18 months than for 12 months. In response to a question, Messner explained that he would expect the rate of new detects (in plants formerly having all-zeros) to taper off as new data is integrated into the data set.
- The Subgroup anticipates fewer source waters (plants) producing zeros because of the higher detection rates for protozoa of the detection method used in the Supplemental Surveys.

The subgroup is exploring whether there are meaningful relationships between *Cryptosporidium* and *Giardia* and other characteristics of a water type in order to develop indicators of microbial pathogen occurrence:

- Anticipated higher occurrence in Spring (due to runoff) has not been observed in ICR data. The subgroup will continue to investigate whether there are any temporal trends.
- The subgroup is currently looking at one variable (e.g., temporal pattern, location, source water type, etc.) at a time. A statistical model is being developed to allow investigation of the effects of more than one variable on protozoa occurrence.

Messner presented the TWG list of 18 priority questions identified for the subgroup to address (see Attachment II.a).

In response to a question, Messner noted that the large number of zeros, or non-detects, may be the result of small volumes analyzed. The Subgroup will approach the meaning of zeros on two simultaneous analysis paths. These approaches will be used to answer questions and then be compared to see how answers differ and why:

1. The data point incorporated into the analysis is zero. *This approach does not deal with the uncertainty of zero.*

2. The true concentration may (or may not) be greater than zero. *This approach deals explicitly with uncertainty of the zero.*

In conclusion, Messner made the following points:

- The Microbial Occurrence Subgroup is "data rich", though still "information poor".
- Supplemental Survey data will have a higher percentage of detects for protozoa than ICR data.
- The Subgroup has a high level of activity with many highly motivated participants, weekly conference calls, and an upcoming meeting on November 12.

A FACA member observed that it is curious that 40 to 50% of virus samples have a one detect. The Subgroup has not yet looked in to explanations for this finding.

ICR Data Summary

McGuire continued the TWG presentation by reviewing source water quality, enhanced coagulation, specific disinfection byproducts (DBPs) and TWG next steps [Attachment II.b.] McGuire began by noting that the primary Auxilliary data base (Aux 1) and Aux 3,4,5 & 6 are all on-line. The query tools, Aux 2 and Aux 8, are still under development. Data presented is for 12 months (4 quarters). ICR data has a high number of samples; some are collected monthly and some quarterly. ICR sampling is done on a plant basis and may include blends of more than one source type. Compliance is calculated based on a system, rather than a plant, basis.

McGuire made the following clarification points regarding presentation slides and graphics on ICR data analysis (See Attachment II.b.):

- *TOC -- Surface vs. Groundwater*: There are substantial outliers. Many of these challenged systems are located in the Southeast and West. In response to a question on variability among plants, McGuire explained that more plants are relatively constant, though there are some rare plants that vary widely. In response to questions from the FACA McGuire noted:
- A TOC level of 3 is the median, 4 is high.
- Analyses by State are difficult because of the small number of samples in many states.
- Observed trends have been verified by plotting data in different ways and by the use of non-ICR data, including additional data on the Florida aquifer.

- *Bromide -- Surface vs. Groundwater*: Groundwaters have significantly higher bromide than surface waters. This is related to saltwater intrusion along the coast. In response to a question McGuire noted that any sample less than detection level is calculated as a zero.
- *Secondary Disinfectant Use by Influent TOC Concentration*: Generally, as water quality becomes more challenging (higher TOC) plants move to chloramine as a secondary disinfectant to meet DBP standards.
- *Enhanced Coagulation*: Approximately 70% of ICR plants already meet the Stage 1 enhanced coagulation requirements.
- *Percent of Plants Meeting Removal Targets*:
- A larger percentage of plants with low TOC source waters do not meet Stage 1 DBP standards than plants with higher TOC source waters.
- The ICR did not provide information on all criteria needed to determine compliance under Stage 1 DBP rule, so this data does not account for actual level of compliance.
- This analysis does not include a margin of safety.
- In response to a question McGuire noted that a TWG Subgroup has been formed to look at outliers to understand, based on engineering judgement, what these plants need to do to meet standards.
- *TTHM in Distribution System*: While the vast majority of systems are below the Stage 1 DBP standard (80 ppb), some are drastically higher. ICR data may differ from regulatory standards due to: different location of sampling (ICR looked for maximums) and averaging (under Stage 1 utilities may average between seasons and blend between different source waters). Many systems used the same sampling points for the ICR as for the regulation, therefore broad distribution is representative, however data for individual plants may differ.
- *TTHM Surface vs. Groundwater*: There are generally lower TOC levels in groundwater, and in turn, lower levels of DBPs. The Florida effect of groundwaters with relatively high THMs is clear in the upper tail of the distribution.
- *HAA5 Surface vs. Groundwater*: Though summer levels were expected to be the highest due to warmer weather, they were not as high as spring levels. This may have important regulatory consequences because small systems are currently sampled during the warmest month of the year to gauge the maximum HAA occurrence.
- *Bromine incorporation into HAAs*: HAA9 are unstable in water so little data exists. Stage 1 regulated HAA5 only. HAA6 may be a significant percentage of HAAs in waters with high bromide concentrations. HAA9 occurs in a relatively consistent amount in waters with varying bromide concentrations.
- *TTHM vs. HAA5*: Data is collected for plants, not systems. Approximately 9 percent of plants exceed HAA5 standards (60 ppb) and 5% exceed THM standards (80 ppb). System-wide averages are generally 15-17% lower than plant averages.
- *Surface Water System Running Annual Average DBP Levels*: A greater percentage of surface water plants exceed standard levels than do groundwater plants - except for problem areas (e.g. Florida).
- *Delta TTHM for 12-months of Distribution Sampling*: Delta is the calculated change in TTHM levels between the entry point into distribution system and the maximum distance to a customer (tap). Free Chlorine (Cl2) in distribution systems tend to increase the creation of TTHMs. However, delta depends on primary treatment. If Cl2 is added as primary treatment then TTHM creation occurs within the plant. Optimizing treatment requires balancing different characteristics of control options. Chloramines are often used as a secondary disinfectant because they produce fewer DBPs. Delta measures change, not an absolute number, so a plant with a high delta may still have a low total concentration of DBPs.

Next Steps for the TWG include:

- Prepare Stage 1 baseline for FACA by December/January meeting
- Present results from the other Auxiliary databases - sludge production and washwater
- Present compliance forecast analysis concepts at December FACA meeting - develop vocabulary
- Present preliminary results of GAC and Membrane studies - December or January

III Status Update on Health Risk Assessment (DBPs/Micro)

Stig Regli, EPA, presented an overview of the Health Risk Assessment for DBPs and microbial pathogens for development of the Stage 1 Rules and final Stage 1 Rules. Regli also covered EPA's current understanding of risk and anticipated research in the near term [Attachment III.a.] Regli began with overviews of maximum contaminant level goals (MCLGs) and maximum residual disinfection level goals (MRDLGs) for DBPs, the 1994 regulatory impact analysis (RIA) and microbial risks (*Giarida, Cryptosporidium,* and viruses). Regli also reviewed the M/DBP Research Plan for DBPs and microbial pathogens and specific research completed between 1994 and 1998. *Cryptosporidium* has been a focus for microbial research because it may be an indicator of overall microbial protection.

EPA will provide health risk characterizations for DBPs and pathogens to the FACA over the next several months. The Agency will conduct more formal risk assessments to support the proposed and final rules. EPA believes that existing health effects data suggests enough of a risk from DBPs and microbial pathogens to require that the Agency evaluate how to reduce risk and the cost implications of different risk reduction options. EPA does not expect the risk assessment for DBPs to provide any more confidence regarding what existing studies indicate. Two experts who have previously presented to the FACA, Rochelle Tyl, RTI, and John Reif, Colorado State University, have been asked by EPA to provide the Agency with toxicological and epidemiological evaluations of the reproductive and developmental health effects database. [See Attachments III.b and III.c for Scopes of Work for Tyl and Reif.] These experts where chosen, in part, because of their perceived neutrality.

The evaluations by Tyl and Reif are **not** the risk assessment, but preliminary technical appraisals of the cumulative database. Though there is not much new data, this effort will be more detailed than that required for the FACA presentations. EPA will share the findings of these experts with FACA members as soon as they are available. Tyl and Reif may also be available to provide FACA members additional information or instruction on their reviews of the database.

In addition to the presentation materials Regli made the following points:

- Dose response data based on the Iowa strain indicates that *Cryptosporidium* may be 70% more infective than first thought. The more recent analysis of the Iowa strain data included people infected with and without symptoms. Shedding of oocysts in stool is the most common method of determining infection. However, some people may be infected without shedding oocysts. A FACA member suggested that the problem may be with the detection method and that more sophisticated detection methods would find cysts in these cases.
- Data shows that a significant percent of US population (25-35%) have antibodies indicating that they have been exposed to *Cryptosporidium* oocysts.
- Rates of secondary spread vary greatly between age categories with low rates for adults and high rates for children.

In response to a question, Regli noted that EPA now has better characterization of source water, treatment (filtration efficiency), and dose response information (data for new strains). Understanding of uncertainty levels has improved based on research. In response to a question on the level of confidence in existing data, Regli explained that EPA is reevaluating existing data as well as new research to evaluate the extent to which the characterization of risk from Cryptosporidium may change from previous estimates (i.e., those conducted for IESWTR). EPA intends to present the first parts of this characterization during the next two FACA meetings.

IV Regulatory Issues Involving Distribution System Management and Finished Water Storage

Dan Schmelling, EPA, presented existing distribution systems regulations and an overview of distribution system issues [Attachment IV.] The existing regulations covering water distribution systems include:

- Total Coliform Rule (1989): Limits microbial contamination of potable water distribution systems.

- Lead and Copper Rule (1991): Limits corrosion of lead and copper from plumbing and solder into drinking water. A FACA member noted that MDBP rules, (e.g. adding coagulant) may change the pH of water and effect compliance with this or other rules.
- Surface Water Treatment Rule (1989): Includes provisions for control of microbial regrowth.
- Interim Enhanced Surface Water Treatment Rule (1998): Requires sanitary surveys, which include distribution system information, and requires that all new finished water reservoirs be covered.

V Distribution Systems and Water Quality

Gregory J. Kirmeyer, Economics and Engineering Services, Inc., presented an overview of distribution and storage system maintenance issues [Attachment V.]

Kirmeyer was asked to answer five questions for the FACA:

Question 1: What are typical characteristics of potable water distribution systems and what engineering issues underlay their design?

Kirmeyer began by reviewing key components and characteristics of a distribution systems [see attachment.] Distribution systems, historically, have been designed primarily to meet flow, pressure, and storage requirements for emergency and future development needs, not water quality concerns. Maintaining water quality is now recognized as an important element. Each system is unique and has individual needs and problems. A major component of distribution systems is continual maintenance. In summary:

- Each "system" is unique in its design, operations and maintenance requirements.
- There are many places to check for design guidance - state standards, state design manuals, AWWA and AWWARF guidance.

Question 2: What are the steps which utilities take to maintain water quality in the distribution system?

Kirmeyer based answers to this question on three AWWARF reports [see Attachment]. Water quality is affected by physical, chemical and microbiological parameters. To maintain water quality Kirmeyer recommends that utilities set internal operational performance guidelines/targets. These guidelines include: maintain positive pressure, minimize detention time, maintain disinfection residual, keep distribution system clean, provide treatment, set goals and monitor beyond regulations. Utilities should clearly design operation and maintenance of distribution system with water quality in mind. These designs need to be fully integrated with utilities' water quality programs. Kirmeyer also noted new data on micro-surges caused by hydrant openings and closings that may result in low or possibly negative pressures. Water is incompressible, therefore negative pressures can be formed. Air vacuum relief valves are one place where vacuums in the system may siphon water.

Question 3: What roles do capital improvement and line replacement play in maintaining distribution system water quality?

Roles of capital improvement and line replacement are unique for each utility and are system specific. Priority capital improvements include:

1. Improving problem areas with low pressure - *top priority.*

2. Replacing/rehabilitating tuberculated (choked off or corroded) pipe. In response to a question Kirmeyer explained that most utilities replace pipe based on repair history.

3. Addressing piping that leaks/breaks at excessive rates: emergency repairs are a source of intrusion and leaks are potential pathways for backflow.

4. Addressing storage facilities: reduce potential for intrusion.

5. Addressing monitoring and control systems: real time data especially for remote operations.

Question 4: What are the causes of microbial regrowth in distribution systems and how can it be controlled?

Causes of microbial growth within the distribution system include:

- Passage through treatment plant and colonize in system
- Reactivation of injured organisms
- Contamination from new construction
- Contamination from main repair procedures
- Contamination during a depressurization event
- Backflow (cross-connection)
- Back siphonage (cross-connection)
- Uncovered storage facilities
- Penetration into storage facilities

Control measures include:

- Remove organisms from source
- Provide effective primary disinfection (i.e., no injured organisms to regrow)
- Maintain positive pressure
- Maintain secondary disinfectant residual
- Consider a switch to chloramines
- Optimize chloramine treatment
- Reduce detention time in storage and distribution systems
- Select water with lower temperatures
- Reduce pathogen intrusion potential
- New main procedures
- Sanitary repair procedures
- Flushing to keep system clean
- Provide corrosion control

Question 5: What are the risks, benefits, and other implications of systems switching to chloramines as a residual disinfectant?

Chloramines are produced by adding ammonia to chlorine.

Drawbacks of Chloramination:

- The presence of ammonia may lead to the potential for nitrification. Many utilities periodically switch to free chlorine to rid systems of chloramine resistant bacteria - this is possible under current DBP rules because averaging.
- Residual Depletion
- Proliferation of Bacteria
- Adverse effects on fish rearing and kidney dialysis

Benefits of Chloramination:

- Low Potential--DBP/THMs/HAAs
- Minimal T & O
- Persistence--Remote areas
- Effectiveness--Biofilms

Summary:

- Chloramination has many benefits but requires very careful treatment, operation, and maintenance of distribution system, plus public awareness of change.

FACA members made the following additional comments regarding distribution systems:

- Utilities recognize that distribution systems are equally or more complex than treatment systems. Focus has been on treatment though distribution system conditions may have a very large effect on water quality.
- Distribution systems have not had the same prevention, treatment or reliability standards as treatment systems. This may be because of the enormous cost of maintenance and replacement of distribution systems - approximately $1/2 million per mile.
- Centers for Disease Control reports indicated that 1/4 of waterborne disease is associated with distribution system failure.
- Pathogens in distribution systems may be protected from disinfectant residuals because they are resistant or they are protected by biofilms.
- EPA has added cross-connection control to a list of priority issues based on feedback received during Enhance Surface Water Treatment Rule public comment.
- Emphasis should be on the importance of good management practices. The FACA should look at opportunities to balance distribution system characteristics and procedures with treatment requirements.

FACA members made the following additional comments regarding the use of Chloramines as a secondary disinfectant:

- Fewer small systems are using chloramines.
- Research into the health effects (cancer and epidemiology) of Chloramines is included in the Notice of Data Availability for the Stage 1 rule.
- Ammonia gas presents an additional risk in the use of Chloramines (Chloramines are chlorine + ammonia). However, solid and liquid ammonia can be substituted for gas.
- Chloramines are less effective against viruses.
- Chloramines are very effective against bacterial regrowth in the distribution system.
- Free chlorine may be a better indicator of intrusion than chloramines.

VI Distribution Systems Presentation

Paul H. Schwartz, Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California (USC FCCCHR), presented an overview of the hydraulics of backflow, control measures, and incidents [Attachment VI.] The USC FCCCHR was established in 1944 to investigate backflow occurrences and develop prevention measures. Schwartz provided graphics illustrating backflow, cross-connections and prevention technologies:

- Backflow is the undesirable reversal of flow of water or other substances into the potable water distribution supply.

- Cross-connection is an actual or potential connection between a potable water supply and any non-potable substance or source.

There is little monitoring for contamination of water systems through backflow and cross-connection and events are rarely detected or documented. Schwartz reviewed the effects of four individual incidents and their effects and occurrence data and drew the following summary points:

- Backflow is a real problem - solids, liquids and gasses can all be drawn into a system.
- Transient in nature (occurs in large and small volumes) - incidents can be system-wide or internal, effecting individual users.
- All water systems are susceptible
- Consequences may be severe
- A missing barrier in a multi-barrier approach to water quality may be distribution system protection and effective cross-connection control and backflow prevention.
- In addition, Schwartz noted that some types of backflow prevention assemblies provide a visual indication of operation . Technologies for controlling backflow are available and do work. The increasing use of separate potable and recycled water systems (dual plumbed systems) may present new problems in ensuring that systems remain separate. In response to a question, Schwartz noted that codes and enforcement are not uniform and depend on State, region, or city variances.
- Backflow events are often not detected, are hard or impossible to trace, and are influenced outside of the distribution system by industrial sites or residents.

VII Cross Connection Control Programs

Ken Ashlock, City of Tempe, AZ, presented an overview of backflow prevention programs [Attachment VII.] Ashlock began by reviewing the need for legal authority and personnel training necessary for administering a cross connection control program. Cross connection control programs typically include:

- Hazard surveys: to identify and inspect facilities that may pose a significant hazard from cross connections (e.g. animal care facilities, car washes, hospitals and mortuaries, semiconductor facilities.)
- Public education: to raise awareness of the problem of cross connections through brochures, bill stuffers, informational meetings, and comic books.
- Installation and testing of assemblies: control assemblies should have been through a performance evaluation, be installed correctly, and be maintained and tested regularly by trained personnel.
- Record keeping: on types, operation and maintenance of equipment and type of hazard on premises; and compliance, correspondence, and actions related to the site.
- Incident reporting: written procedures for recording backflow incidents.

Ashlock reviewed the elements of cross connection control programs around the country. Their costs and program requirements differ between states. Some systems have cost recovery programs, including specific user fees for cross connection control.

Key elements of a State program include: establish legal authority, training, public education, record keeping, and enforcement. 96 percent of states have a minimum requirement for cross connection control in their State code. Only 38 percent of States require reporting of backflow incidents.

VIII TWG Non-ICR Subgroup: Overview of Approach to Characterizing Non-ICR Systems

At the request of FACA members, Stig Regli provided an overview of the TWG Non-ICR subgroup's approach to characterizing Non-ICR systems [Attachment VIII.] Non-ICR systems are divided into subgroups for analysis by source and size:

- Medium groundwater (GW) systems (serving 10,000-100,000 people)
- Small GW systems (serving <10,000)
- Medium surface water (SW) systems (serving 10,000-100,000)
- Small SW systems (serving <10,000)

Regli presented breakdowns of the percentage of US population served by ICR, and Non-ICR systems (including the subgroups above), and the total number of systems in each category. Key data sources of data for drinking water systems include:

- SDWIS
- ICR
- Supplemental Surveys
- Disinfection Surveys (evaluates operation of systems)
- Water Stats (treatment technology)
- Bromide Survey (GW systems, small number of sites)
- NRWA DBP Survey (Evaluates small system DBPs, data will be used to evaluate Water Treatment Plan model and cold water verses warm weather data. Information will be used in impact analysis of Stage 2 Rule Proposal.)
- Ground Water Supply Survey (EPA study of TOC in finished water, 500 systems)
- Community Water Supply Survey
- Needs Survey
- State Data

Regli reviewed the TWG subgroup's data analysis approach for each of the four non-ICR system subgroups [See Attachment VII]:

- Medium SW systems: Analysis will be similar to large systems, based primarily on ICR.
- Small SW systems: Cannot be directly extrapolated from large system information, partially due to differences in DBP precursors. EPA has developed a list of 12 model plants that characterize small system universe and will use these to estimate Stage 1 and pre-Stage 1 baselines.
- Medium and Small GW systems: Based on extrapolation from ICR groundwater system data. Effect of THM data from Florida is large factor - 30% Florida small systems exceed Stage 1 THM standard. Treatment for GW systems is expected to be similar for all system sizes because treatment is specific for each well - larger systems have more wells.

The TWG Non-ICR subgroup schedule for developing and providing information to the FACA:

- December 1999 - Present results of pre-Stage 1 baseline conditions to FACA.
- January 2000 - Present results of Stage 1 impacts analysis to FACA (small SW systems analysis in February)
- TBD - Present results of Stage 2 impact analysis to FACA

In response to a question, Regli explained that the subgroup expects that the Supplement Survey will identify small system source water characteristics to adjust model. New data is available on small systems that should allow for a "fairly good" impact analysis.

IX Report-outs from FACA Caucus Sessions

In the afternoon of October 27, FACA members split into three cross-caucus breakout sessions. Participants in the breakouts were chosen so as many perspectives as possible were represented in each breakout group. The purpose of breakout groups was to allow FACA members and alternates to discuss openly any aspect of Stage 2 Rule development and the work of the FACA. On October 28 each group informally presented an overview of their discussion. These presentations are summarized below:

The group in the large conference room listed the following as points that the FACA could consider in its discussion:

- Operator competency
- Best Management Practices for distribution systems
- Importance of affordability/costs - especially once alternatives are identified
- Recognition of public health concerns regarding byproducts and microbial pathogens.
- Need for cost characterization of treatment technologies, options for all system sizes.
- Maybe the TWG could provide estimates of costs per system size for a given technology. This would give information on cost impact for each system size and technology. Marginal cost is hard to characterize on a National basis.
- Explore multiple barriers including surface water protection for microbes.

The group in the middle conference room listed the following points:

Perspectives to consider - *components of an effective regulatory system:*

- Establish a floor to ensure protection based on sound science and health information - bring outliers to the minimum standard.
- Optimize the operation or treatment and distribution systems (tweak zone) to meet or exceed the floor.
- Provide incentives for technology to advance and be incorporated by utilities for expansion, replacement, or updating of the system.
- Prevention verses treatment: understanding of unintended consequences and reducing regulatory burden.

Issues to consider:

- Should there be different regulatory requirements for flowing streams, reservoirs or lakes?
- Is there enough health effects information to justify a change in treatment technology?
- How can we best address risk issues in the distribution system as part of a holistic view of the water treatment and delivery system?
- Should we consider a maximum or cap for DBPs?
- What additional reduction of DBP levels can be achieved from Stage 1?
- What would a risk based requirement for the inactivation of *Cryptosporidium* look like?
- How do we improve reliability/assurance of performance of systems?
- What is the role of source water protection in a multiple barrier approach?
- Can microbial issues be addressed by dealing with operational anomalies?
- Should standards be based on surrogates or individual contaminants?
- Are there win/win approaches to reduce microbial and DBP risk simultaneously while looking at water sources, technology, and distribution systems.
- What is the cost, in terms of health effects, of not acting now and how does this balance costs of adjusting treatment technology?

The group in the conference room "behind the desk" listed the following discussion points and comments:

- Desire to flesh out treatment options.
- A desire to keep in mind public health and operational goals.
- Develop several specific outlines or lists of key issues to be discussed or focused on.
- Need to seek integrated strategies that incorporate prevention, treatment and reliability.
- Analysis of the acute, subacute, and chronic health effects of disinfection, including reproductive effects and malignancies.
- Cognizance of new knowledge about *Cryptosporidium* health effects and disinfection possibilities.
- Desire to acknowledge clean water sources in the regulations.
- Cost and acceptance issues.
- Recognize the financial, managerial, technical and other difficulties faced by small, especially rural, utilities.
- This regulatory process may only be a small step in a prolonged regulatory process that stretches over years.

X Next Steps

FACA members discussed the following next steps:

- Some FACA members requested assistance understanding health effects data and reviewing the critique of evaluations undertaken for EPA by Rochelle Tyl and John Reif on reproductive and developmental effects. [See Attachments III.b and III.c for Scopes of Work for Tyl and Reif.] Tyl and Reif may be available to provide FACA members with additional information or instruction on their reviews of the existing database.
- Fred Hauchman has presented additional health effects research that is planned or currently underway at previous FACA meetings. There will an opportunity for a Notice of Data Availability (NODA) in August 2001. The FACA may agree to meet in late summer 2001 to discuss new information. EPA, however, is under a time constraint for proposal development.
- December meeting will be one year anniversary of Stage 2 FACA.

XI Public Comment

Two speakers addressed the FACA during the public comment period on October 28:

Mike Doherty, Water Program Manager, U.S. Marine Corps, asked that the FACA look carefully at issues surrounding DBP in the distribution system. Many distribution systems are currently in a state of "crisis management." One recent positive step was EPA's guidelines for State water utility operator certification, including distribution system operator certification. The FACA should consider:

- Manganese contamination has been a problem at groundwater systems in California, though it is not included in the DBP rules.
- States have a broad range of regulations regarding operation and management. To date this has not been included in the scope of the MDBP FACA. FACA should look to equilibrate at operation and maintenance requirements through States - especially for distribution systems.

Caroline Cinquanto relayed the story of her child, who was born with a congenital heart defect. Though there is no way to know the cause, Ms. Cinquanto asked the FACA to consider that if drinking water was a contributing factor, the FACA should act to reduce these risks.

Adjourn

XII **ATTACHMENTS**

I.a Participants List

I.b Meeting Agenda

II.a Microbial Occurrence (Report from TWG Subgroup) - Michael Messner, USEPA - OGWDW

II.b TWG Presentation to FACA Committee -- ICR Data Summary - Michael J. McGuire, MEC

III.a Status Update on Health Risk Assessment (DBPs/Micro) - Stig Regli, EPA

III.b Scope of Work - Rochelle Tyl, RTI

III.c Scope of Work - John Reif, Colorado State University

IV. Regulatory Issues Involving Distribution System Management and Finished Water Storage - Dan Schmelling, EPA

V. Distribution Systems and Water Quality - Gregory J. Kirmeyer, Economic and Engineering Services, Inc.*

VI. Distribution Systems - Paul H. Schwatz, Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California*

VII. Cross Connection Control Programs - Ken Ashlock, City of Tempe, AZ,*

VIII. TWG Non-ICR Subgroup: Overview of Approach to Characterizing Non-ICR Systems - Stig Regli, EPA

**note:* due to the size of these presentations they have been printed with 6 slides per page. If you would like larger copies of the slides, or electronic versions of these presentations please contact Eddie Scher at [escher@resolv.org].