U.S. Environmental Protection Agency
RESEARCH AND INFORMATION COLLECTION PARTNERSHIP
STEERING COMMITTEE MEETING

September 22-23, 2009

Meeting Summary

***Meeting Objectives/Desired Outcomes*:**

- Review draft Research and Information Collection Agenda (R&IC Agenda) and criteria, and provide comments on proposed initial high priority projects for possible implementation by the partners in the near term, and
- Learn about current research and information collection activities underway by EPA, the Water Research Foundation, and CDC and how these activities relate to the initial priorities identified in the draft Agenda.
- Discuss plans for completing the final Research and Information Collection Agenda and objectives for April 2010 meeting

I. Key Decisions

	Subject	Decision
1	Project Description Development	Develop project descriptions for storage and cross-connection control
2	Project Prioritization	• High priority projects: Sur1, Pre2, Hea2, and new projects for storage and cross connection • Develop storage and cross connection project descriptions • Revise project descriptions for Pre2, Sur2 and Sur4. • All projects to be prioritized scoring system once it is revised and accepted by SC

II. Key Next Steps

	What	Who	When
1	Identify additional high priority data gaps for Tier 1 issues	Steering Committee	By October 9
2	Provide additional comments on the text of the Research and Information Collection Agenda	Steering Committee	By October 9
3	Develop project descriptions for cross-connection control and storage	Developers	By October 23
4	• Revise the project descriptions for the initial high priority projects listed in the table above (start with Pre2);	Developers	By October 23

	• Develop knowledge goals/overarching questions for each; • Rework descriptions for Sur2 and Sur4		
5	Revise scoring system	Developers	By October 23
6	Hold SC conference call to provide feedback on: • Revised project descriptions, including knowledge goals; • New scoring system	Steering Committee	1st week in November
7	Develop a "straw" communication plan	Partners	By January
8	Schedule April meeting of SC	RESOLVE	ASAP

III. Welcome, Introductions, Meeting Objectives and Agenda[1]

Representatives of the Research and Information Partnership (RICP) partners welcomed participants to the meeting of the RICP Steering Committee and thanked Steering Committee members and the developers for the time and effort they have put into the process. Chris Rayburn, Director of Research Management for the Water Research Foundation (the Foundation), noted that the partners hoped to come out of the meeting with a good sense of whether or not they were on the correct path. He added that the partners have acknowledged the Steering Committee's desire for more input into the process, and the agenda for the meeting is focused heavily on open discussion. Because there is an opportunity for the partners to move forward on some projects prior to the research and information collection (RIC) agenda being finalized in April, Mr. Rayburn hoped that the Committee could advise the partners on which projects are the highest priority.

Pam Barr, US EPA Office of Ground Water and Drinking Water (OGWDW), reiterated the importance of each of Mr. Rayburn's comments. She also emphasized the fact that the research and information collection agenda is a draft and that the partners are anxious to hear the Steering Committee's input.

Kathy Grant, the meeting facilitator, reviewed the meeting agenda, objectives, and materials. She noted that the meeting goal was to provide input on the draft research and information collection agenda and to identify high priority projects for early implementation.

IV. Draft Research and Information Collection Agenda

A. Presentation: "Draft Research and Information Collection Agenda."[2]

Vanessa Speight, Malcolm Pirnie, provided the Committee with an overview of activities since the last Steering Committee meeting in June and briefly summarized the revisions made to the

[1] Please see Attachment A for a copy of the meeting agenda. Please see Attachment B for a list of the meeting participants.

[2] Please see Attachment C for a copy of Dr. Speight's presentation "Draft Research and Information Collection Agenda."

analytical framework process. She then described the development process of the draft Research and Information Collection Agenda. She explained that the EPA and Water Research Foundation developers first identified a list of 182 research and information needs and then divided the list of needs into six categories - two for information collection (surveys, monitoring) and four for research (pressure management, health effects, risk management, contaminants). The developers reviewed the needs in each category and developed a list of projects, 25 in total, to address those needs. Based on a defined set of criteria, the developers ranked the 25 projects and identified six high priority projects - two survey and four research - to consider for early implementation.

During the discussion, members of the Committee made several general comments about the RIC agenda. Some reiterated the importance of focusing on projects that can provide the "biggest bang for the buck" in terms of protecting public health. Also, the partners noted that the projects presented to the SC as high priority were largely judged to be those providing information that was "cross-cutting" to a few of the seven framework topics.

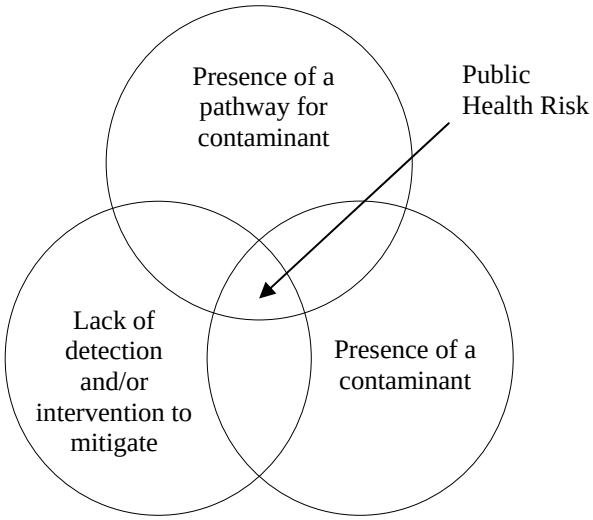
Members noted that the type of research and information collection that is needed may differ depending on whether the expected policy outcome is likely to be regulation, guidance, training for operators, etc. The partners explained that it is not possible to know at this stage what the outcome will be. They noted that one possible outcome is to refine the sanitary survey requirements, an outcome that several members supported as the single most important way of improving public health protection.

A suggestion was made to mine the state database to identify the subset of systems with recurrent *E. coli* and total coliform violations and to target information collection and research efforts on these systems.

During the discussion, members of the Committee made the following suggestions for revisions to the language in the Draft Research and Information Collection Agenda:

- Discuss the Total Coliform Rule/Distribution System Advisory Committee's (TCRDSAC) recommended division of topics into Tier 1 and Tier 2 and where appropriate how these tiers are factored into the RIC agenda. If the tiers are not factored into the RIC agenda an explanation needs to be provided.
- Provide more detailed information on the process used to: identify the initial list of 182 research and information collection needs; develop 25 possible research and information collection projects; and narrow the list of 25 to six high priority projects.
- Since many of the projects seem to be driven by premise plumbing issues, provide a clear explanation of the relevance to the distribution system and to what the water systems and EPA can actually control. (The TCRDSAC determined in its discussions that premise plumbing control was outside its purview.)
- Provide more explanation of how the first two criteria (potential to increase knowledge of public health risk and of approaches to risk mitigation) were applied. Consider including the concept of prevention of risk, not just lessening (mitigation) of risk in the latter criterion.

- Include the diagram below, which shows the three factors necessary for public health risk, in the text of the RIC agenda and in each of the seven research and information collection needs analyses (formerly known as deliverable ones); link the needs and projects back to one or more factors in the diagram.



B. Presentations: Overview of 25 Research and Information Collection Projects by Category.

As Dr. Speight explained in her presentation, the developers initially divided the list of 182 research and information needs into six categories. At the request of the Steering Committee, the developers briefed the Steering Committee on the projects they identified. The Committee's discussion of the projects following each presentation, as well as all other Committee comments on the projects over the course of the meeting, are summarized below.

Survey Information Collection Projects

Melinda Friedman, Confluence Engineering, summarized the activities of the survey project group. Of the 182 research and information collection needs identified, 90 made reference to a survey. The survey group condensed the 90 needs into four projects:

1. Sur1 – a survey of large systems on types of infrastructure and physical conditions, and on which risk management practices are used.
2. Sur2 – a survey of small and medium systems on types of infrastructure and physical conditions, and on which risk management practices are used.
3. Sur3 – follow-up field visits on risk management practices, challenges, and effectiveness; expected to occur after completion of Sur1 and Sur2.
4. Sur4 – a survey of non-utilities (e.g., manufacturers, fire departments, primacy agencies, etc.) on the use and effectiveness of risk management strategies.

Ms. Friedman noted that a "national" survey does not mean a census of every utility in the nation, but rather enough systems to extrapolate a national view.

Steering Committee members made the following comments about survey projects:

- The survey projects should be looked at as "buckets" of information needed. Rather than doing one large survey, consider doing smaller projects and tying the results together.
- It is important that the key terms in the survey are clearly defined. It is also important, in terms of changing professional behavior, that the data generated is useful and fed back to the people contributing the data.
- The small and medium system survey (Sur2) should come after and be informed by Sur1. Because the response rate for the small and medium systems survey is expected to be low, it may be better to target small and medium systems in a few select states in a pilot survey.
- Sur4 should come after Sur1 and Sur2 and focus on the specific safeguards about which more information is needed. Sur4 also should focus on state practices with regard to training.
- Collect information about costs in the surveys.

Pressure Management Research and Information Collection Projects

Frank Blaha, Water Research Foundation, provided a brief overview of the activities of the pressure management project group. Of the 182 research and information collection needs, approximately 18-19 had pressure as a major factor. Out of these, the group identified one survey and three research projects:

1. Pre1 – a one-year survey of water utilities on pressure management infrastructure and operation, and on the occurrence of factors contributing to pressure events.
2. Pre2 – a study on the propagation of pressure events in the distribution system to understand critical controlling factors that limit or extend the events; uses an extended hydraulic or surge model as a tool to help predict both the location of problem areas and what will happen in various scenarios; model results to be verified with field data.
3. Pre3 – a field study on the prevalence of pressure events and the effectiveness of monitoring approaches.
4. Pre4 – develop a toolkit for pressure management that will synthesize the information collected from the previous projects as well as other research efforts, and evaluate the effectiveness of specific mitigation measures.

Steering Committee members made the following comments about pressure management projects:

- There are several concerns related to measuring pressure events: existing monitoring may occur at convenient rather than critical locations; monitors may not pick up short-term pressure events; and monitoring may not occur frequently enough.
- As a result of the concerns noted above, care must be taken if data from one process is used in the analysis of a second process. It would be better to work only with those systems that do critical monitoring.
- For Pre2, there is too much focus on surge models. These models are only useful if you know what to look for and under what conditions. As a "bucket," Pre2 is fine, but the project description should be reworked.

- Consider combining Pre1 and Pre3 into one project with two phases.

Health Effects Research and Information Collection Projects

Frank Letkiewicz, The Cadmus Group, summarized the activities of the health effects project group. Less than 10 of the 182 research and information collection needs were relevant to health effects; however, the four research projects the group developed apply to more than one of the frameworks.

1. Hea1 – a quantitative microbial risk assessment that will make use of the information from the other three health effects studies to compute and characterize the likely incidence of infection and illness, and what portion of those public health cases might be reduced with mitigation strategies.
2. Hea2 – a prospective epidemiological study, applicable to intrusion, cross connections, and main repair, on low or negative pressure events. Researchers will identify systems with a history of pressure events to study over a period of time, try to link those events with adverse health effects, and characterize the differences in mitigation strategies and the health consequences of those differences. There may be a pilot aspect to the study.
3. Hea3 – an events-based study in which teams are trained and prepared to respond to significant events and gather information.
4. Hea4 – a molecular epidemiological study to try to differentiate between organisms, associated with distribution systems and those associated with premise plumbing or other sources outside the system.

Steering Committee members made the following comments about the health effects projects:

- For Hea3, it may be more practical to do a retrospective study and mine the data from past events to determine if there were public health outcomes (e.g., Northeast blackout of 2003). One of the partners noted that there may not be water quality data associated with past events.
- For Hea4, it may be helpful to look at the syndromic analyses, which look at patterns of admission at hospitals, conducted by some large city health departments.

Risk Management Research and Information Collection Projects

Dr. Speight explained that the risk management project group looked at the 40-50 research and collection needs related to risk management and developed five research projects. She noted the risk management category became something of a "catch-all" for research and information collection needs that did not fit into the other categories. The five projects are:

1. RisM1 – a project to develop a big-picture decision support system on risk management practices using information collected from Sur3.
2. RisM2 – a project to build on and improve existing distribution system hydraulic models (an example of a model improvement would be to ensure that the model will not crash when a system depressurizes).
3. RisM3 – a project to collect baseline data to better understand why contaminants from biofilms and sediments are mobilized in distribution systems and to develop tools to prevent this mobilization.

4. RisM4 – a project to track how changes in water quality and operation and maintenance practices impact the release of contaminants from solids and biofilms in distribution systems and storage facilities.
5. RisM5 – a project to develop a next generation water quality model that takes into account everything that has been learned about biofilms and accumulated solids.

One Committee member asked why issuing a boil water notice, which is a common risk management strategy, is not included in the project descriptions. Very little is known about the benefits, costs, and side effects of boiling water. Another member suggested that boil water notices are not a reliable risk management practice if people do not comply with them.

Contaminant Characterization Research and Information Collection Projects

Mark Rodgers, US EPA, explained that the contaminant characterization project developed all the research and information collection needs associated with contaminants into seven projects with the goal of answering two overarching questions:

1. Under what conditions and scenarios do contaminants enter the distribution system?
2. What is the fate or the behavior of those contaminants once they are inside the distribution system?

Mr. Rodgers stated that the products from the seven proposed contaminant projects will include the following information:

- The volume of contaminants introduced into the distribution system through unprotected cross connections and the frequency of contamination;
- Scenarios resulting in the entry of contaminants into the distribution system from storage facilities;
- The fate of those pathogens in storage sediment and release scenarios;
- Guidance for avoiding contaminants during main repair;
- A survey of the range of contaminant levels in soils outside water mains;
- The validation of equation used for estimating intrusion volume based on the type of orifice;
- A greater understanding of the role of biofilms in protecting *Legionella* and *Mycobacterium*; and
- A greater understanding of the role of biofilms in protecting organisms native to the distribution system.

Steering Committee members made the following comments about the contaminant characterization projects:

- Five cities, including Philadelphia, are working with EPA's water security division on contaminant propagation in the distribution system. It could be valuable to take this work a step further and look at the fate and transport of contaminants for which this information is not available.

- Con3, which seeks to characterize breaches in storage facilities, is a low priority project - there is no need to characterize holes when the mitigation is to have no holes. One of the partners explained that part of the intent of the project is to look at how to implement investigation of storage tanks given the risk the entailed in doing so.
- Con5, while interesting, is a low priority.

V. Current and Planned Research Projects Related to RICP Topic Areas

Audrey Levine, US EPA, provided an overview of the US EPA's Office of Research and Development's (ORD) distribution system research. She noted that ORD has a comprehensive program on water infrastructure research which is relevant to several RICP research needs. ORD also has active programs in health effects research, pathogens, biofilms, nitrification, and contaminant accumulation. Distribution system research is also part of the Water Research Program's extramural STAR (Science to Achieve Results) program. In addition, a cooperative agreement with the Water Research Foundation and the Water Environment Research Foundation includes research on distribution systems. During the discussion that followed, Dr. Levine noted that applications for ORD's solicitation for STAR projects are currently under review.

Frank Blaha, Water Research Foundation, summarized the Foundation's current and planned research projects related to the RICP topic areas and the process used to determine research priorities. One example of an RICP-relevant project that has been funded by the Foundation is Fleming, et al, 2006, *Susceptibility of Distribution Systems to Negative Pressure Transients.* This project addressed risk factors that can lead to low pressure incidents or pressure fluctuations, as well as improved pressure management at utilities. The results of this project and related projects have contributed to some of the distribution system optimization approaches being developed in an ongoing Foundation project, "Criteria for Optimized Distribution Systems" to define excellence in distribution system design and operations, and also additional possible follow-on work regarding pressure management being considered for 2010 funding.

Joan Brunkard, Centers for Disease Control and Prevention (CDC), gave an overview of research activities within the CDC related to distribution systems and brief summaries of individual studies currently underway including an epidemiologic study looking at risk for gastrointestinal illness associated with water main breaks, an economic analysis of the recent Salmonella outbreak associated with contamination of a public drinking water supply, and studies looking at the impact of monochloramine introduction on *Legionella* colonization in potable water systems and mycobacteria in healthcare premise plumbing. In the discussion that followed, Dr. Brunkard explained that her summary of CDC activities related to distribution system research included only those studies that had been voluntarily forwarded to her by CDC researchers for inclusion in the presentation.

Mark LeChevallier, American Water, presented his research on managing risks from pathogen intrusion into drinking water systems. He noted several conclusions from his research including the following:

- The coincidence of virus consumption and the duration of the negative pressure event are the most critical parameters driving risk. External virus concentrations, virus infectivity, mixing, or orifice size had little impact of risk.
- Single events of short duration pose little risk
- Maintenance of a free chlorine residual (>0.2 mg/L) provides a protective barrier against low-level intrusions.
- A monochloramine residual (0.5 mg/L) does not have a big impact on Norovirus risk reduction due to the highly infectious nature of the viruses.
- Pressure management to reduce the extent of negative pressure events is particularly important in chloraminated systems.
- Axial dispersion of microbes (through interactions with biofilms) will likely have an important impact on risk and should be studied.

VI. Discussion of High Priority Research and Information Collection Projects.

Following the presentations on the 25 projects (by category) in the RIC agenda and the presentations on current and planned projects, the Steering Committee engaged in a discussion to determine which projects, if any, should be recommended to the partners for early implementation. They discussed the six high priority projects in the RIC agenda and other projects from the list of 25 that should be considered high priority. They also identified gaps in the list of 25 projects.

At the end of their deliberations, the Steering Committee recommended the following list of initial high priority projects (although all projects should be prioritized according to the reworked prioritization criteria once these criteria are agreed to):

1. ***A new project focused on storage;***
2. ***A new project focused on cross-connections;***
3. ***Pre2***
4. ***Hea2***
5. ***Sur1***

They also agreed that the project descriptions for Sur2 and Sur4 should be reworked immediately.

The following is a summary of the Committee's key points related to high priority projects, which, in addition to comments made in the discussion of specific projects (Section III.B.), led to these decisions.

Goal of the Process. Members affirmed the importance of 1) gathering enough information on at least one of the TCRDSAC's seven priority topics to come to a policy decision in five years; and 2) developing a long-term research and information collection agenda. The RIC agenda should include a mixture of short-term and long-term projects.

Storage and Cross Connections. Members noted that there were no specific projects that focused on storage or cross-connections even though both are Tier 1 topics. However, the members recognized that the issues would be addressed in some of the surveys. Given the amount of

information already known about these issues, members commented that there is a high likelihood of gathering enough information to make policy decisions within five years. They also noted the importance of standardized training and promotion of best management practices in addressing both these topics.

Health Effects and Epidemiology. Some members commented that there should be more epidemiological studies, including anticipatory epidemiology, on the high priority list. Others stressed the need for projects that look at health effects related to cross connections and main breaks as a way to get at exposure. Some members suggested including the quantitative microbial risk assessment project (Hea1) as a high priority project, either done consecutively with the epidemiological study (Hea2) or prior to it in order to help in the design of Hea2. In response to a concern about using analytical tools that are based on assumptions and uncertainties in the data to drive policy decisions, it was noted that uncertainty analyses can identify research gaps to reduce the uncertainties.

A member raised two cross-cutting issues not listed as a high priority projects in the RIC agenda: 1) monitoring and detection of pathogens in water (in parallel with epidemiological studies); and 2) looking at the value chlorine residual provides when a contaminant enters the distribution system. The partners explained that monitoring and detection projects did not rank high because of the longer duration of these projects. They also noted that since chlorine residual was not identified by the TCRDSAC as a priority topic, there is not a stand-alone project associated with it; however several projects address the topic indirectly.

The Steering Committee stressed the importance of clearly defining the overarching questions or knowledge goals for each of the high priority projects and expressed an interest providing input into these goals. They also asked that the partners and developers rework the project descriptions to reflect the Committee's discussion and comments.

During the discussion, Mr. Rayburn informed the group that there was still (for about another month) an opportunity for input into the Water Research Foundation's research budget for the next year, and that the projects the Steering Committee considers a high priority could possibly be brought before the Foundation's Research Advisory Committee for consideration. The Foundation can budget for both short and long-term projects. Ms. Barr explained that US EPA ORD planning for the 2011 budget is just beginning, and it is important for the division to know the Committee's recommendations. EPA's budget is on a yearly cycle, so it is not likely that a high priority project that will take 10 years to complete would be included in the budget.

VII. Approach to Completing the Research and Information Collection Agenda

Mr. Letkiewicz gave a presentation "Completing the Research and Information Collection Agenda (with an Illustrative Prioritization Approach)."[3] He reviewed again the steps taken to prioritize projects for the RIC agenda and in particular the various prioritization criteria

[3] Please see Attachment D for a copy of Mr. Letkiewicz's presentation "Completing the Research and Information Collection Agenda (with an Illustrative Prioritization Approach)."

considered. He then gave an overview of one example of a systematic approach – a scoring mechanism – for finalizing the agenda.

Throughout the two day meeting, the Steering Committee members discussed different aspects of the prioritization criteria and the scoring approach to prioritization of projects. Below is an overview of the Committee's discussion on the Illustrative Prioritization Approach.

Criteria

Steering Committee members discussed the six criteria used in the Illustrative Prioritization Approach to rank the research and information collection projects. During the discussion, members made the following comments:

- The first two criteria are threshold criteria that all projects must meet.
- The criterion "addresses multiple needs" assumes that all the needs are of equal size and importance. It would be helpful to check the prioritization results to be sure the number of research and information collection needs for each project is not misleading.

Scoring

Steering Committee members made several positive comments about the scoring approach to prioritization. During the discussion, they also made several suggestions for improving and revising the approach:

- Remove the "relevance to other projects" from the scoring system.
- Consider the "duration" and "estimated years until start" factors separately and after the "importance for informing magnitude" and "importance for informing mitigation" factors. In considering duration and years until start, be careful that very important projects that take longer are not trumped by projects that take less time and are far less importance.
- Consider weighing every vote and looking at the distribution of those votes instead of using only the average of the votes.
- Figure out how to give more weight to Tier 1 topics.
- Do a gap analysis to determine if there are areas where no research is being done – by EPA, the Water Research Foundation, or other research organizations (e.g., the International Water Research Coalition).
- Look at the overall balance in the portfolio of projects.

The Steering Committee suggested that the partners and developers rework the scoring system, based on the Committee's discussion, and present a revised version on a future call of the Committee.

VIII. Follow-up Actions for the Steering Committee

1. The RICP Steering Committee will meet via conference call in the beginning of November to discuss the project descriptions for the high priority projects, including the knowledge goals for each project, and the revised scoring process.

2. The Steering Committee will meet via conference call in early January to discuss the draft communication plan drawn up the partners, and to provide further feedback on the draft research agenda.

3. In April, the Committee will hold an in-person meeting to review the final research agenda.

Attachments

Attachment A – Meeting agenda
Attachment B – List of meeting participants
Attachment C – Vanessa Speight's presentation "Draft Research and Information Collection Agenda"
Attachment D – Frank Letkiewicz's presentation "Completing the Research and Information Collection Agenda (with an Illustrative Prioritization Approach)"

Attachment B

U.S. Environmental Protection Agency
RESEARCH AND INFORMATION COLLECTION PARTNERSHIP
STEERING COMMITTEE MEETING

September 22-23, 2009

Meeting Participants

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Nick Ashbolt, US EPA, ORD, National Exposure Research Laboratory *
Pam Barr, US EPA, OGWDW
Jeremy Bauer, US EPA, OGWDW
Marie-Claude Besner, US EPA, OGWDW
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Frank Blaha, Water Research Foundation
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Melinda Friedman, Confluence Engineering
David Gute, Tufts University*
Kathy Grant, RESOLVE
Mark LeChevallier, American Water*
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