



THE
Water
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FOUNDATION

FOCUS AREA RFP

This project is being funded through the Focus Area Program, which enables WRF to solve broadly relevant subscriber issues and challenges with a targeted, sustained research effort. The program is developed around research Focus Areas: a topic area that is of high interest and priority to WRF subscribers because of a challenge or opportunity that is present, emerging, or anticipated, and for which research will help subscribers manage and address the challenge or optimize the opportunity. A focus area includes a discrete challenge or opportunity statement, measurable objectives, and one or more projects that will lead to applied solutions and benefits for WRF subscribers within a specified, relevant time frame.

*This project is funded under the Focus Area titled, **Waterborne Pathogens in Distribution and Plumbing Systems** and is intended to support the Focus Area objective(s):*

- **Understand the factors governing the proliferation of waterborne pathogens.**
- **Develop best practices for risk management.**
- **Formulate effective communication strategies.**

Sampling and Monitoring Strategies for Opportunistic Pathogens in Drinking Water Distribution Systems (RFP # 4911)

Project Objective

The goal of this project is to establish an optimized sampling and monitoring protocol providing a practical guideline for drinking water utilities to manage the detection of opportunistic pathogens in distribution systems.

Budget

Proposals may request WRF funds in the range of \$300,000 - \$320,000. WRF funds requested and total project value will be a criteria considered in the proposal selection process.

Background

Opportunistic pathogens such as *Legionella spp.* have been responsible for numerous water-associated outbreaks in recent years. Typically, human exposure occurs through inhalation of water aerosols originating from premise plumbing systems, especially in large multi-story buildings such as hospitals and hotel complexes. Various factors in large and complex premise plumbing systems (i.e., water age, absence of disinfectant residual, types of pipe materials, high surface area to volume ratio, presence of biofilm, and sub-optimal water temperature) favor regrowth of *Legionella spp.* and other opportunistic pathogens. However, the relationship between the presence of opportunistic pathogens in premise plumbing, and the upstream drinking water treatment/disinfection processes is not known. The Maximum Contaminant Level Goal (MCLG) for *Legionella spp.* under the Safe Drinking Water Act is zero, and the presence of the pathogen is regulated through a treatment technique requirement. However, there are no requirements for direct measurement of the presence of opportunistic pathogens such as *Legionella spp.* in the distribution system, and surrogate detection procedures such as heterotrophic plate count bacteria (HPC) and disinfectant residual levels are insufficient in providing the needed information.

It is generally assumed that opportunistic pathogens enter water distribution systems from source waters, and from intrusions during main breaks and low-pressure accidents – but at a level that is very

low and infrequent. In the United States, the aging water infrastructure (i.e., storage systems and distribution system pipe networks) may provide conditions for regrowth of opportunistic pathogens. While this has not yet been a source of concern, the microbial populations in drinking water distribution systems may serve as the seed for the opportunistic pathogens in premise plumbing where regrowth conditions are more likely to exist.

As regulated utilities typically rely on treatment techniques targeted for the control of viruses, bacteria, *Cryptosporidium* and *Giardia* to indirectly manage microbes such as *Legionella spp*, an absence of direct monitoring makes it a challenge to respond to questions regarding the contribution of drinking water supplies during a premise plumbing outbreak. To minimize outbreaks, better understanding of the potential factors contributing to the increased occurrence of opportunistic pathogens in distribution systems is required.

Where monitoring is performed, utilities need to know how to interpret and communicate information regarding the significance of such data. Even in most situations where there are no outbreaks, it seems prudent to better understand the potential factors that could increase the density or occurrence frequency of such pathogens and minimize these conditions where possible. It is consistent with the drinking water industry's proactive history to comprehensively assess the influence of water treatment and operations on downstream water quality, and optimize treatment and operations as necessary.

Research Approach

The main objective of this project is to establish an optimized sampling and monitoring protocol providing a practical guideline for drinking water utilities to manage the detection of opportunistic pathogens in distribution systems. Proposals must clearly present the research approach to be used to develop appropriate sampling and monitoring protocols to be implemented as a practical guide for utilities. Collaborative projects that include experts and communicational specialist are encouraged. The research team should keep in mind that water utilities are the target users for this project.

To achieve the objectives, researchers are expected to complete the following tasks:

- With a focus on known opportunistic pathogens (e.g. *Legionella spp*) in drinking water systems, select at least 2 pathogens, and provide justification to support the selection.
- Develop appropriate sampling and monitoring strategies to evaluate the factors and conditions that contribute to the persistence and growth of opportunistic microbes in drinking water distribution systems. The final deliverable should include the following:
 - A literature summary of available information on sampling and monitoring of specified opportunistic pathogens in the distribution system.
 - Recommended strategies for identifying appropriate sampling sites, taking into account that water distribution systems differ in design and operation. Consideration should be given to the proper selection of sampling sites such as hydrants, water fountains, utility sampling taps, and customers' faucets. Which sampling site can provide representative samples from the distribution system? How should such sampling sites be flushed or disinfected or otherwise prepared for sampling to prevent false positives? How to make

sure that the plumbing to the sampling site does not contribute to positive test results? A statistically sound sampling plan is highly encouraged.

- Recommended strategies for choosing sample types. Either biofilm and bulk water samples, or both could be included.
 - Recommendations for measuring other distribution system and water quality characteristics (e.g., temperature, pH, water age, pipe materials, use of corrosion inhibitors) that may correlate with opportunistic pathogens in the distribution system.
 - Recommendations for choosing the most appropriate pathogen detection technique. If the project team chooses molecular techniques, information should be provided regarding the interpretation of the data relative to traditional culture techniques.
 - Field results from at least two water utility systems should be included in demonstrating the chosen sampling strategy and analytical methods.
 - Recommendations on how to evaluate the results to provide actionable information.
- Develop a practical guidance for water utilities to interpret and communicate the test results to their executive management, regulatory authorities, and customers. Involvement of a communication specialist will be highly encouraged.

Proposal Preparation Instructions

Proposals submitted in response to this RFP must be prepared in accordance with the Water Research Foundation document “Guidelines for Focus Area Program Proposals.” The most current version of these guidelines is available at <http://www.waterrf.org/funding/Pages/proposal-guidelines.aspx>. The guidelines contain instructions for the technical aspects, financial statements and administrative requirements that the applicant must follow when preparing a proposal.

Eligibility to Submit Proposals

This RFP solicits proposals from all technically qualified U.S. based or non-U.S. based applicants, including educational institutions, research organizations, federal or state agencies, local municipalities, and consultants or other for-profit entities. *(If there is any funding from non-WRF sources, check with WRF Grants Management regarding possible eligibility restrictions)*

WRF’s Board of Trustees has established a Timeliness Policy that addresses researcher adherence to project schedule. The policy can be reviewed at <http://www.waterrf.org/funding/Pages/policies.aspx>. Researchers who are late on any ongoing WRF-sponsored studies without an approved no-cost extension are not eligible to be a named participant in any proposal. If you have any questions about your eligibility for WRF projects, please contact the WRF Research Manager listed at the bottom of the RFP.

Administrative, Cost and Audit Standards

WRF's Focus Area Program standards for administrative, cost and audit compliance are based upon and comply with Office of Management and Budget (OMB) Uniform Grants Guidance (UGG), 2 CFR Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, and 48 CFR 31.2 Contracts with Commercial Organizations. These standards are referenced in the WRF's "Guidelines for Focus Area Program Proposals" and include specific guidelines outlining the requirements for Indirect Cost Negotiation Agreements, Financial Statements and the Statement of Direct Labor, Fringe Benefits and General Overhead. Inclusion of indirect costs must be substantiated by a negotiated agreement or appropriate Statement of Direct Labor, Fringe Benefits and General Overhead. Well in advance of preparing the proposal, your financial staff should review the detailed instructions included in WRF's annually released "Guidelines for Focus Area Program Proposals."

Budget and Funding Information

The funding available from WRF for this project is in the range of \$300,000 - \$320,000. A minimum 25 percent of the total project value must be contributed by the applicant (i.e. the applicant's minimum contribution must equal one-third of WRF funds requested). Acceptable forms of applicant contribution include cost-share, applicant in-kind or third-party in-kind that comply with 2 CFR Part 200.306 Cost sharing or matching. The applicant may elect to contribute more than 25 percent to the project but the maximum WRF funding available remains fixed at \$320,000. **Proposals that do not meet the minimum 25 percent of the total project value will not be accepted.**

Period of Performance

The proposed project schedule should be realistic, allowing ample time for the preparation of final reports and for review of project results. It is WRF's policy to negotiate a reasonable schedule for each research project. Once this schedule is established, WRF and its sub-recipients have a contractual obligation to adhere to the agreed-upon schedule. Under WRF's No-Cost Extension Policy, a project schedule cannot be extended more than nine months beyond the original contracted schedule, regardless of the number of extensions granted. The policy can be reviewed at <http://www.waterrf.org/funding/Pages/policies.aspx>.

Utility and Organization Participation

WRF is especially interested in receiving proposals which include both participation and contribution of resources from water utilities and organizations in the research effort. Information on utilities and/or organizations that have indicated an interest in participating in this research project are listed on the last page of this RFP. While WRF makes utility and organization participation volunteers known to applicants, it is the applicant's responsibility to negotiate utility and organization participation in their particular proposal, and the utilities and/or organizations are under no obligation to participate.

Application Procedure and Deadline

Proposals are now being accepted exclusively online in PDF only format and must be fully submitted before August 22, 2018, 5pm Mountain Time. All the forms and components of the proposal are available online in the "Proposal Component Packet" zip file. A login is required to download this packet and use the proposal website. This information is available at <https://proposals.waterrf.org/Pages/RFPs.aspx>

The online proposal system allows submission of your documents until the date and time stated in the RFP. To avoid the risk of the system closing before you press the submit button, do not wait until the last minute to complete your submission.

Questions to clarify the intent of this Request for Proposals and WRF's administrative, cost and financial requirements may be addressed to the Research Manager, Dr. Grace Jang, at (303) 347-6112 or by e-mail at hjang@waterrf.org.

UTILITY AND ORGANIZATION PARTICIPANTS

The following utilities have indicated an interest in possible participation in this research. This information is updated within 24 business hours when a utility submits a volunteer form and this RFP will be re-posted with the new information. **(Depending upon your settings, you may need to click refresh on your browser to load the latest file.)**

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UTILITY AND ORGANIZATION PARTICIPANTS (Continued)

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