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REQUEST FOR PROPOSALS (RFP)

Demonstrating the Effectiveness of Flushing for Reducing the Levels of Legionella in Service Lines and Premise Plumbing (RFP 5033)

Due Date: Proposals must be received by 2:00 pm Mountain Time
on Tuesday, September 24, 2019

WRF Project Contact: Grace Jang, hjang@waterrf.org

Project Sponsors
This project is funded by The Water Research Foundation (WRF) as part of WRF's Research Priority Program.

Project Objective

- To assess the effectiveness of flushing to reduce the levels of *Legionella* in service lines and premise plumbing pipes, either as a corrective response or for ongoing maintenance.
- To evaluate the use of water quality parameters as an indicator for effectiveness of flushing.
- To develop data-driven guidance on applicability and effectiveness of flushing as a method for *Legionella* control.

Budget
Applicants may request up to **$200,000** in WRF funds for this project. WRF funds requested and total project value are evaluation criteria considered in the proposal selection process.

Background and Project Rationale
A Centers for Disease Control and Prevention (CDC) study reported that 85% of Legionnaires' disease outbreaks were associated with preventable water system maintenance deficiencies [1]. The CDC recommends these deficiencies be addressed with a comprehensive water management program that includes several strategies for reducing *Legionella* growth and transmission. One recommended strategy is flushing. Flushing may address a variety of water quality issues including low disinfectant residual, colored water, taste and odor, biofilm growth, and bacterial contamination, but may also have consequences if not conducted properly. Therefore, it is expected that flushing could be an effective tool to reduce *Legionella* in plumbing systems, but applying flushing practices to different and complex building water systems may also bring challenges.

Currently, there is insufficient information demonstrating the effectiveness of flushing to reduce *Legionella* in plumbing systems. This information is needed to develop guidelines on the operational parameters, frequency, and efficacy of flushing to reduce *Legionella* in plumbing systems. For example, it is not known if flushing is only effective as an intermittent solution or whether it produces sustained improvements. Although there are various guidelines on flushing of water distribution mains following

water main breaks or to hydraulically remove mobile sediment and other constituents from systems, there is no technical basis for applying guidance to understanding if flushing removes *Legionella* from premise plumbing systems.

Along with the evaluation of flushing as a remedial strategy, it is equally important to evaluate flushing performance and effectiveness as a preventive strategy. Although flushing may not remove all risks, it is necessary to understand if potential risks may be effectively managed through proper flushing applications. Furthermore, because premise water systems operate differently than distribution systems (e.g., substantially smaller pipe diameters, and multiple opportunities for microbial growth at water outlets), it is unclear whether flushing is required to manage *Legionella*, or if water movement alone is needed to maintain proper water temperatures and/or disinfectant residual levels.

This project will provide science-based information to demonstrate the benefits, risks, control parameters, and impacts of flushing to mitigate or minimize the risk of *Legionella* occurrence in service lines and premise plumbing.

Research Approach
The proposal must include the following elements in the team's research approach:

Task 1: Literature Review and Development of Research Plan
- Review and synthesize available guidance and protocols on current practices of flushing in service lines and premise plumbing focusing on *Legionella* control (but not limited to *Legionella* control). The literature review should also include 1) benefits, risks, and limitations of flushing and 2) occupational and public health risks information such as aerosolization of *Legionella* as well as inhalation and surface contamination risks.
- Review pertinent findings from recently completed or ongoing projects (see resources section below).
- Use this literature review to develop a research plan and provide justification to support study design.
- Set the desired outcomes for flushing by which its effectiveness will be measured.
- Select other water quality or operational parameters that may be used to guide flushing in real time.

Task 2: Evaluation of Flushing Effectiveness
- Conduct experiments evaluating the impacts of various flushing approaches on water quality and *Legionella* occurrence and persistence.
- Conduct field studies for flushing efficacy in multiple premise plumbing environments.
- Investigate such factors as duration, flow rate, resulting temperature needed for effective flushing, water quality factors, etc., that could enhance or deter the desired outcomes and/or impact other consequences (e.g., metals and/or scale release), plumbing design and operational factors that could limit the effectiveness of flushing, cold and hot water line flushing, etc.

Task 3: Development of Protocol and Guidance
- Provide flushing procedures and measurable goals for a building manager who is not trained as a water professional.
- Provide simplified sampling protocols to demonstrate the effectiveness of flushing and to use measurable water quality parameters for operational guidance.

- Define the measurable goals that flushing can achieve for both remedial action and preventive maintenance.
- Consider potential difficulties routine flushing may have for building owner/operators in cities with mandatory water conservation measures or buildings with LEED/green building certification.
- Discuss the benefits, risks, and limitations of flushing based on the findings of this project
- Estimate or evaluate costs for different strategies.

Expected Deliverables

Expected deliverables include, but are not limited to:

- Literature review.
- Final report, with all detailed data and literature and evaluations.
- Guidance document on how to conduct premise flushing for *Legionella*, written for building managers.
- Guidance document that can assist/provide adequate information to educate utility managers and local and state regulatory bodies.
- Webcast for WRF subscribers.

Communications Plan

Please review WRF's *Project Deliverable Guidelines* for information on preparing a communications plan. The guidelines are available at http://www.waterrf.org/funding/Pages/proposal-guidelines.aspx. Conference presentations, webcasts, peer review publication submissions, and other forms of project information dissemination are typically encouraged.

Project Duration

The anticipated period of performance for this project is 24-30 months from the contract start date.

References and Resources

The following list includes examples of research reports, tools, and other resources that may be helpful to proposers. It is not intended to be comprehensive, nor is it a required list for consideration.

1. Garrison L.E. et al. Vital Signs: Deficiencies in Environmental Control Identified in Outbreaks of Legionnaires' Disease — North America, 2000-2014, 65(22); 576-584.
2. WRF 4653: Use of Flushing as a Corrective Action Under the Revised Total Coliform Rule.*
3. WRF 4584: Evaluation of Flushing to Reduce Lead Levels.*
4. WRF 4572: Flushing Guidance for Premise Plumbing and Service Lines to Avoid or Address a Drinking Water Advisory.*

* *Note: A copy of the report will be provided upon request. Contact Research Manager, Grace Jang, via email at hjang@waterrf.org.*

Proposal Evaluation Criteria

The following criteria will be used to evaluate proposals:

- Understanding the Problem and Responsiveness to RFP (maximum 20 points)
- Technical and Scientific Merit (maximum 30 points)
- Qualifications, Capabilities, and Management (maximum 20 points)
- Communication Plan, Deliverables, and Applicability (maximum 15 points)
- Budget and Schedule (maximum 15 points)

Proposal Preparation Instructions
Proposals submitted in response to this RFP must be prepared in accordance with the WRF document *Guidelines for Research Priority Program Proposals*. The current version of these guidelines is available at http://www.waterrf.org/funding/Pages/proposal-guidelines.aspx, along with *Instructions for Budget Preparation*. The guidelines contain instructions for the technical aspects, financial statements, indirect costs, and administrative requirements that the applicant must follow when preparing a proposal.

Eligibility to Submit Proposals
Proposals will be accepted from domestic or international entities, including educational institutions, research organizations, governmental agencies, and consultants or other for-profit entities.

WRF's Board of Directors has established a Timeliness Policy that addresses researcher adherence to the 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 approved no-cost extensions are not eligible to be named participants in any proposals. Direct any questions about eligibility to the WRF project contact listed at the top of this RFP.

Administrative, Cost, and Audit Standards
WRF's research 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 WRF's *Guidelines for Research Priority 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 research and financial staff should review the detailed instructions included in WRF's *Guidelines for Research Priority Program Proposals* and consult the *Instructions for Budget Preparation*, both available at http://www.waterrf.org/funding/Pages/proposal-guidelines.aspx.

Budget and Funding Information
The maximum funding available from WRF for this project is $200,000. The applicant must contribute additional resources equivalent to at least 33 percent of the project award. For example, if an applicant requests $100,000 from WRF, an additional $33,000 or more must be contributed by the applicant. 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 33 percent to the project, but the maximum WRF funding available remains fixed at $200,000. **Proposals that do not meet the minimum 33 percent of the project award will not be accepted.** Consult the *Instructions for Budget Preparation* available at http://www.waterrf.org/funding/Pages/proposal-guidelines.aspx for more information and definitions of terms.

Period of Performance
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 encourages participation from water utilities and other organizations in WRF research. Participation can occur in a variety of ways, including direct participation, in-kind contributions, or in-kind services. To facilitate their participation, WRF has provided contact information, on the last page of this RFP, of utilities and other organizations that have indicated an interest in this research. Proposers are responsible for negotiating utility and organization participation in their particular proposals. The listed utilities and organizations are under no obligation to participate, and the proposer is not obligated to include them in their particular proposal.

Application Procedure and Deadline

Proposals are accepted exclusively online in PDF format, and they must be fully submitted before 2:00 pm Mountain Time on Tuesday, September 24, 2019. All proposal documents must be compiled into two (2) PDF files consisting of your technical review documents and your financial review documents. All forms and components of the proposal are available in the *Proposal Component Packet* zip file on the proposal website at https://proposals.waterrf.org/Pages/RFPs.aspx. An FAQ and a tutorial are also available. A login is required to access the proposal website and download the packet. Proposers are encouraged to create logins and verify the validity and compatibility of the system well in advance in order to avoid last-minute errors or delays.

The online proposal system allows submission of your documents until the date and time stated in this 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 RFP and WRF's administrative, cost, and financial requirements may be addressed to the WRF project contact, Grace Jang at (303) 347-6112 or hjang@waterrf.org. Questions related to proposal submittal through the online system may be addressed to Caroline Bruck at (303) 347-6118 or cbruck@waterrf.org**.**

Utility and Organization Participants

The following utilities have indicated interest in possible participation in this research. This information is updated within 24 business hours after a utility or an interested organization 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.)**

Sophie Manley
Sanitary Engineer
City of Chicago Department of Water Management
1000 E Ohio Street
Chicago, IL 60611
USA
(312) 744-8195
sophie.manley@cityofchicago.org

Kate A. Martin
Water Quality Analyst
Golden State Water Company
Foothill District, Region III
401 S San Dimas Canyon Road
San Dimas, CA 91773
USA
(909) 592-4271
kate.martin@gswater.com