THE Water Research FOUNDATION

Date Posted: August 14, 2020

REQUEST FOR PROPOSALS (RFP)

Guidance for Using Pipe Loops to Inform Lead and Copper Corrosion Control Treatment Decisions (RFP 5081)

Due Date: Proposals must be received by 2:00 pm Mountain Time on
Thursday, October 15, 2020
WRF Project Contact: Jonathan Cuppett, jcuppett@waterrf.org

Project Sponsors
This project is co-funded by The Water Research Foundation (WRF), American Water Works Association (AWWA), and The Copper Development Association (CDA) as part of WRF's Research Priority Program.

Project Objectives
To provide "fit for purpose" guidance for corrosion control pipe loop construction, operation, sampling, and data interpretation to inform pipe loop implementation for corrosion control studies.

Budget
Applicants may request up to **$150,000** 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
In November 2019, The EPA proposed revisions to the Lead and Copper Rule (LCR). A Final Rule is expected to be released in the near future. The proposed LCR contains significant changes to requirements for analysis of corrosion control treatment. If the Final Rule incorporates these proposed changes, it is anticipated that many water systems will use pipe loops in the future to better understand and inform potential water treatment changes. The proposed rule includes provisions that will necessitate use of pipe loops (1) to evaluate further reduction in lead levels when a system's 90th percentile lead concentration exceeds 10 µg/L, (2) to evaluate further reduction in copper levels when a system's 90th percentile copper concentration exceeds 1.3 mg/L, (3) to evaluate lead level control when individual compliance monitoring samples exceed 15 µg/L, and (4) in preparation for changes in water source or water treatment. Water systems will need to use pipe loops to discern significant and sustained differences in corrosion control treatment performance in a much narrower performance window than before. Moreover, while ensuring control of lead and copper levels, corrosion control strategies will also have to mitigate corrosion of other materials and be consistent with other treatment processes. Importantly, careful review of corrosion control will be of elevated importance to smaller systems and to systems that rely on wholesale suppliers. Pipe loops can also be used for utilities that want to minimize lead and copper release, even though they have no planned water changes or regulatory drivers. Furthermore, pipe loops can be used as part of a general data gathering process to

better understand corrosion-related issues under baseline conditions.

"Pipe Loop" is a general term that refers to test apparatuses that can be constructed in a variety of ways depending on test objectives, available budget, and many other factors. Typically, a pipe loop consists of multiple sections of pipe that are filled with water, and designed to simulate different corrosion control scenarios of interest. Pipe sections can be included to understand metal release from lead, copper, lead solder, brass, or additional materials. Other pipe loop designs use metal plates instead of pipes to study the impacts of water on metal release. The water in the pipe loop cycles between periods of stagnation and flow designed to simulate real intermittent water use scenarios. Periodic sampling is conducted and then the metal concentrations are analyzed to better understand the impact that varying water quality has on metal release. There are numerous considerations when designing and operating a pipe loop, including but not limited to:

- What materials to incorporate?
    - Should new or harvested pipes/materials be used?
    - What length of pipes/materials are appropriate?
    - How to simulate lead, copper, brass, and lead solder?
- What are criteria for making basic pipe loop design decisions?
    - Where should sampling ports be located?
    - Where should the pipe loops be located?
    - What parameters should be sampled and how much volume is needed?
    - How often should sampling be performed and for what duration?
    - Should the water be recirculated or flow to a drain?
    - Should automation be incorporated to control water quality (i.e., pH, disinfectant, etc.) and how would this be monitored?
    - Can coupons be integrated into the design?
    - What are appropriate sampling flow rates?
- What are indicators that the pipe loop is ready to use or that a treatment condition has reached steady state?
    - How long should the pipes be conditioned?
    - How long should the periods of stagnation and flow be?
    - How long should the pipe loop operate overall?
- How does the pipe loop design influence interpreting study results with confidence?
    - What statistical approaches can be used to assess pipe loop data?
    - How can uncertainty of the degree to which results will be indicative of actual system performance be assessed?
    - How many replicates of pipes are needed?
    - How reproducible are the results among replicates?
    - How to consider random particulate release?
- How is a pipe loop designed and operated to conduct special studies?
    - Does the impact of microbial growth need to be evaluated?
    - What impact do specific pipe scales have and how could that be assessed?

Previous research has evaluated pipe loop protocols to better understand appropriate design and operational guidance[1,2,3]. However, some of the previous research is now decades old or was not intended to develop "fit for purpose" designs and recommendations. Additionally, many utilities have designed and used pipe loops for various intended objectives. The past research and utility specific designs have provided a wealth of information on pipe loop design and operation. However, the vast

amount of information can also be a challenge when a utility is trying to understand the best approach for its systems. Pipe loop guidance resources that synthesize previous information and provide a current "state of the art" analysis are needed to help systems of all sizes, available financial resources, and expertise better understand how to implement a "fit for purpose" approach for pipe loops.

It is anticipated that this project will provide guidance for utilities interested in constructing and operating pipe loops for different circumstances. An approach appropriate for a system assessing corrosion control for a new source is expected to be potentially different from a system re-optimizing after an increase in lead or copper levels at the tap, and different from a system attempting to further decrease already low lead levels. This project should acknowledge the variety of different objectives for pipe loops and provide "fit for purpose" recommendations for construction and operation for the different scenarios.

Research Approach

Research plans should present a strategy for providing "fit for purpose" guidance related to pipe loops informing corrosion control treatment for a diverse range of circumstances. It is not expected that this project will recommend a single pipe loop design for any or all circumstances. Rather, the project should evaluate the variety of different options when designing and operating a pipe loop and discuss advantages and disadvantages of the different approaches. The final resources should enable systems to design and implement a "fit for purpose" pipe loop based on site-specific drivers and limitations. The following list contains research plan suggestions. However, alternative ideas that are not included in this list are acceptable.

- Review existing literature, research reports, and other documentation related to construction, operation, costs, sampling, and data interpretation for various pipe loop designs that can inform corrosion control treatment decisions.
- Document pipe loop case studies to better understand the potential different designs based on site-specific objectives.
- Organize a workshop of pipe loop and corrosion control experts to discuss challenges and opportunities related to using pipe loops to inform corrosion control treatment. A virtual workshop may be required based on future travel restrictions. All workshop-related costs should be accounted for in the project budget.

The final deliverables for this project are expected to be useful to utilities with different levels of financial resources, expertise, and different corrosion control treatment objectives. The project approach should reflect a recognition of this issue, and the final deliverables should provide information that is actionable by all utilities. Periodic conference calls with WRF and the Project Advisory Committee are encouraged to allow discussion on project progress.

Expected Deliverables

- A guidance document that utilities can reference when planning, building, or evaluating pipe loops to inform their corrosion control treatment. The guidance document should contain information that utilities can easily utilize to inform "fit for purpose" pipe loop decisions.
- An electronic tool or other decision-making framework to facilitate pipe loop planning.
- Conference presentations or other appropriate outreach should be prioritized to share interim results of interest.

- A WRF-sponsored webcast following project completion.

Communication Plan
Please review WRF's *Project Deliverable Guidelines* for information on preparing a communications plan. The guidelines are available at https://www.waterrf.org/proposal-guidelines. 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 12 -18 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) The Water Research Foundation. 1994. Development of a Pipe Loop Protocol for Lead Control (#604).
2) The Water Research Foundation. 2014. Non-Intrusive Methodology for Assessing Lead and Copper Corrosion (#4317).
3) The Water Research Foundation. 2017. Optimization of Phosphorus-Based Corrosion Control Chemicals Using a Comprehensive Perspective of Water Quality (#4586).

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 https://www.waterrf.org/proposal-guidelines, 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 https://www.waterrf.org/policies. 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 https://www.waterrf.org/proposal-guidelines.

Budget and Funding Information
The maximum funding available from WRF for this project is $150,000. 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 $150,000. **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 https://www.waterrf.org/proposal-guidelines 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 https://www.waterrf.org/policies.

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 Thursday, October 15, 2020. All proposal documents must be compiled into two 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, Jonathan Cuppett at (303) 347-6122 or jcuppett@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**.**

5081 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.)**

Shobanaa Sivavarman
Engineer
Toronto Water
55 John Street
Toronto, ON
Canada
(416) 392-5459
shobanaa.sivavarman@toronto.ca

Wendy Krkosek
Water Quality Manager
Halifax Water
450 Cowie Hill Rd.
Halifax, NS
Canada
(902) 483-4432
wendyk@halifaxwater.ca

Jessica Glowczewski
Watershed Superintendent
City of Akron, Ohio Water Bureau
1570 Ravenna Road
Kent, OH
USA
(330) 678-0077
Jglowczewski@akronohio.gov

Wendell James
Manager, Process Development Team
EPCOR Water Services
#2000 10423 – 101 St.
Edmonton AB T5H0E8
Canada
(780) 412-7875
wjames@epcor.com

Michael Rau
Water Quality Manager
Central Utah Water Conservancy District
1426 E 750 N Street, Suite 400
Orem, UT 84097
USA
(801) 226-7113
miker@cuwcd.com

Stephen Estes-Smargiassi
Director of Planning and Sustainability
Massachusetts Water Resources Authority
100 first Ave
Boston, MA 02129
USA
(617) 839-9638
smargias@mwra.com