



Date Posted: Monday, August 9, 2021

REQUEST FOR PROPOSALS (RFP)

Using Phosphate-Based Corrosion Inhibitors and Sequestrants to Meet Multiple Water Treatment Objectives (RFP 5119)

Due Date: Proposals must be received by **3:00 pm Mountain Time**
on Tuesday, September 14, 2021

WRF Project Contact: Jonathan Cuppett, jcuppett@waterrf.org

Project Objectives

To provide guidance for dosing and/or adjusting phosphate-based corrosion inhibitors and sequestrants while minimizing metals release (lead, copper, and others) and avoiding unintended consequences.

Budget

Applicants may request up to \$250,000 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

More than half of water systems are reported to add phosphate-based corrosion inhibitors and sequestrant chemicals (orthophosphate, ortho-polyphosphate blends, zinc orthophosphate, and polyphosphate)¹ to their water. This addition may be to reduce lead or copper corrosion, prevent discolored water complaints, or protect distribution system materials. The phosphate-based corrosion inhibitor or sequestrant dose is dependent on various site-specific conditions and the efficacy and control mechanisms can be different for lead and copper. Making water quality changes, including changes to phosphate-based inhibitors and sequestrants, can potentially impact pipe scales and thus influence lead, copper, and other metal release. Controlled studies can be performed to better understand phosphate-based inhibitor and sequestrant addition impacts. However, mechanisms of metal release such as the sporadic release of particulates from the pipe scale are hard to quantify experimentally. Previous WRF research has explored phosphate-based chemicals for corrosion control.^{2,3,4,5,6}

It is anticipated that the revised Lead and Copper Rule (LCRR) will require many utilities to revisit their corrosion control strategies. Moreover, as water systems make changes in water sources or treatment, they will be scrutinizing the potential impacts of those changes. The selection and balancing of phosphate-based inhibitors and sequestrants, as well as transitioning from one chemical addition strategy to another must be carefully considered and implemented to avoid unintended consequences. Situations of particular concern for water systems include but are not limited to:

- Reducing phosphate-based inhibitor/sequestrant use to decrease downstream phosphorus impacts
- Changing (reducing or increasing) current phosphate-based inhibitor/sequestrant concentration to improve treated water quality
- Changes in the phosphate inhibitor dosing regimen involving an initial acclimation phase at higher dose followed by a maintenance phase at lower dose
- Differences in phosphate dosing strategies when dealing with lead, copper, iron, etc.
- Discontinuing use of a phosphate-based inhibitor/sequestrant
- Switching from one phosphate-based inhibitor/sequestrant type to another (e.g., ortho-poly blend to ortho)
- Changing the phosphate-based inhibitor/sequestrant chemical composition from an existing supplier or manufacturer
- Changing the supplier or manufacturer of your phosphate-based inhibitor/sequestrant chemical
- Optimizing phosphate-based inhibitor/sequestrant and pH for inhibitor chemistry while maintaining chloramine stability
- Addressing potential chemical supply-related challenges
- Understanding the impacts of the variety of chemical combination changes that could occur when a change in corrosion treatment is being considered (e.g., chemicals that change pH)

The LCRR requires systems with elevated lead levels to conduct a corrosion control study that includes orthophosphate addition at two concentrations (1 mg/L and 3 mg/L as PO₄). The effective date of the revised LCR has been delayed until December 16, 2021. EPA will engage with stakeholders during this delay to evaluate the rule and determine whether to initiate a process to revise components of the rule. If the current requirements remain, they will influence corrosion control practices well beyond those systems that are triggered to evaluate corrosion control under the current LCR. Moreover, while systems seek to reduce lead and copper levels, they also face the challenge of reducing phosphorus addition for downstream users, controlling the deposition and release of other metals (e.g., manganese), release of iron from unlined cast iron mains and galvanized piping, copper pitting corrosion, maintaining regulatory compliance (e.g., secondary disinfectant residual, disinfection byproducts, etc.), and numerous other additional concerns.

Research Approach

Research plans should present a strategy to provide guidance related to the numerous circumstances, challenges, and opportunities associated with phosphate-based corrosion inhibitor/sequestrant practices. It is not expected that this project will conduct laboratory experiments to explore specific phosphate-based chemical interactions. Rather, the project should compile and assess existing information on this topic in order to provide guidance. The project should address selection and balancing of phosphate-based corrosion inhibitors/sequestrants, transitioning from one chemical addition strategy to another, as well as potentially discontinuing the use of an inhibitor/sequestrant while avoiding unintended consequences. Successful application of the resources provided will facilitate assessment and implementation of phosphate-based corrosion inhibitors/sequestrants that minimizes release of lead and other metals but also achieves a water system's other water quality objectives. The following list contains research plan suggestions. However, alternative ideas that are not included in this list are acceptable.

- Review existing published literature, research reports, and other documentation related to the phosphate-based inhibitor/sequestrant practices.

- Analyze grey literature including conference presentations, individual utility reports, and other unpublished information.
- Document case studies associated with phosphate-based inhibitor/sequestrant practices. The case studies should cover the wide variety of circumstances possible on this topic.
- Organize a workshop(s) of corrosion inhibitor/sequestrant application experts to develop and/or discuss guidance related to this topic. Virtual workshops can be considered.
- Conduct a survey to better understand the issues associated with phosphate inhibitor/sequestrant practices.
- Development of tools, decision trees, or other stand-alone resources should be considered.

The final deliverables for this project are expected to be useful to utilities with different levels of financial resources, expertise, and different phosphate-based inhibitor/sequestrant objectives. In addition to providing guidance for utilities, the content from this project is anticipated to serve as a resource for utilities to work with their regulators on this topic.

Expected Deliverables

- A guide for water systems that covers the various practices encountered related to phosphate-based corrosion inhibitor/sequestrant use.
- Supporting resources to aid water systems with phosphate-based corrosion inhibitor/sequestrant planning.
- Conference presentations, journal publications, and 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 communication plan. The guidelines are available at <https://www.waterrf.org/project-report-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 18-24 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 and are cited in this RFP. It is not intended to be comprehensive, nor is it a required list for consideration.

- 1) McNeill, L. and M. Edwards. 2002. Phosphate Inhibitor Use at US Water Utilities. *Journal AWWA*. 94:7.
- 2) Cantor, A. F. 2017. *Optimization of Phosphorus-Based Corrosion Control Chemicals Using a Comprehensive Perspective of Water Quality*. Project 4586. Denver, CO: Water Research Foundation.
- 3) Bae, Y. and D. Giammar. 2019. *Processes Controlling the Development of Effective Lead Corrosion Control with Orthophosphate*. Project 4686. Denver, CO: The Water Research Foundation.
- 4) Schneider, O. D., J. Parks, M. Edwards, A. Atassi, and A. Kashyap. 2011. *Comparison of Zinc vs Non-Zinc Corrosion Control for Lead and Copper*. Project 4103. Denver, CO: Water Research Foundation
- 5) Cornwell, D. *Ongoing. Analysis of Corrosion Control Treatment for Lead and Copper Control*. Project 5032. Denver, CO: The Water Research Foundation.

- 6) Edwards, M., L. S. McNeill, T. R. Holm, and M. C. Lawrence. 2001. *Role of Phosphate Inhibitors in Mitigating Lead and Copper Corrosion*. Project 2587. Denver, CO: AwwaRF.
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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.

Proposals that include the production of web- or software-based tools, such as websites, Excel spreadsheets, Access databases, etc., must follow the criteria outlined for web tools presented in the Web Tool Criteria and Feasibility Study for The Water Research Foundation Project Deliverables at <https://www.waterrf.org/sites/default/files/file/2021-07/WebToolCriteria.pdf>.

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 \$250,000. 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 \$250,000. **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 3:00 pm Mountain Time on Tuesday, September 14, 2021.

The online proposal system allows submission of your documents until the date and time stated in this RFP. Submit your proposal at <https://forms.waterrf.org/212075460313849>

Please ensure you upload the required documents before the deadline. **Proposals submitted after the deadline will not be accepted.**

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.

5119 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 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.)**

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