

## **Sustainability Comparison Study: Centralized vs POU/POE Treatment for Small System Compliance to the SDWA**

**RFP Issued:** February 19<sup>th</sup>, 2019

**Submission Deadline:** May 20<sup>th</sup>, 2019 at 11:00 am Central

**Budget:** Total budget shall not exceed \$130,000\*

\*Maximum funding available. Researchers should attempt to submit proposals for the lowest dollar amount that is practical. Preference may be given to the lowest cost proposal that still best meets all the requirements/deliverables.

### Introduction

This research project will consist of a review of multiple case studies in different geographical regions in the United States which compares the sustainability of centralized versus point-of-use (POU) and point-of-entry (POE) treatment for small communities to become compliant with the Safe Drinking Water Act (SDWA). The contaminants, treatments and distribution sizes that should be included are further described in the [“Detailed Information on the Project Concept”](#) section.

For this study, the POU and POE technologies in the comparison must be used for potable, domestic consumption. Therefore, any commercial/industrial POE systems are to be excluded from this research. Researchers should take every precaution to keep water treatment manufacturer and brand names confidential in the final report. The expected result is a report comparing the sustainability of utilizing POU/POE treatment options as a permanent compliance solution versus the sustainability of the centralized treatment options (including any upgrades) that would be necessary to deliver the same quality of water. For POU/POE treatment to be used for SDWA compliance, federal regulations state that the equipment must be owned, controlled, and maintained by the water district or contracted out to professionals.<sup>1</sup> Therefore, any data about homeowner POU/POE installations are to be excluded from this research.

Strong proposals will include a statement demonstrating how the researcher will engage with state or national agencies to help them utilize the results from this sustainability comparison study.

### Who is WQRF?

The Water Quality Research Foundation (WQRF) was formed in 1952 to serve as a universally recognized, independent research organization for residential, commercial and industrial drinking water treatment topics. Since inception, WQRF has sponsored numerous research studies which have established best practices, generated essential marketing information, positively impacted legislative change, and helped decrease product testing costs.

This project concept aligns with [WQRF’s research agenda](#) to: 1) investigate point of use and whole house devices as a means for sustainable treatment to create more opportunities for industry professionals to provide better quality water to more people, 2) investigate ways to sustain the industry with innovative technologies as well as provide options for sustainability efforts of agencies or localities such as reuse, reclamation, etc., 3) Conduct research to defeat ill-conceived codes and rules or promote technologies in highly regulated arenas, and 4) aid or support implementation of technologies to provide cost effective options for emerging contaminants.

## Background on this RFP

Generally, many small public water systems (PWSs) have significant challenges complying with the lead and copper rule, and other maximum contaminant levels (MCLs) such as nitrate and arsenic. As an example, one common strategy to prevent lead corrosion is to dose phosphates. This coats the pipes and reduces the amount of lead which leaches into the drinking water. The phosphates also serve as “food” for microorganisms, and this can trigger the need for adding a disinfectant (e.g., chlorine) in small systems which were previously using a groundwater supply and were not required to add a disinfectant. The addition of a disinfectant, in turn, triggers the need to comply with the disinfectant byproduct rule.

Another strategy to reduce lead concentrations in drinking water is replacement of pipes and fittings which contain high lead content (e.g., lead service lines, galvanized service lines, etc.) This strategy also poses significant challenges. Property rights may cause an obstacle since typically the homeowner is responsible for any maintenance or replacement of the final portion of the service line which extends under their property and up to the house. Partial replacement (i.e., replacing only the portion of the line which the city or utility has responsibility for) often causes an increase in lead concentrations in the drinking water for the following months and makes the situation worse.<sup>2</sup> Even full replacement causes disturbances and vibrations which can cause sediment containing high lead content to enter the premise plumbing, where it will settle and continue to leach lead into the drinking water.<sup>3</sup> All solutions available to address this problem have a significant environmental footprint, and the financial burden can be prohibitive for small systems or economically challenged communities.

Challenges, such as the example given above, for small PWSs were addressed in the 1996 SDWA. Congress explicitly allowed systems to install POU and POE treatment devices to achieve compliance with some of the MCLs established in the National Primary Drinking Water Regulations (NPDWRs) (Section 1412(b)(4)(E)(ii) of SDWA). According to the EPA, “...the system should fully understand that State and local regulations may also affect the selection of a POU or a POE strategy.”<sup>1</sup> Despite this treatment strategy being allowed at the federal level, only a select number of states have implemented POU/POE for compliance. This fact has prompted WQRF to undertake this research concept.

## Detailed Information on the Project Concept

As mentioned in the introduction to this RFP, this research project is intended to consist of a review of multiple case studies which compare the sustainability of centralized versus POU/POE treatment for small communities in different geographical regions in the United States. The public water system (PWS) in this study must meet the [US EPA’s definition of a small system](#), having a minimum of 15 service connections or serving 25 people. The researcher should determine the maximum number of service connections by reviewing data on a state-by-state basis. WQRF suggests using SDWIS for this task. The proposal should clearly define the method used for determining the PWS size selected for this research.

WQRF requests that proposals identify the number of case studies that would be feasible for inclusion in this research, as well as whether a single contaminant and treatment technology *or* multiple contaminants and treatment technologies should be investigated. Lead was given as an example in the background information above, but WQRF does not have a preference as to which contaminants are included in the study.

Researchers shall utilize the [EPA’s Best Available Technology \(BAT\)](#) when deciding on a treatment technology. Multiple distribution sizes shall be investigated as WQRF is interested in comparing the analysis outcomes.

The final result should be a report comparing the sustainability of utilizing POU/POE treatment options as a permanent compliance solution to the sustainability of the centralized treatment options (including any upgrades) that would be necessary to deliver the same quality of water. For the purposes of this project, please utilize the following definition of sustainability:

**Sustainability** - Human activity conducted in a way that meets “the needs of the present without compromising the ability of future generations to meet their own needs.”<sup>4</sup> In the marketplace, the term is used to address ideas and emerging systems of thought that include corporate social responsibility, corporate citizenship and environmental responsibility.

It is important to note that this definition includes “The Three P’s – People, Planet, and Profit”. The sustainability evaluation shall therefore include the social and public health impacts (People), environmental impacts (Planet), as well as economic impacts (Profit).

WQRF has identified specific areas of interest regarding the terms “People, Planet, and Profit”. Please note that proposals should address, but are not limited to, the below categories/examples:

### **PEOPLE**

“People” has been broken down into two overarching topics: health and acceptability. Both of these topics are further defined, and are as follows:

- a. **Health: work environment, long term health effects, contaminants, etc.**
  - i. WQRF would be interested in data relating to any potential health risks associated with work environments. If such data are available, a representative of the average work environment should be used for both centralized and POU/POE treatment.
  - ii. There is a cost associated in terms of health effects or increase in risk from the period of non-compliance while there is no treatment in place for the regulated contaminant. The WQRF is interested to know how the expected timeline of implementation for POU/POE versus Centralized treatment compares in terms of the cost of health effects from exposure to the water during this period of non-compliance. Therefore, a review of the healthcare costs avoided due to the reduction of risk with a shorter implementation timeline should be included in the report. Please see previous WQRF research on this topic in the [“Informative References” section](#) for more information.
  - iii. Regarding contaminants, only contaminants governed by the [NPDWRs](#) should be considered for this research. However, microbiological contaminants are to be excluded for this study as POU devices are prohibited for compliance by the EPA for microbials.
  
- b. **Acceptability: this section will only be a literature review.** WQRF is not aware to what degree this information is available in current literature and looks forward to hearing about the feasibility of inclusion for this study. Below are some sample questions that WQRF would like to have data on, if possible, regarding acceptability:
  - i. What treatment method (centralized or POU/POE) is more widely accepted by individuals?
  - ii. What demographic is most likely to accept centralized treatment?
  - iii. What demographic is most likely to accept POU/POE treatment?

**PLANET**

Environmental impacts (resource depletion/consumption, emissions, and holistic impacts) of the life cycle phases (raw material extraction/production, manufacturing, packaging/distribution/transportation, use, and end-of-life) are used to assess sustainability. Proposals should include a literature search to find pre-existing data about these environmental impacts, as it relates to both POU/POE and centralized treatment (Table 1).

Table 1: Life Cycle Phases and the Corresponding Environmental Impacts which are Proposed to be Included in the Literature Review Assessment for Comparing Centralized and POU/POE Treatment

		Environmental Impacts						
		Resource Depletion/Consumption			Emissions Impacts			Holistic/Long-Term Impacts
		raw materials	energy	water	to air	to water	solid waste	Ecosystems/Biodiversity
Life Cycle Phases	raw material extraction/production							
	manufacturing							
	packaging/distribution/transportation							
	use							
	end-of-life							

Table 1 shows all the datasets that should be considered for the research proposal. WQRF is cognizant that certain data regarding the environmental impacts of the lifecycle phases may be scarce or unavailable in the literature or publicly available sources. Therefore, WQRF requests that proposals address what data are presumed to be available for inclusion in this study, and the methodology that will be used to find such data. Rationale for any data that are proposed for exclusion should be explained. This table is provided in the [WQRF executive summary template](#) and is to be filled out according to the researcher’s proposed work. For more information about the executive summary template, reference the [“Proposal Format”](#) section.

Additionally, it is important to note that:

- The end-of-life phase is inclusive of packaging, consumables, and systems as a whole
- Recycling can fit under packaging/distribution/transportation and end-of-life solid waste emissions
- Regeneration of media/resins fits under energy consumption, water consumption, and water emissions for the end-of-life phase
- Impacts to air include both hazardous emissions (SOx, NOx, Particulates, CO, VOCs, etc.), as well as Greenhouse Gases [GHGs - mainly CO<sub>2</sub>]
- Impacts to water means not the water itself, but rather contaminants that are included with water being discharged either to public waterways or publicly owned treatment works (POTWs)
- Solid waste analysis should include a consideration of both hazardous and non-hazardous waste

## **PROFIT/ECONOMIC VIABILITY COMPARATIVE ANALYSIS**

For the purposes of this project, the researcher must produce an economic viability comparison of POU/POE solutions versus centralized treatment solutions. Rather than being concerned about whether the profit from either solution is sustainable for the entity profiting from the treatment (whether that be a POU/POE provider, a public utility, or a private utility), the researcher should focus on whether the cost to implement and maintain that treatment solution is sustainable based on the economic viability for the consumers who are benefiting from it. Another way to state this concept is through considering the true cost of the treatment solution. If infrastructure upgrades are required (e.g., a water pipeline to consolidate two systems), the researcher should not only consider the cost of the upgrades, but also the cost of maintaining that new infrastructure. While Federal Grants may be obtainable in some cases to pay for infrastructure upgrades, those costs should be included in the analysis because they represent real dollars that ultimately come from consumers. All costs from a global perspective must be accounted for, as it would be inappropriate to discount any costs just because the local taxing jurisdictions are not responsible for meeting these costs.

Aspects which should be included on the cost side of this analysis include, but are not limited to:

- Infrastructure or capital improvements (normalized for expected lifespan)
- Maintenance of infrastructure or capital
- Initial purchase and installation costs for POU/POE (normalized for expected lifespan)
- Consumables (e.g., chemicals, replacement cartridges for POU/POE, treatment media for PWS)
- Pilot testing costs
- Cost of technical assistance (consultants, engineers, water treatment professionals)
- Cost of water monitoring/analysis of water samples (initial and ongoing based on recommendations of subject matter experts)
- Jobs: staffing needs (creating/maintaining jobs), salaries/benefits, initial and ongoing training/licensing, etc.
  - It is important to note the differences in staffing needs for centralized vs POU/POE treatment. In order to properly monitor POU/POE devices for compliance, the municipality may choose to partner with a local POU/POE device dealer, hire on additional staff, or monitor the devices without hiring additional staff.
- Administrative costs
- Liability

On the economic sustainability side of this equation, a strong proposal would consider the economic status of the community that is impacted (e.g., tax basis which could sustain a local treatment solution), as this influences the ability of the local community to sustain the costs associated with a proposed treatment solution.

## **Requirements for Researchers**

Researchers must be well-qualified and have expertise in POU/POE drinking water treatment. The names and qualifications of primary investigators involved in this project must be provided.

The researchers must have the facilities and capabilities to accomplish this project or provide a list of partners and their qualifications they will work with to accomplish this project, as well as a list of the primary investigators from those partners.

The researchers must complete work on this project within two years of the approved start date.

## Restrictions

Please read this section carefully. Researchers are encouraged to consult with the WQRF if you feel your proposal borders on one or more of these restrictions. Proposals which violate any one of these restrictions will not be funded by the WQRF:

- The proposal shall be scoped to prevent use of the study to promote or disparage a specific product model, company/organization or brand name.
- The research shall not be of a type ordinarily carried on by commercial or industrial operations such as: the ordinary testing and inspection of materials/ products, or design and construction of water treatment equipment or parts thereof.
- While the WQRF supports the benefits of product validation testing, the WQRF does not fund validation testing of new products or emerging technologies.
  - Projects that involved general benchmarking of the benefits relative to a technology sector have been funded (e.g., [the benefits of softening study](#), [the benchmarking of emerging scale prevention technologies](#)) only when they were structured to benefit the entire industry and not to promote a specific product, benefit a specific manufacturer, or develop a new patent.
  - Consistent with this policy, WQRF bylaws require that any accidental patents or trademarks resulting from research they fund shall be made available to the public-at-large on a non-discriminatory basis.
- The researchers cannot have a commercial interest in any products or technologies proposed for inclusion in the study.

## Business Requirements and Responsibilities

In support of this project, WQRF and WQA agree to the following duties and responsibilities:

- WQRF will provide the researcher with any background information needed, such as a list of industry stakeholders.
- The WQRF research task force, WQRF technical staff and the WQA Water Sciences Committee will take an active role in technical review of interim reports and approval of final report, especially with regards to industry specific knowledge or operations which the researcher may not be otherwise aware of.
- WQRF and WQA will track progress and provide any necessary coordination with industry stakeholders throughout the course of the research, will supply technical input upon request, and will facilitate support and input from the Water Sciences Committee.
- WQRF will provide public access to the executive summary and the full report.

The researcher will contract with WQRF to perform the following activities and any other activities necessary:

- Perform all aspects of the research concept.
- Provide an invoicing schedule for completing the research, including a schedule of interim reports for peer review by the research task force, and complete the study in a timely manner according to the schedule. All invoices must be linked to a deliverable or scientific milestone. Ten percent (10%) of the project cost must be associated with the delivery of the final report.
- Engage with and provide response to the WQRF questions relating to progress and coordination, as well as comments on interim reports.

- Agree all intellectual properties and copyrights are owned by the Water Quality Research Foundation:
  - WQRF owns the entire right, title, and interests, including all copyrights and other intellectual property rights, in and to all Project Intellectual Property developed by WQRF personnel. Project Intellectual Property that is jointly developed by the researcher and WQRF personnel under this Agreement will be jointly owned by the researcher and WQRF.
  - It is important to understand that while the WQRF reserves the intellectual property rights associated with the final report submitted to WQRF, the copyright thereof, and all rights to distribute the final report, WQRF freely shares the knowledge gained through research that they fund, and the researcher will not be precluded from republishing that knowledge or from using that knowledge to further their own research. However, no research results can be published by the researcher without prior review and approval by WQRF (or where so designated the WQA Water Sciences Committee).
- Republish the study in a peer-reviewed publication:
  - It is WQRF's preference that after review and approval of the final report, the researcher will seek to republish the study in a peer-reviewed publication. Whenever referencing or republishing information, knowledge and/or data derived from a WQRF project, researchers must make proper citation to the WQRF report. Such publication should be completed within 9 months from the date that WQRF approved the final report. WQRF cannot guarantee that the research results will be withheld from the public during the 9-month period.

## Confidentiality

All proposals will be treated as confidential and will not be shared outside of the WQRF, with the exception of committees, task forces and WQA staff members who are acting under restriction of confidentiality on behalf of the WQRF. The distribution list includes the WQA Water Science Committee (members only) and their assigned Research Task Force. The Water Science Committee and its assigned Research Task Force are made up of subject matter experts from the water treatment industry.

## Proposal Format

Proposals shall follow the format provided in [Appendix A](#).

## Selection Criteria

Proposals will be mainly evaluated based on value by rating the potential (positive) impact of the research compared to the cost. The WQRF prefers to keep indirect costs at or below 13% of the total research budget. The researcher's credibility, previous experience, qualifications and publications will also be taken into consideration. Strong proposals will include a statement demonstrating how the researcher will engage with state or national agencies to utilize the results from this sustainability comparison study. Additional factors will be considered where applicable.

## Informative References

Click on the following links for informative references. These references are neither all inclusive, nor mandatory for this research. Please note that researchers are in no way limited to the use of the links below and are encouraged to use other appropriate references.

- [EPA's Small Drinking Water Systems Research](#)
- [EPA's Best Available Technology \(BAT\)](#)
  - [Drinking Water Treatability Database](#)
- [EPA's Technologies and Costs for Removal of Arsenic from Drinking Water](#)
  - This source contains POU/POE case studies starting on page 169
- [Arizona Point of Use Compliance Program Guidance](#)
- [California Code of Regulations: Point-of-Use Treatment](#)
- [NSF's Environmental Technology Verification \(ETV\) testing](#)
- [Community Engineering Corps – South Dakota](#)
- [EPA Enforcement and Compliance History Online \(ECHO\)](#)
- [Cost Benefits of Point-of-Use Devices in Reduction of Health Risks from Drinking Water](#)

## Due Date

Proposals must be submitted to [Kayla Heriaud](#) by 11:00 am Central on May 20<sup>th</sup>, 2019.

## Questions

The contact for this RFP is Kayla Heriaud. Questions can be directed to her at any time.

*Kayla Heriaud*

*WQRF Research Project Leader*

630-929-2599

[kheriaud@wqrf.org](mailto:kheriaud@wqrf.org)

## Citations

1. US EPA, Office of Water. *Point-of-Use or Point-of-Entry Treatment Options for Small Drinking Water Systems*. (April 2006). Retrieved from: [https://www.epa.gov/sites/production/files/2015-09/documents/guide\\_smallsystems\\_pou-poe\\_june6-2006.pdf](https://www.epa.gov/sites/production/files/2015-09/documents/guide_smallsystems_pou-poe_june6-2006.pdf)
2. Frumkin, Howard. *Important Update: Lead-based Water Lines*. (2010) Center for Disease Control and Prevention. Retrieved from: <https://www.cdc.gov/nceh/lead/waterlines.htm>
3. Swackhamer, Deborah L. *Science Advisory Board Evaluation of the Effectiveness of Partial Lead Service Line Replacements*. (2011) EPA. Retrieved from: [https://www.epa.gov/sites/production/files/2015-09/documents/sab\\_evaluation\\_partial\\_lead\\_service\\_lines\\_epa-sab-11-015.pdf](https://www.epa.gov/sites/production/files/2015-09/documents/sab_evaluation_partial_lead_service_lines_epa-sab-11-015.pdf)
4. United Nations, Report of the World Commission on Environment and Development, General Assembly Resolution 42/187 (1987).

## APPENDIX A – Format

Proposals should *not* be password protected to restrict editing. Upon receipt, WQRF adds a watermark to the proposal to identify it as confidential prior to distributing to task force members and subsequently password protects the document. Proposals should include the following sections, and if necessary, other sections may be added:

Executive Summary – The executive summary form is available as a downloadable Word document at <http://www.wqrf.org/open-rfps.html>. This form should be completed and included as the first page of your proposal.

Abstract – Summarize the research project, plan, timeline and objectives. Explain the potential (positive) impact on the industry from your proposed project.

Introduction and literature review – Should include an overview of the research topic, especially focal points which are relevant to the proposed work, and a review of related research or publications which define what is already known about the research topic.

Detailed research plan and methodology – Describe the proposed experiment(s) including any equipment and methods which will be used to complete the work. As there is no word/page limit for the proposals, methodology should be written thoroughly. Proposals without a detailed methodology will likely be eliminated from consideration by the research task force.

Deliverables – Describe the deliverable(s) that you will be providing for this work. For example, the project deliverables might include: raw data, interim research report(s), final research report, presenting the findings at a relevant conference, hosting a workshop, or other deliverables.

Estimated timeline – This should be completed based on an unknown start date (e.g., the first interim report will be issued 3 months from the authorized start date...) The projected start date is subject to change but is estimated to fall between July 2019 and September 2019 inclusive. The timeline shall not exceed 2 years from the start date. Please include an estimated invoicing schedule along with your timeline that includes the percent owed at the start of the project and its various milestones. As previously mentioned, all invoices must be linked to a deliverable or scientific milestone and ten percent (10%) of the project cost must be associated with the delivery of the final report.

Credentials and qualifications – A statement of qualifications, previous experience, and related publications of the primary and supporting investigators.

Budget – Total budget shall not exceed \$130,000 as this amount is the maximum funding available. However, researchers should attempt to submit proposals for the lowest dollar amount that is practical. Preference may be given to the lowest cost proposal that still best meets all the requirements/deliverables. At a minimum, the budget should be broken down by the following categories (where applicable): Salaries, Fringe Benefits, Equipment (including materials & supplies), Travel, Subcontract fees, and Indirect costs. Indirect costs only need to be included in the budget if this is something that the bidding organization normally tracks through their financials. The WQRF prefers to keep indirect costs at or below 13%. Other categories may be added as needed.

Potential Conflict Circumstances statement (required) – A statement shall be included reporting any direct or indirect circumstances which could potentially create a conflict of interest. For example, if the proposed study could further the interests of a company with which the researcher or the research organization has a contractual agreement to provide testing, certification, consulting or other services (or is negotiating such an agreement), that shall be disclosed as a potential conflict circumstance. The WQRF shall have final authority over whether a potential conflict circumstance represents a Conflict of Interest.