THE Water Research FOUNDATION

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REQUEST FOR PROPOSALS (RFP)

Technical Brief: Compounds of Current and Future Interest and Implications for One Water (RFP 5036)

Due Date: Proposals must be received by 2:00 pm Mountain Time on Friday, September 27, 2019

WRF Project Contact: Lola Olabode, lolabode@waterrf.org

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

Project Objective
The objective of this project is to develop a technical brief addressing ecological and human health impacts of compounds of emerging concern (CECs)/trace organic compounds (TOrCs) in the One Water context (i.e., wastewater, receiving water, urban stormwater runoff, recycled water, groundwater, and drinking water). The technical brief will consist of plain English fact sheets written in layman's terms that:

- Synthesize the current definitions of compounds of interest, unregulated compounds of concern, and newly emerging compounds.
- Summarize the state of the knowledge (i.e., what we know and don't know) about these compounds in the One Water context.
- Describe currently used and promising methods to identify, measure and assess the impact of CECs, as well as the most effective treatment processes for wastewater, recycled water and drinking water.
- Evaluate the potential human health and ecological effects of CECs.
- Identify current management strategies for CECs.

Budget
Applicants may request up to **$75,000** 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
The Water Research Foundation has been engaged in research and tracking of new developments related to the occurrence, treatment, fate, and transport of CECs in receiving waters, wastewater, water for reuse, and biosolids. WRF has previously sponsored several research projects designed to tackle various aspects of multi-stressors, pharmaceuticals and personal care products, and other compounds of interest and concern.

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In 2007, WRF conducted a roadmapping exercise on TOrCs, and subsequently developed a strategy to lead on some issues, collaborate whenever possible, and monitor all CEC/TOrC activities. This exercise funded research in three focus areas related to TOrCs in the natural environment:

1) Treatment Efficiency
2) Aquatic Impacts
3) Risk Communication

WRF's treatability study, *Trace Organic Compound Indicator Removal during Conventional Wastewater Treatment* (CEC4R08), helped to select TOrC indicator chemicals for research conducted in the aquatic environment (CEC5R08[1], CEC5R08a[2], CEC5R08b[3], and CEC5R08c[4]). In 2010, WRF released a Phase I report, *Diagnostic Tools to Evaluate Impacts of Trace Organic Compounds* (CEC5R08), which served as the direct precursor to *Testing and Refinement of the Trace Organics Screening Tool* (CEC6R16). Phase II of this work (CEC6R12[5]) was conducted with the goals of: 1) refining and applying the tools developed in Phase I; 2) demonstrating their utility using existing data; and 3) validating the tools using new data.

Over the past 10 years, many of WRF's projects focusing on the aquatic environment were designed to help increase our understanding of the fate, wastewater treatment, and ecological risks of CECs. These prior research efforts, as well as concurrent research being conducted in Canada, the European Union (EU), and elsewhere, provide valuable tools that can be used to better inform utilities, regulatory agencies, and the public about prioritizing, monitoring, assessing, and managing CECs in surface waters. Methodologies to analytically and biologically monitor and assess exposure and effects of CECs have advanced at a rapid pace, providing better tools for addressing CEC risks to aquatic life.

Several collaborative workshops with organizations such as Southern California Coastal Water Research Project, Water Environment Federation, Canadian Water Network, Society of Environmental Toxicology and Chemistry, and the U.S. Environmental Protection Agency have improved our understanding by simplifying risk evaluations of chemical mixtures originating from treated wastewater effluents. WRF's involvement with the Global Water Research Coalition, a group of a dozen water research organizations from eight countries around the world, provides an opportunity to track CEC activities.

Numerous resources are available from organizations such as the National Water Research Institute (NWRI), European Union (EU) solution projects, and WRF, including the recent WRF 2018 expert workshop on CECs (CEC 17-09/4786, *Expert Workshop on Compounds of Emerging Concern Research Needs. Where Do We Go from Here?*).

Predicting risks or retrospectively assessing risks of specific chemicals on aquatic life in surface waters are challenging. CECs represent an ever-increasing number of chemicals, many of which are not well understood in terms of their fate and potential effects on aquatic life.

The complexity is augmented when other stressors, including conventional water quality indicators (biological oxygen demand, solids, temperature), as well as habitat and flow alterations, are co-located. Hence, from a management perspective, there is a critical need to improve chemical characterization and distinguish the effects of CEC exposure from those of other stressors. Such knowledge will guide

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[1] *Diagnostic Tools to Evaluate Impacts of Trace Organic Compounds*
[2] *Diagnostic Tools to Evaluate Impacts of Trace Organic Compounds: Prioritization Framework for Trace Organic Compounds*
[3] *Development of Diagnostic Tools for Trace Organic Compounds and Multiple Stressors*
[4] *Testing Diagnostic Tools for Trace Organic Compounds and Multiple Stressors: Case Studies*
[5] *Testing and Refinement of the Trace Organics Screening Tool*

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appropriate management decisions that will result in improved ecological status, which are verifiable using methods accepted by experts in distinguishing causes of biological impacts from potentially diverse sources. Given the overlap of statutes within the Clean Water Act (e.g., fishable, swimmable), diagnostic tools and treatment technologies that yield ecological improvements may also reduce risk to human health (i.e., contact and/or potable source water).

To address the needs of the water supply and wastewater communities regarding CECs, an expert workshop was sponsored by WRF, which was convened at WRF's Denver, CO, office on September 27-28, 2018. The purpose of this workshop was to: (1) identify what is known, as well as data gaps, regarding the potential effects of CECs; and (2) recommend actionable next steps that will reduce the uncertainties associated with the identified gaps.

Appropriate communication is critical for the results of these historical and future works to be understood. This will provide decision-makers with the tools and understanding to address real and perceived CEC risks.

Research Approach

- Identify a multidisciplinary team with expertise in the following topic areas: ecotoxicology (adverse outcome pathways, omics, bioanalytical screening), biology (species diversity and population effects), chemistry (analytical measurements, fate and transport), and human health.
- Update the current state of knowledge regarding CECs. Key reports and publications to include are listed below in the "References and Resources" section.
- Develop a semi-exhaustive list of CECs that are present or likely to persist in the different water matrices.

Expected Deliverables

The One Water community needs a simplification of the complexities involved with CECs. Success and communication of this technical brief will include and highlight the following elements:

- Plain English Fact Sheets and/or FAQs in layman's terms, including infographics, as applicable. Topics that could be covered on the fact sheets/FAQs are as follows:
  - What are CECs (with a focus on trace organics)?
  - What are the most promising assessment tools (modeling, ecotoxicological and analytical approaches)?
  - What are the data gaps/research needs that need to be addressed to improve the link between exposure and effects?
  - What is the state of the science for CECs from different types of discharge/habitats?
    - agricultural runoff
    - urban stormwater runoff
    - wastewater
    - recycled/drinking water
- Summary of the current state of science, knowledge and data gaps.
- 1-2 minute video clips on the state of knowledge and current trends in CECs, including the effects and implications for One Water.
- PowerPoint presentation to enable communication at conferences and meetings.
- Webcast to communicate the state of science, knowledge gaps and data gaps, and to share current activities, drivers, and collaborative solutions from other organizations on CECs in One Water.

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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 9 - 12 months from the contract start date.

References and Resources
The following charts include 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.

WRF Research

Technical Brief: Trace Organics Compounds and Implications for Wastewater Treatment (project CEC3R07, published in 2008)
Technical Brief, Endocrine Disrupting Compounds and Implications for Wastewater Treatment (project 04-WEM-6, published in 2005)
WRF Compounds of Emerging Concern Research Project Listing

Other Key Reports and Publications

Title	**Reference**	**Publication Date**
A Framework for Screening Sites at Risk from Contaminants of Emerging Concern	*Environ Toxicol Chem,* 34(12): 2671-81.	2015
Emerging Pollutants in the EU: 10 Years of NORMAN in Support of Environmental Policies and Regulations	Environ Sci Eur, 30(1): 5.	2018
Evaluation of the Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse	Expert Panel Final Report, prepared by NWRI for the State Water Resources Control Board	2016
Towards the Review of the European Union Water Framework Directive: Recommendations for More Efficient Assessment and Management of Chemical Contamination in European Surface Water Resources.	*Sci Total Environ,* 576: 720-737.	2017

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)

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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 $75,000. 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 $75,000. **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

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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:00 pm Mountain Time on Friday, September 27, 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, Lola Olabode at (571) 384-2109 or lolabode@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**.**

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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.)**

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