

2024 ITRC Project Proposal

Proposed Project Title

Contaminants of Emerging Concern Identification Framework - Biologicals

State Team Leader

1. Vivek Mathrani, PhD, DABT, California, vivek.mathrani@dtsc.ca.gov
2. Paula Panzino, MSE, Arizona, panzino.paula@azdeq.gov

Proposal Contacts

The proposal contacts are the State Team Leaders listed above.

Abstract

The ITRC Contaminants of Emerging Concern (CEC) definition reads, “Contaminants of emerging concern refer to substances or microorganisms, including physical, chemical, biological, or radiological materials, known or anticipated in the environment, that may pose newly identified risks to the human health or the environment.” “Microorganisms” and “biological” contaminants remain only loosely addressed in the current draft of the CEC Framework, and the approaches to their identification and monitoring are distinct from those employed for chemicals. The current CEC Team hopes to continue its work in making the current ITRC CEC Framework comprehensive in scope under the definition it adopts, and empower states to take a more holistic approach to addressing CEC that may impact environmental resources. The current draft Framework to be finalized in late 2023 will be augmented with information on how biologically-based CEC can be identified (i.e., monitoring programs, key variables [criteria], analytical methods) and how human health and environmental risk associated with biological contaminants could be communicated.

Problem Statement & Importance to the States and Broader Environmental Community

The Contaminants of Emerging Concern (CEC) Team is proposing to expand the content promised by the CEC definition, which is adopted from the *Clean Water and Drinking Water State Revolving Fund Provisions* of the 2022 Bipartisan Infrastructure Law. These provisions provide guidance to the states on how to access federal funding to address CEC in drinking water, wastewater, and other impacted environmental media.

The definition reads, “Contaminants of emerging concern refer to substances or microorganisms, including physical, chemical, biological, or radiological materials, known or anticipated in the environment, that may pose newly identified risks to the human health or the environment.” The Team decided to meet the two-year timeframe of the original proposal by focusing on physical and chemical contaminants. Approval of this proposal would allow the CEC Team to provide a more comprehensive identification framework by including environmental biological contaminants. The term “biological contaminant” remains undefined by the CEC Workgroup.

Novel and emerging biological contaminants are an area of great importance to the states as demonstrated by the notable challenges public health agencies have faced in recent decades when waste streams are diverted or insufficiently managed. According to the [World Health Organization](#), thirty-five new pathogens were discovered and several others re-emerged after periods of inactivity between 1972 and 1999. There are 12 viruses, bacteria, and protozoa on the [EPA's Fifth Contaminant Candidates List](#) (USEPA, October 2022). Climate change and regional anthropogenic impacts on environmental systems create new niches for pathogens to survive. Stormwater runoff impacted by sewer lines, septic systems, road runoff or animal waste can contaminate surface water. Improperly treated sludge and organic waste purposed for fertilizer can increase risk of food-borne disease. Microplastics can serve as a substrate for microbial communities and can transport pathogenic, invasive species to non-native waters. The coverage of the emergence of bovine spongiform encephalopathy in cattle and Creutzfeldt-Jakob disease (CJD) in humans in the 1980s raised awareness of prions, the only infectious agents known that lack nucleic acid. Antibiotic-resistant bacteria and genes are on the rise in aquatic ecosystems. Early in the COVID pandemic, the necessity and approach to managing SARS-CoV-2 detections in wastewater and sewage were unknown. It is clear that a regulatory approach to managing environmental health needs to expand focus beyond chemicals and substances. As with any contaminant, we only manage what we measure.

In addition to microbial contaminants, the new material will answer questions on how to generically address and prioritize chemical contaminants that are byproducts of microorganisms. ITRC has specifically addressed Harmful Cyanobacterial Blooms (HCBs) and their associated toxins. Past ITRC Teams have been dedicated to addressing specific physical and chemical CECs (microplastics, PFAS, 1,4-dioxane, tire anti-ozonants), which culminated on the 2022 Team to develop a generic CEC identification framework. The new Team proposed herein hopes to similarly equip the states to address biologicals beyond ITRC's HCB-1 and -2 guidance documents. The Analytical Methods component of the Biological CEC Framework will also serve to update techniques featured in the 2011 Environmental Molecular Diagnostics guidance as discussed below. Therefore, in addition to expanding the CEC Framework, the proposed work would build on the previous ITRC products.

This supplementary information would provide a more comprehensive view of CECs to empower state procurement of federal funding. The CEC Team requests the ITRC Board's support for this additional effort. Several current Team members who are CEC specialists for their respective agencies agree that this is the next logical step to further develop ITRC's CEC Framework. The current CEC Team includes members from 46 states and 8 foreign nations, which we believe reflects the broad interest and importance of the work.

Project Deliverables

This extension will enable the CEC Team to provide a more comprehensive web-based CEC Identification Framework. The 2022 Team's (current) products would be augmented as follows:

- The **White Paper** would be expanded to explain the scope of what is included in the biological contaminant category, provide a definition and why these are important for a State CEC Program;
- The **Identification of CEC Monitoring Programs Fact Sheet** would be updated to include an inventory of environmental monitoring programs for biological hazards to provide states with current, active information resources;
- The **Identification of Key Variables Fact Sheet** would add a discussion of health effect metrics and examples of chemical and biological interactions and the contaminant byproducts.

A case study would be added to illustrate how key variables can be used to identify a biological CEC;

- The **Risk Perception and Communication Fact Sheet** would be updated to include guidance specific to the communication of health effects due to exposure to biological contaminants; and
- The **Adoption of Analytical Methods Fact Sheet** would include how biological contaminants are isolated and identified. The addition of material to this fact sheet would likely update and go beyond the 2011 ITRC Environmental Molecular Diagnostics Fact Sheets. An additional case study would be added to illustrate how the identified analytical methods could be used to identify novel biological contaminants.
- Associated outreach and training on the developed Biological CEC Identification Framework.

Additional Information

Several public agencies perform work relevant to the scope of this proposal:

- Federal EPA selects microbial and biological agents for its [Candidate Chemical List \(CCL\)](#) based on its own preliminary screening approach and subsequently occurrence in drinking water and human health effects.
- CDC National Outbreak Reporting System (NORS) maintains a [dashboard](#) on water-borne and environmental outbreaks.
- National Institute of Allergy and Infectious Disease (NIAID) has an [emerging infectious diseases/pathogens research program](#).
- The [New York State Water Resources Institute](#) at Cornell University supports science and dialogue between researchers, managers, policymakers, and the public to improve water management through original research and outreach on topics of local, state, and national importance.
- The California State Water Resources Control Board investigates public health issues and scientific and technical matters regarding water recycling criteria for [direct potable reuse](#) and publishes a [Summary](#) of Statewide/Regional CEC Policies, Plans, and Results Reports.
- The California Department of Public Health Infectious Diseases Branch has a [Surveillance Section](#).
- [Ohio](#), [Minnesota](#), [Arizona](#), [Florida](#), and [Oregon](#) are among the states that currently have or are developing strategies to monitor and address biological CEC.

The Council of State and Territorial Epidemiologists publishes a [list of infectious disease points of contact](#) by state. This list will be used to identify personnel interested in participating in the Biological CEC Team.

The [Association of State and Territorial Health Officials](#) provides capacity building and technical assistance in advancing environmental health and managing infectious diseases.

USEPA publishes a list of [laboratories that analyze for cyanobacteria and cyanotoxins](#) which may extend to other biological contaminants.

Subject matter experts that would be interested in joining this project team include environmental microbiologists, wastewater treatment specialists, drinking water treatment specialists, epidemiologists, infectious disease specialists, toxicologists, molecular biologists, and virologists. The current CEC Team membership includes several toxicologists and molecular biologists. Additional recruiting for subject matter expertise in other practice areas will be necessary. However, the several months that the 2022-23 CEC Team took to adopt both a CEC definition and a structure for its framework would instead be

dedicated to identifying qualified Team members and reviewers. The current CEC Team membership would be requested to help identify counterparts in their respective health departments.

This Biological CEC Proposal submitted herein addresses several environmental priorities of interest identified by states that ITRC indicated in its call for project proposals (figure below):

- Climate Considerations (warming surface waters; increased rainfall and flooding)
- Water Resource Considerations (wastewater effluent; drinking water safety)
- Nonpoint Source Pollution and Stormwater (increased rainfall and surface runoff; flooding/mobilization of sanitation systems)
- Agricultural Impacts (food safety from sludge-based fertilizer; nutrient loading)
- Emerging Contaminants (per the Clean Water and Drinking Water State Revolving Fund Provisions)

