Center for Environmental Sciences & Engineering

University of Connecticut

Environmental Chemistry Laboratories

Analysis of Aquatic Pollutants and Natural Toxins

***Environmental Context*—**Water quantity and quality play a critical role in determining vital characteristics of marine, freshwater, and terrestrial ecosystems, and contribute significantly to human well-being. Consequently, physical, chemical, and biological characteristics of water represent key indicators of both ecological and human health. Human activities such as urbanization, industrial development, agricultural practices, mining, and fuel use significantly alter many characteristics of water, resulting in changes in quality and utility. For example, aquatic environments that receive inputs of nitrogen due to human land use practices (e.g., crop fertilization, waste disposal) often become eutrophic and support high concentrations of Cyanobacteria. Many of the common species of Cyanobacteria produce toxic metabolites that can be lethal to wildlife, livestock, and humans, consequently endangering ecosystem and human health.

***Resources and Instrumentation*—**CESE has extensive analytical expertise and advanced instrumentation in the quantification of nutrients and trace pollutants, both organic and inorganic, in ground and surface waters. Instrumentation includes:

- Ion chromatograph
- Segmented flow auto analyzer
- Total organic carbon analyzer
- Inductively coupled plasma/mass spectrometer
- Cold vapor atomic fluorescence spectrometer
- ELISA plate reader
- Ultra performance liquid chromatograph/ tandem mass spectrometer (UPLC/MS/MS)
- Gas chromatograph/tandem mass spectrometer (GC/MS/MS)
- Fluorometer

***Research Capabilities*—**CESE has considerable capacity to support a diversity of research projects related to water quality research and analysis by providing quantitative assessments of a wide array of compounds including nitrogen and phosphorus species, pharmaceuticals, mercury, organic carbon, and ground water tracers.

Examples of projects that CESE can support include:

- Quantification of nutrient species in fresh and saline systems, with detection limits of as low as 1ppb.
- Assessment of environmental estrogens, pharmaceuticals, and personal care products in surface, storm, and wastewater.
- Quantification of harmful algal bloom toxins, including individual microcystin analogs.
- Analysis of per- and polyfluoroalkyl substances (PFASs) in surface and ground waters.
- Development and validation of groundwater tracers for use in pollution mobility studies.
- Analysis of traditional and emerging pollutants in drinking and ground water wells.

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