Technical Report 0600

Workshop Report
Managing Contaminants of Emerging Concern in California: Developing Processes for Prioritizing, Monitoring, and Determining Thresholds of Concern

Produced by:
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EXECUTIVE SUMMARY

Contaminants of emerging concern (CECs) are a diverse group of relatively unmonitored and unregulated chemicals found in consumer and industrial products that have been shown to occur at trace levels in wastewater discharges, ambient receiving waters, and drinking water supplies. CECs include pharmaceuticals, personal care products, and other commercial and industrial compounds. A lack of basic information and the technology to efficiently measure CECs at trace levels (i.e., parts per trillion) hampers our ability to assess their potential risks, though scientists are beginning to generate such information. State and local health and regulatory agencies are aware of (and, in some cases, are funding this research), but have not yet synthesized the information into a comprehensive strategy for developing their monitoring and regulatory actions. A number of workshops have been held where scientists shared results among themselves and charted future directions for their scientific investigations on CECs in water, but there have been few mechanisms for the interaction between scientists, water quality managers, and other stakeholders.

In response, a workshop was convened to bring together 50 scientists, water quality managers, and stakeholders to enhance communication and formulate a path forward for integrating science into an effective CEC management strategy that is protective of water quality. Although the Workshop reviewed information on a national basis, the focus of the Workshop was devoted to approaches and recommendations on CECs in California.

The Workshop included plenary presentations that summarized the state-of-the-science and informed participants about regulatory practices for waterborne contaminants, and breakout sessions intended to review CEC approaches for California. Specific breakouts discussions were held on: 1) CECs that are of sufficient concern to be incorporated into routine monitoring programs, 2) measurement techniques for monitoring these CECs, and 3) thresholds of ecological and human health concern for interpreting CEC monitoring data.

Workshop participants began by agreeing that the current chemical-specific risk assessment approach is neither feasible nor cost-effective for prioritizing and managing the vast majority of CECs. The participants noted that chemical-specific risk assessment approaches will continue to play a role in the regulation of contaminants for those chemicals with known adverse effects. There are 129 priority chemicals currently regulated by the USEPA under the Safe Drinking Water Act and Clean Water Act, but tens of thousands of CECs exist that may potentially require assessment to ensure their impacts to human and ecological health are minimal. The traditional risk-based approach can be retained for those CECs for which detailed information on occurrence, concentrations, exposure, and toxicity (e.g., dose-response relationships) is available; however, this current paradigm is not feasible given the extreme data

gaps for most CECs and the limited resources available to fill these gaps. A new paradigm which prioritizes chemicals (or chemical classes) with similar modes/mechanisms of action for further evaluation is needed.

Monitoring of CECs is a key part of that new paradigm, but Workshop participants stressed that we are currently in the investigative phase, and developing regulatory limits would be premature at this time. Identifying a clear set of goals for investigative monitoring (e.g., to address unanswered questions on CEC occurrence and concentrations, or to assess the removal efficiency of existing or new treatment processes) was deemed essential for filling the most critical data gaps and obtaining maximum benefit from the limited resources available to support such studies. Because trace levels of CECs may impact multiple beneficial uses of water (e.g., human consumption and ecological health) in a variety of settings, a set of priority questions specific to the monitoring application were developed to guide future data collection. These applications included protection of human health and/or ecosystem health in drinking water supplies, recycled water for non-potable and potable reuse, wastewater discharge, and stormwater runoff. By delineating these applications, the participants were able to identify commonalities in data collection needs across different sectors of the water resources community and highlight areas of potential collaboration.

Owing to the scarcity of data and lack of robust methodologies for measuring most CECs, *a flexible, multi-element prioritization framework was recommended to identify those compounds of highest concern.* This framework would integrate risk-, occurrence-, and modeling-based prioritization elements to select the highest priority CECs for each specific monitoring application and geographical location. Priority CEC lists could be further optimized by incorporating indicator compounds and/or surrogate parameters, which serve to enhance the effectiveness of monitoring approaches while reducing the cost and complexity of monitoring. While analytical methods exist for some CECs, the development of robust techniques at trace levels for additional chemicals is needed to provide a solid foundation for monitoring programs. Since it is impractical to develop analytical methods for thousands of individual CECs, the use of appropriate indicators and surrogates to help meet monitoring goals was encouraged. In addition, there is a likely need to complement chemical testing by developing and testing high throughput bioanalytical methods that can integrate the activity of multiple toxicants into a single mode-of-action based response.

The participants overwhelmingly agreed that creation of a single master list of CECs that agencies could apply effectively across all applications was unlikely. Instead, participants concluded that the logical next step in this process will be to formulate *preliminary lists* of priority CECs, indicator compounds, and surrogate parameters that will address the investigative monitoring goals for the various applications, including drinking water, recycled water (nonpotable and potable reuse), wastewater discharges, and ambient receiving waters. These preliminary lists could then be incorporated into existing and/or planned collaborative studies that are organized at the watershed or regional scale. Results from these pilot studies will be used to fill key data gaps and initiate the iterative process formulated during the Workshop for prioritizing those CECs in need of regulatory review.

Interpretation of monitoring data and subsequent decision making should be based on tiered, multiple thresholds. Thresholds associated with no, little, moderate, and high probabilities of impact should be used to trigger risk-appropriate actions aimed at protecting beneficial uses of the resource. In concert with the proposed risk-based prioritization framework, the participants stressed that development of effects-based thresholds should consider mode-of-action, as well as the distribution of dosages that elicit the response of interest.

Participants also emphasized that we are early in the CEC evaluation process and *an adaptive management strategy is imperative to respond to rapidly changing knowledge.* There was also a general consensus that trust among water quality managers, scientists, and the public is a key component in

moving this process forward. Developing a communication plan that fosters transparency in setting goals, minimizes inappropriate use of investigative monitoring data, facilitates timely response to changing information, and provides ample opportunities for candid and objective discourse across stakeholder communities was endorsed by the participants.

Full Text

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