

# Contaminants of Emerging Concern (CECs)

## A Fact Sheet from the Southern California Coastal Water Research Project



January 2012

### What are CECs?

CECs are a diverse group of chemicals and their by-products. CECs are used in industrial, agricultural, or consumer applications, but most are not currently regulated and routinely monitored in the environment.

The largest class of CECs is industrial chemicals, followed by ingredients in personal care products, food additives, pharmaceuticals, and pesticides.



### Why the Focus?

Concern about CECs stems from the rapid pace of new chemical production, along with an increased focus on CEC detection in the environment and drinking water sources. More than 100,000 chemicals are currently in use, but fewer than 130 constituents are regulated as priority water pollutants. Most CECs do not have approved measurement methods, and few studies have examined the environmental fate and potential harmful effects of CECs on organisms (including humans).

CEC detection in the environment is frequent, though generally at low concentrations. Preliminary research has found some effects on wildlife at the individual organism level, but not larger population effects. CEC effects on humans are not evident, although biological effects research is still in its early stages.

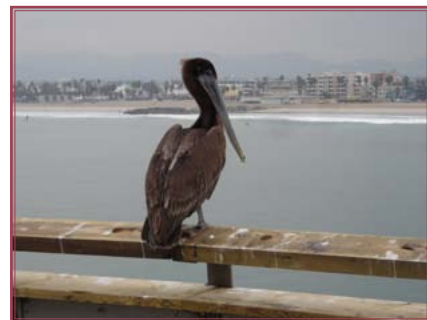
Class	Common Examples	
Industrial chemicals	Siloxanes	Silicone-based compounds in anti-foaming agents, water-repellant coatings, sealants, and lubricants
Personal care products	Triclosan	Antibacterial agent in soap, deodorant, toothpaste, and mouthwash
Food additives	Caffeine	Natural stimulant in coffee and tea, added to soda, sports, and energy drinks
Pharmaceuticals	Ethinyl-estradiol	Synthetic hormone in oral contraceptives
Pesticides	Fipronil	Insecticide used on crops, golf courses, lawns, and household pets

### How Do CECs Enter the Environment?

CECs enter the environment through a variety of pathways and move among land, air, and water.

#### Common Examples

- ▶ Pharmaceuticals excreted in urine or flushed down the toilet, if not removed by standard wastewater treatment practices, are discharged with treated effluent into rivers or the ocean.
- ▶ Pesticides used on gardens, golf courses, or crops run off into streams, storm drains, and coastal waters when it rains.
- ▶ Fire retardants applied to furniture and electronics volatilize into air, leach into water, or bind to particles like house dust and soil.



## Conducting Field Surveys

To address data gaps, collaborative surveys have been conducted to measure CECs in stormwater, treated wastewater, and ocean receiving waters, while investigating potential impacts to wildlife. In addition, SCCWRP and partners are researching new field and lab techniques for studying CECs.



## Monitoring Mussels

Filter feeders like mussels tend to concentrate water contaminants. In 2009, scientists began measuring CECs in mussel tissue as part of the National Oceanic and Atmospheric Administration's Mussel Watch, a long-running coastal bivalve monitoring program.

*Research produces new knowledge to help guide management of CECs.*

## Building Scientific Consensus

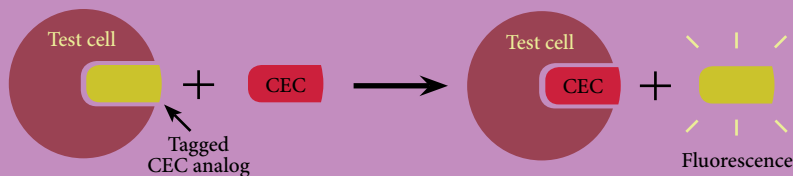
Several California-based workshops and meetings have been held to build consensus on CEC issues, and two targeted expert advisory panels were formed to offer guidance to the State Water Resources Control Board. The recycled water panel proposed a list of CECs to monitor but urged development of rapid tests to screen for potential biological effects of all CECs. The second panel is formulating recommendations for fresh and marine receiving waters.



## Developing New Biological Methods

Biological methods integrate monitoring for numerous chemicals by looking at their combined effects on test organisms, cells, or DNA. This approach can save time and expense, and account for broad sets of CECs (including unknowns). To efficiently screen for CEC contamination in recycled water, SCCWRP and collaborators are working to develop a battery of rapid tests linked to higher biological impacts.

## Example of Rapid Water Quality Screening



- 1 Scientists design and grow engineered cells that respond predictably to CECs exhibiting the same mode of biological activity (e.g., those that cause genetic, immunological, or hormonal changes).
- 2 In the laboratory, a concentrated extract from a water sample is placed in contact with the cells for a short period of time.
- 3 The biochemical reaction of interest is then detected by imaging (e.g., fluorescence).

For more information on SCCWRP research, visit: [www.sccwrp.org](http://www.sccwrp.org)