

State Water Resources Control Board Science Advisory Panel on Chemicals of Emerging Concern in Recycled Water

April 15, 2010, Draft Panel Report Communications Fact Sheet

This fact sheet was developed as an information piece for water, wastewater, and recycled water agencies in addressing potential questions from managers, staff, customers, and the media regarding the April 15, 2010 draft report on monitoring of chemicals of emerging concern in recycled water. The draft report can be downloaded online at: www.sccwrp.org/view.php?id=574 (look in the table under “April 15”).

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PANEL BACKGROUND

1. Purpose of Panel. The State Water Resources Control Board (SWRCB) – the regulatory agency responsible for setting statewide water quality policy – adopted a Recycled Water Policy¹ (Policy) in 2009 that:

- Established State water recycling goals.
- Clarified how Regional Water Quality Control Boards (RWQCBs) are to interpret and implement the State Antidegradation Policy (Resolution No. 68-16) for landscape irrigation and groundwater recharge water recycling projects.
- Clarified the role of the California Department of Public Health (CDPH) with regard to establishing health-based requirements for landscape irrigation and groundwater recharge water recycling projects.
- Included provisions to streamline the permitting of these types of projects, and incentives to facilitate the use of recycled water.

One provision in the Recycled Water Policy was how to address new classes of chemicals (such as pharmaceuticals, ingredients in personal care products, current use pesticides, and industrial chemicals), collectively referred to as “chemicals of

¹ State Water Resources Control Board, Resolution No. 2009-0011, Adoption of a Policy for Water Quality Control for Recycled Water (www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/).

emerging concern” or CECs,² that may be present in recycled water. The Policy authorized the formation of a “blue ribbon” advisory panel, convened by SWRCB in consultation with CDPH, to guide future actions relating to the monitoring of CECs for recycled water projects.

- 2. Panel Scope.** A blue ribbon advisory panel – called the “Science Advisory Panel” (Panel) – was convened in May 2009. The SWRCB contracted with the Southern California Coastal Water Research Project (SCCWRP) to administer the Panel. More information on the Panel, including meeting presentations and reports, can be viewed online at www.sccwrp.org/view.php?id=574.

In accordance with the Policy, the Panel is comprised of the following experts:

- Human health toxicologist.
- Environmental toxicologist.
- Risk assessment/epidemiologist.
- Biochemist.
- Civil engineer (familiar with design and construction of recycled water treatment facilities).
- Chemist (familiar with the design and operation of advanced laboratory methods for the detection of emerging constituents).

The Panel was charged with addressing the following questions related to CECs in recycled water used for landscape irrigation and groundwater recharge:

- What are the appropriate constituents to be monitored in recycled water, and what are the applicable monitoring methods and detection limits?
- What toxicological information is available for these constituents?
- Would the constituent list change based on level of treatment? If so, how?
- What are the possible indicators (i.e., surrogates) that represent a suite of CECs?
- What levels of CECs should trigger enhanced monitoring in recycled, ground, or surface waters?

The Panel was explicitly charged with answering questions related to the use of recycled water in the terrestrial environment and its impacts on groundwater, with the primary focus on protection of human health. While addressing questions related to the discharge of treated wastewater effluent into the aquatic environment is an important task (and is being initially addressed by a separate panel of experts on marine ecosystems), the Panel determined at its first meeting that this was not an issue for recycled water used for urban landscape irrigation or groundwater recharge.

The goal of the Panel is to provide regulators (including the CDPH, SWRCB, and RWQCBs) with recommended actions that the State of California should take to improve our understanding of CECs and, as appropriate, to protect public health and the environment. In particular, the Panel was charged with providing recommendations on monitoring CECs for projects that use recycled water for urban

² The term "CECs" is also used to refer to “constituents of emerging concern.”

landscape irrigation, indirect potable reuse via surface spreading, and indirect potable reuse via subsurface injection.

DRAFT PANEL REPORT FINDINGS AND RECOMMENDATIONS

- 1. Draft Panel Report.** A draft panel report, titled “Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water,” was released for public review on April 16, 2010. Comments, which are due by May 15, 2010, should be emailed to Keith Maruya of SCCWRP at keithm@sccwrp.org. WateReuse, NWRI, CASA, and ACWA intend to submit joint comments.

The Panel’s final meeting is scheduled for May 20-21, 2010, to address comments received on the draft report. The public portion of the meeting is scheduled to begin at 9:00 am on May 21, 2010, at SCCWRP’s offices in Costa Mesa, CA.

2. Summary of Panel Findings.

The Panel’s draft report includes the following four products:

- **Product #1: A conceptual framework for determining which CECs to monitor.** Since thousands of chemicals potentially are present in recycled water and information about these chemicals is rapidly evolving, the Panel developed a transparent framework to guide the prioritization of CECs for monitoring. The framework includes four evaluation steps:
 1. Compiling occurrence data (a “measured environmental concentration” or MEC) in the source water used for a project.
 2. Developing a “monitoring trigger level (MTL)” based on toxicological relevance.
 3. Comparing occurrence with the trigger level (the ratio between MEC and MTL) - CECs with MEC/MTL greater than “1” are prioritized for monitoring).
 4. Screening the priority CECs to ensure robust analytical methods are available.

This component of the framework is focused on CECs for which there is occurrence data from recycled source water and toxicological information. The framework also includes a provision for prioritizing chemicals for which such information is presently unavailable (i.e., “unknown unknowns”) that focuses on the potential for using bioanalytical screening methods.

In addition to defining an approach to selecting specific chemicals to monitor, the Panel also defined an approach to identify indicator compounds for assessing treatment performance and to protect against system performance failures. The Panel recommends the use of a combination of surrogate parameters and CEC indicator compounds tailored for individual unit treatment processes.

- **Product #2: Application of the framework to identify a list of chemicals that should be monitored presently.** The Panel compiled available California MEC data and derived MTLs from drinking water benchmarks to apply the screening

approach (from #1). Using conservative assumptions, the Panel provided the following recommendations:

- **For groundwater recharge projects:** Three compounds were prioritized based on their toxicological relevance: 17 beta-estradiol, caffeine, and triclosan. Additional CECs were identified as viable performance indicator compounds (which would differ by reuse project and the specific treatment processes applied).
- **For urban irrigation reuse:** None of the chemicals for which measurement methods and exposure data are available exceeded the threshold for monitoring priority. This result is due to the higher MTL levels because of reduced water ingestion in a landscape irrigation setting. The Panel recommended that monitoring emphasis should be placed on the use of indicator CECs that can demonstrate that the project-specific treatment processes employed are effective in removing CECs.
- **Product #3: A sampling design and approach for interpreting results from CEC monitoring programs.** The Panel recommends a multi-phase approach for implementing recycled water CEC monitoring programs and interpreting the resulting data. The approach involves the use of multiple tiers to provide a flexible, adaptable response to increase or decrease monitoring based on the initial results, thereby providing a cost-effective means for incremental information gathering. Should compounds be consistently present at high levels, additional evaluations or actions may be warranted. The Panel also recommends strict sampling and laboratory measurement quality assurance guidelines.
- **Product #4: Priorities for future improvements in monitoring and interpreting of CEC data.** The Panel noted that the science of CEC investigation is still in its early stages and the State should undertake particular activities to improve both monitoring and data interpretation for recycled water management, including:
 1. Develop more and better analytical methods to measure CECs in recycled water.
 2. Encourage the development of bioanalytical screening techniques that allow better identification of the “unknown unknown” chemicals.
 3. Develop a process to predict likely environmental concentrations of CECs based on production, use, and environmental fate, as a means for prioritizing chemicals on which to focus method development and toxicological investigation.

3. Summary of Panel Recommendations.

The Panel noted in the summary of the draft report that the compounds selected for monitoring in recycled water applications represent a preliminary list based on the limited data that are presently available and on qualifying assumptions. While representing a conservative screening of CECs, the information available for such screening is growing rapidly as is the volume of monitoring and supporting toxicological information.

The Panel made the following additional recommendations to the State:

- Conduct an initial performance evaluation of commercial laboratories to gauge the capabilities of and robustness of analytical methods available for monitoring priority CECs.
- Develop a process to rapidly compile, summarize, and evaluate monitoring data as they become available.
- Reapply the prioritization process on at least on a triennial basis.
- Establish an independent review panel that can provide a periodic review of the proposed selection approach, reuse practices, and environmental concentrations of ongoing CEC monitoring efforts.

CECs – GENERAL INFORMATION

- 1. Definition of CECs.** CECs (i.e., “chemicals of emerging concern” or “constituents of emerging concern”) are typically the pharmaceuticals that people use to treat illnesses and the components of personal care products, like shampoos and detergents, which people use every day. These constituents get into wastewater and our water supply by flushing unused medications down the drain, dumping personal care products and household cleaning products down the drain, excreting unabsorbed medications into the sewer system, and improper commercial disposal methods. These constituents are not regulated in the potable water supply or in wastewater. However, these constituents are found at trace levels in many of our waters, including untreated surface water, drinking water, wastewater, and recycled water.
- 2. CECs in Recycled Water.** CECs enter wastewater collection systems through human use and disposal. Conventional wastewater treatment partially removes CECs to very low levels or levels below detection (at nanograms per liter or less). Advanced engineered and natural treatments, such as those selected as appropriate for use in indirect potable reuse projects, remove CECs to levels below detection. As analytical methods improve to allow the detection of even lower levels of contaminants (less than nanograms per liter), more compounds will be found. The ability to detect a compound does not necessarily translate to human health concerns.
- 3. Water/Wastewater Agency Role.** Recycled water agencies are committed to producing high-quality recycled water through source control, treatment, monitoring, and research.

Pollution prevention efforts, such as source control programs, and public outreach programs, diminish the amount of CECs entering wastewater collections systems (for instance, “No Drugs Down the Drain” at www.nodrugsdownthedrain.org). In addition, many CECs are removed or reduced in conventional wastewater treatment facilities.

Recycled water agencies are also actively involved in increasing our understanding of CECs through research and monitoring. These agencies are collaborating with regulators on increasing our knowledge about the occurrence, fate, and potential impacts on human health associated with CECs in our water, including water supplies

(e.g., groundwater and surface water), drinking water, wastewater, recycled water, and ocean water.

4. Preventative Actions by the Public. The general public can help reduce, but not completely eliminate, concentrations of CEC in our water by taking the following simple actions:

- Never flush unused medications down the drain (alternative disposal options are listed at <http://www.nodrugsdownthedrain.org/disposal.html>).
- Do not dump old cleaning products, pesticides, or automotive products down the drain. Rather, turn in potentially hazardous chemicals during local hazardous materials collections.
- Use personal care products sparingly and according to the label recommendations.

The Medical Waste Management Act (see <http://www.cdph.ca.gov/certlic/medicalwaste/Pages/default.aspx>) and other regulatory mandates help prevent the improper disposal of pharmaceuticals and other CECs by commercial, industrial, and institutional sites.

5. Detection of CECs. CECs are detected at very low (or trace) levels in water (for instance, detected concentrations of pharmaceutical CECs are millions of times less than a pharmaceutical dose). The ability to detect a compound does not necessarily translate to human health concerns.

The ability to detect CECs at very low levels in water is a relatively new breakthrough in science. However, these methods are not standard methods (i.e., methods approved for regulatory purposes), but are currently being commercialized or are being used for research.

6. Health Impacts. Currently, no adverse human health impacts have been documented from exposure to the extremely low concentrations of pharmaceuticals or personal care products found in water supplies. Water and wastewater agencies are diligent in increasing our understanding of health impacts associated with CECs. Our understanding of the potential for public health impacts resulting from CECs in our recycled water is being expanded by the following work:

- State and federal public health and environmental agencies are currently assessing the need for further research and other studies to determine whether CECs pose human health risks and, if so, what additional measures will need to be implemented.
- Collaborative studies are currently being conducted by the water, wastewater, and water recycling community (including utilities, research organizations, and regulatory agencies) to increase our understanding of any possible impacts on public health and the environment.