

Science Advisory Panel for CECs in Recycled Water

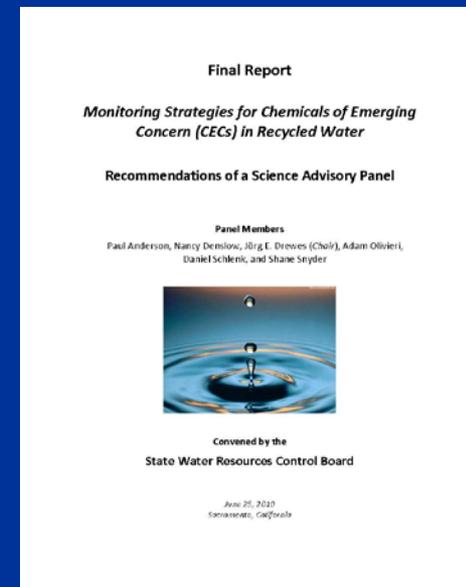
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Presentation to the SCCWRP Commission
March 2, 2018



EXPERT PANEL REVISIT

- **Six experts convened in 2009 to provide guidance for monitoring of CECs statewide**
- **In their 2010 report, the Panel recommended**
 - a list of known CECs to be monitored in potable reuse applications
 - developing better tools to address unknowns
- **Periodic updates are needed to keep policies current**
 - knowledge of CECs evolving at a rapid pace
 - are original recommendations relevant after 7 years?



RECYCLED WATER USES HAVE EXPANDED

- **NON-POTABLE USES (“TITLE 22”)**
 - Then: landscape irrigation
 - *Now: crop irrigation, industrial cooling, recreational impoundments (45 different practices)*
- **INDIRECT POTABLE REUSE (IPR)**
 - Then: groundwater recharge (surface spreading, subsurface injection)
 - *Now: surface (raw) water augmentation*
- **DIRECT POTABLE REUSE (DPR) NOT ADDRESSED**
 - report on feasibility of regulating DPR released in 2016

MORE DATA IS NOW AVAILABLE

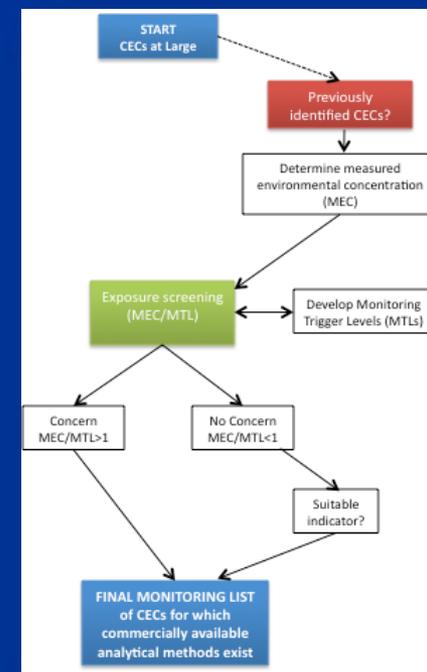
- **Monitoring of CECs by recycled water facilities**
 - Supplied by 8 utilities in CA covering period 2009-2017
 - sample sizes from < 10 to > 200
- **Data quality and comparability greatly improved**
 - a single lab generated 90% of monitoring data
- **Toxicity thresholds expanded, updated**
 - new sources for a wider list of known CECs

SUMMARY OF FINDINGS

- **Should the list of CECs to be monitored be revised?**
 - Yes, but the number of chemicals remains small
- **How do we screen for unknown chemicals?**
 - Bioanalytical tools for endocrine disrupting chemicals are ready to go
- **What is the risk posed by antibiotic resistance?**
 - The science is not mature enough to make a sound assessment
- **Are there ways to improve the CEC monitoring program?**
 - A more dedicated, cohesive and responsive program is recommended

UPDATING THE LIST OF CECs

- **Monitor CECs in recycled water**
 - Measured environmental concentration (MEC)
- **Select thresholds protective of human health**
 - Monitoring trigger level (MTL)
- **Compare MEC to MTL (MEC/MTL)**
 - If ratio is ≤ 1 , no concern
 - If ratio is > 1 , add to monitoring list
 - estradiol; MEC = 0.5 ng/L; MTL = 0.9 ng/L \rightarrow ratio = 0.6 NO
 - NDMA; MEC = 77 ng/L; MTL = 10 ng/L \rightarrow ratio = 7.7 YES

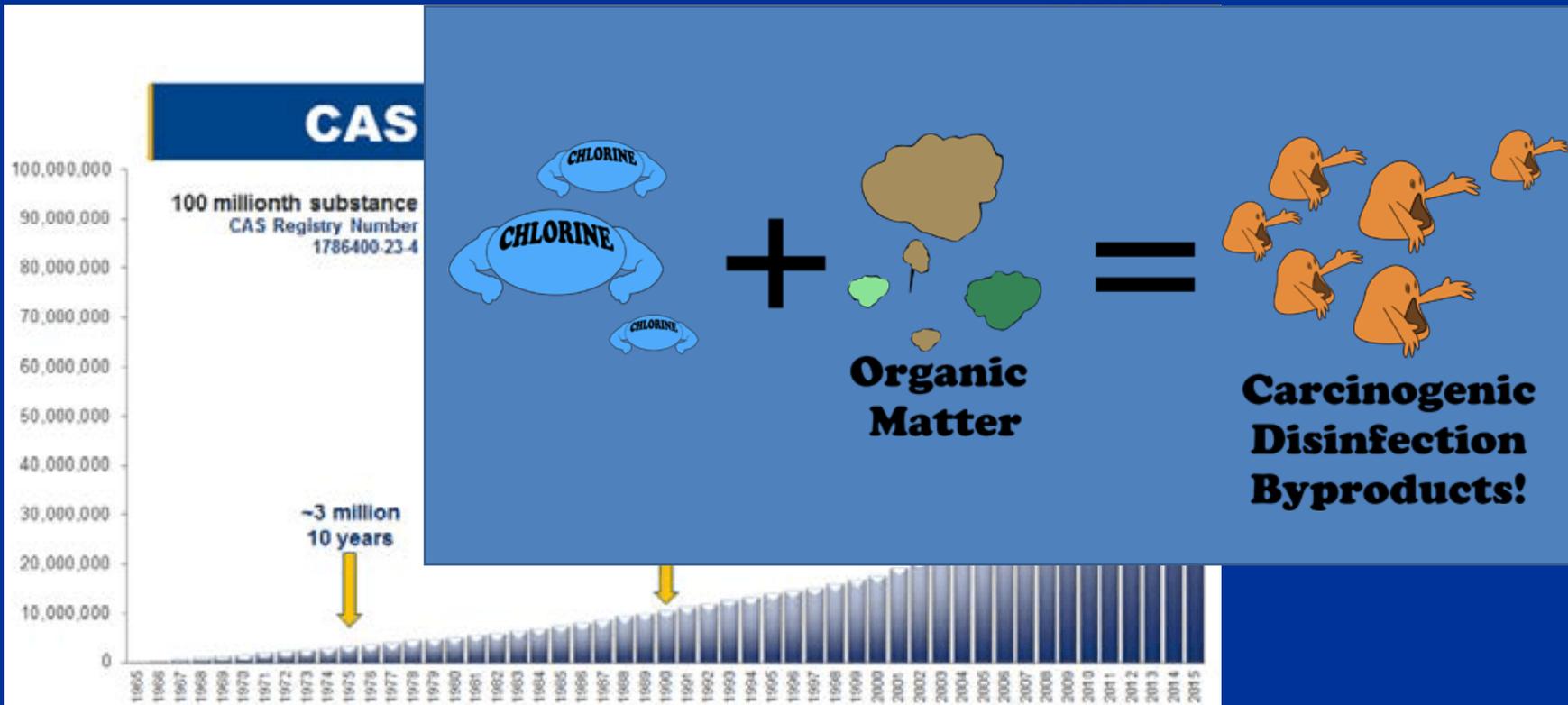


THERE ARE NO SMOKING GUNS

- **Out of ~100 CECs, none had MEC/MTL > 10**
 - For *potable* reuse, only 3 CECs had $1 < \text{MEC/MTL} > 10$
 - For non-potable reuse, no CECs had $\text{MEC/MTL} > 1$
- **The Panel's framework allows for on- and off-ramping**
 - 17 β -estradiol (removed) - 1,4-Dioxane (added)
 - Triclosan (removed) - Nitrosomorpholine (NMOR) (added)
 - Caffeine (removed) - Nitrosodimethylamine (NDMA) (retained)
- **Very conservative assumptions were applied:**
 - 90th percentile exposure concentrations (MECs)
 - effects thresholds for *sensitive populations* (MTLs)
 - *Non-nitrified secondary effluent* as feed
 - *No attenuation credit* for treatment/environmental barriers

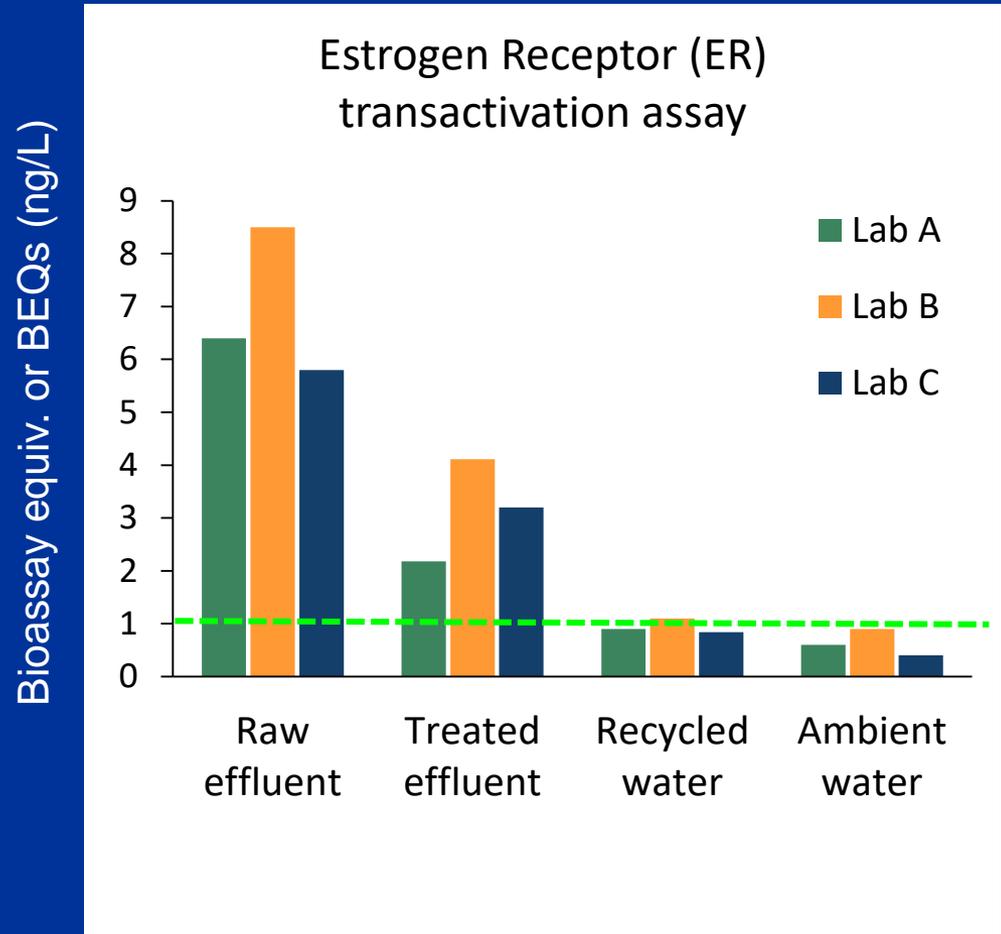
ARE WE DONE YET?

- **CECs will continue to evolve:**
 - Changing chemical use
 - New treatment practices and recycled water applications
 - New science on toxicity
 - New technologies for monitoring



SCREENING FOR UNKNOWNNS

- **Bioanalytical tools measure groups of bioactive chemicals**
- **Cell lines have been standardized for water quality monitoring**
 - estrogen receptor (**ER- α**)
 - aryl hydrocarbon receptor (**AhR**)
- **Screening thresholds are being established**
 - similar to MTLs



IDENTIFYING UNKNOWNNS

- **Use existing *targeted* methods that are informed by bioscreening results**
 - e.g. EPA 1698 hormone list for ER- α
- **If not successful, *non-targeted* analysis is an option**
 - broadens search for bioactive chemicals
- **Only select labs have resources/expertise to conduct advanced identification evaluations**

The Panel does NOT recommend routine application of non-targeted analysis, but encourages more research to better develop diagnostic methodologies and databases

ANTIBIOTIC RESISTANCE

The Panel's literature review revealed that:

- **Microbes, including antibiotic resistant bacteria (ARB), are removed during water treatment**
- **Transfer of antibiotic resistance genes (ARGs) in water reuse practices (like agricultural irrigation) has been documented**
- **We lack standardized methods to quantify ARB/ARGs**
 - Human health risks cannot be assessed
- ***Current weight of evidence does not suggest a clear-cut problem***
- ***The Panel recommends that regulators consider the results of more definitive research on relationships among antibiotic resistance, recycled water and human health before changing the Policy***

REMAINING SCHEDULE

- **Draft Panel Report Released 31 January 2018**
 - 30-day public comment period
 - comments due March 2, 2018
- **Draft Policy Amendment with updated CEC monitoring recommendations**
 - expected release in Spring 2018
 - 45-day public comment period
- **Peer-review of Panel recommendations**
 - Summer-Fall 2018
- **Consideration of adoption of Policy Amendment by SWB**
 - December 2018