COMPLETION OF DIRECT POTABLE REUSE RESEARCH

In early 2021, WRF will publish results of direct potable reuse (DPR) research funded by a $1.3 million grant from the California State Water Resources Control Board (SWB), along with additional funding from Metropolitan Water District of Southern California. SWB is relying on this research to aid in the development of uniform water recycling criteria for DPR that are protective of public health.

This research is key for the State of California. It is also applicable to stakeholders around the world who are considering or implementing potable reuse. The tools and findings developed through this research advance the state of knowledge to better address potential public health risks associated with microbial and chemical constituents of concern.

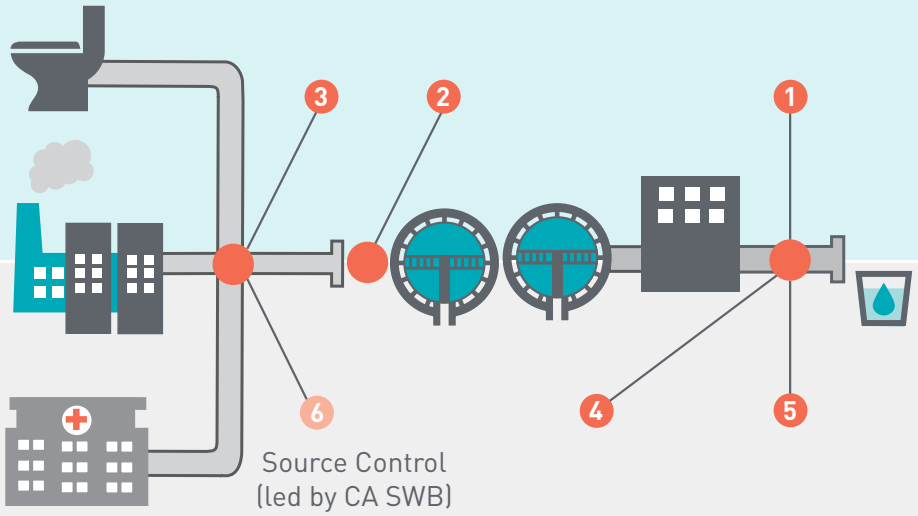
PROJECTS TO INFORM THE DEVELOPMENT OF DPR REGULATIONS

PATHOGENS

1. Tools to Evaluate Quantitative Microbial Risk and Plant Performance/Reliability
2. Measuring Pathogens in Wastewater
3. Collecting Pathogens in Wastewater During Outbreaks

CHEMICALS

4. Defining Potential Chemical Peaks and Management Options
5. Evaluating Analytical Methods for Detecting Unknown Chemicals in Recycled Water



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1 Tools to Evaluate Quantitative Microbial Risk and Plant Performance and Reliability (4951)

This research developed a user-friendly tool to identify the risk associated with viruses and protozoan pathogens (i.e., *Cryptosporidium* and *Giardia*) in DPR applications taking into account performance of the treatment plant. Ultimately, regulators and utilities can use this probabilistic quantitative microbial risk assessment (QMRA) tool to assist in designing treatment trains that meet the required pathogen log removal values (LRVs) to achieve acceptable public health risk thresholds. The SWB will utilize and maintain the DPRisk tool.

Principal Investigator:
Brian Pecson, PhD, Trussell Technologies
Research Team:
Dan Gerrity, PhD, University of Nevada
Edmund Seto, PhD, University of Washington

Technical Work Group:
Nick Ashbolt, PhD, University of Alberta
Chuck Haas, PhD, Drexel University
Terri Slifko, PhD, Metropolitan Water District

2 Measuring Pathogens in Wastewater (4989)

This research, valued over $1.5M, developed recommendations for collection and analysis of data on waterborne pathogens in untreated wastewater and conducted monitoring of untreated wastewater to develop better data on key waterborne pathogen concentrations and variability. This project developed the most robust pathogen data set to date through an 18-month monitoring campaign of 5 diverse CA utilities, filling in knowledge gaps that are critical to recommend pathogen LRVs. The data were incorporated into the QMRA project and tool.

Principal Investigator:
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Laboratory Participants:
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3 Collecting Pathogens in Wastewater During Outbreaks (4990)

This research examines the feasibility of linking the wastewater concentrations of pathogens (*Cryptosporidium* spp., human norovirus, and human adenovirus) to illness prevalence in communities. This is important for identifying the highest pathogen concentrations in untreated wastewater and also for applying wastewater epidemiology to predict community prevalence. The results identify the major sources of community illness data and records major gaps that are necessary for understanding illness levels and dynamics

Principal Investigator:
Krista Wigginton, PhD, University of Michigan

Technical Work Group:
Tim Wade, PhD, U.S. EPA

4 Defining Potential Chemical Peaks and Management Options (4991)

The goal of this project is to define a chemical peak and identify and evaluate options to manage peaks, particularly for chemicals with the potential to persist through advanced water treatment. Options to be evaluated include enhanced source control, improvements to plant operations and monitoring, and additional treatment. Management options can include modifying treatment processes that cause the removal or transformation of a contaminant or may involve a blending or dilution scheme to reduce chemical peaks to background levels.

Principal Investigators:
Jean Debroux, PhD, Kennedy/Jenks Consultants
Megan Plumlee, PhD, OCWD
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Research Team:
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5 Evaluating Analytical Methods for Detecting Unknown Chemicals in Recycled Water (4992)

This project evaluated analytical methods for identifying contaminants not presently detected by existing monitoring approaches. The report proposes an integrated and phased framework that includes:

- targeted analysis of known low molecular weight compounds that are anticipated to make it through a full advanced treatment train (i.e., reverse osmosis and advanced oxidation), as described in California's recycled water regulations
- semi- and non-targeted analysis of unknown contaminants by instrumental methods and bioassays, including the advantages and limitations of each approach

In addition, a strategy is outlined for communicating about monitoring for unknown trace organic compounds using the methods discussed.

Principal Investigators:

Keith Maurya, PhD, Southern California Coastal Water Research Project

Charles Wong, PhD, Southern California Coastal Water Research Project

Technical Work Group:

Eunha Hoh, PhD, San Diego State University

Shane Snyder, PhD, University of Arizona and NTU Singapore

WHAT'S NEXT?

SWB will convene an independent expert panel to review proposed DPR criteria in the second quarter of 2021. SWB's DPR website provides more information on the framework for regulating DPR and the development of DPR criteria, including how to engage in the public process associated with the development of these regulations.

WRF received an additional $3.1M grant from the SWB to advance potable and nonpotable reuse. The 20 projects under this grant are ongoing through 2023, and will help California, other states, and the international community address technical and operational reuse challenges.

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