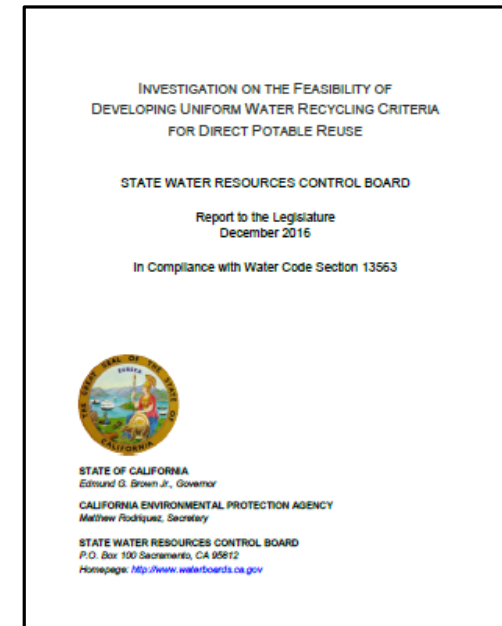
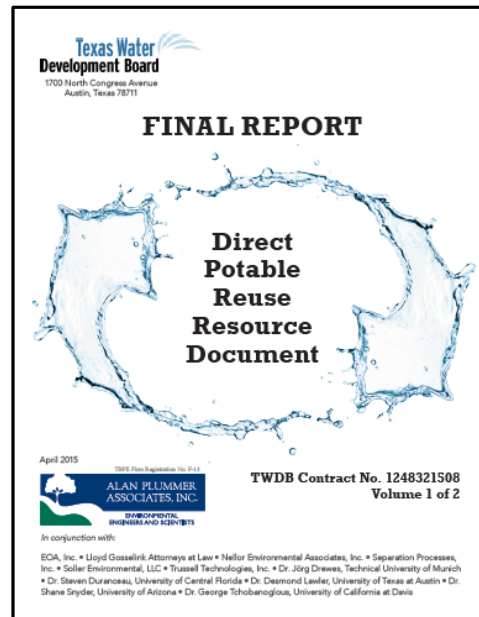
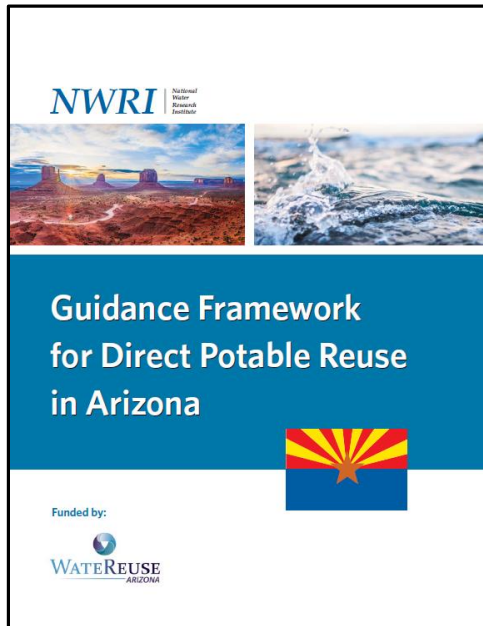




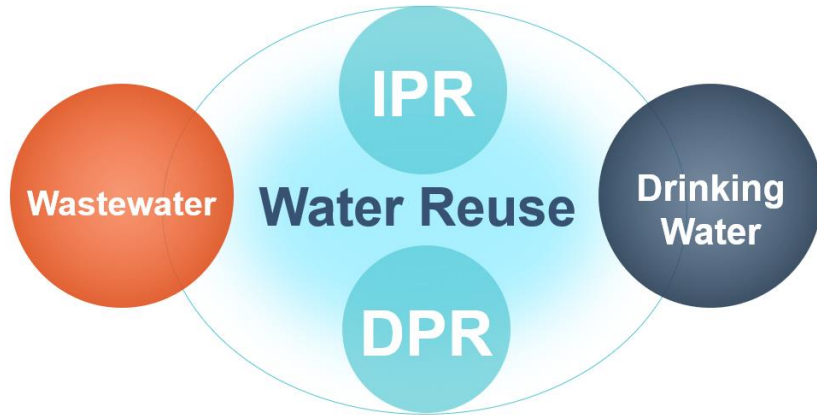
Operator Readiness for Potable Reuse

Troy Walker – Hazen and Sawyer
MSSC Summit February 2019

Direct Potable Reuse – Coming to a State Near You (or already there)



Will Operators Be Ready?



Existing Training/certification doesn't cover reuse well

<http://dx.doi.org/10.5961/OP2017.43.0009>
 Troy Walker and Ben Stanford are with Hazen and Sawyer (www.hazardandawayer.com), Tempe, Ariz., and Raleigh, N.C., respectively.

Water Sources

Direct Potable Reuse: Widespread Implementation Requires Ready Operators

Research has been conducted on how to effectively control microbial hazards for an increasing number of water reuse projects in the United States and around the world. Operators play a vital role in today's ever-evolving water reuse management frameworks. **BY TROY WALKER AND BEN STANFORD**

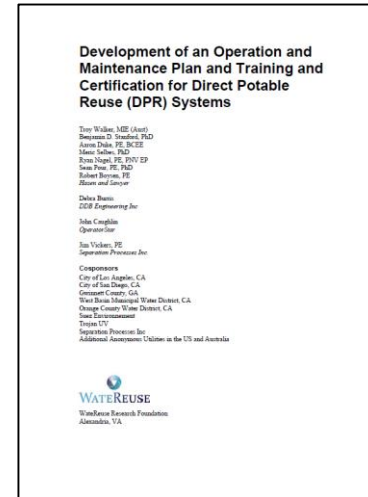
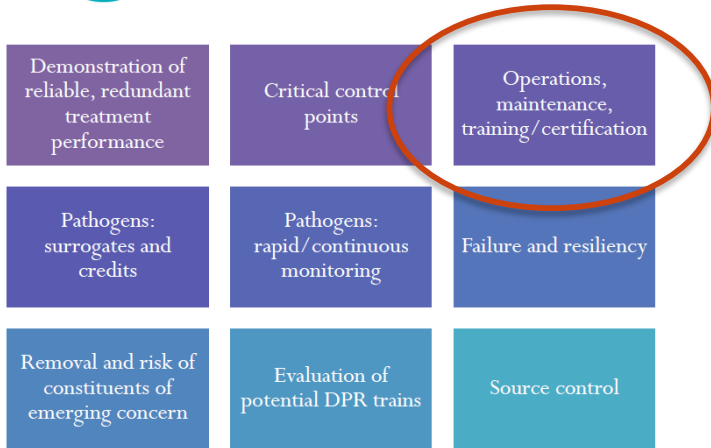
MANY WATER UTILITIES have turned to potable reuse of municipal wastewater, either directly or indirectly, to help meet growing demands. Direct potable reuse (DPR) entails supplying highly treated reclaimed water directly to a drinking water treatment plant or distribution system, with or without an engineered storage buffer. This differs from indirect potable reuse (IPR), which involves using an environmental buffer, such as a lake, reservoir, or aquifer, to help filter the water before it arrives at a drinking water treatment plant. DPR has several potential benefits, compared with IPR, including reduced energy requirements, construction costs, and operational expenses. IPR may even provide an opportunity to allow potable reuse in situations where a suitable environmental buffer isn't available for IPR.

DEVELOPING A DPR FRAMEWORK
 All water treatment facilities require a high level of reliability for delivering water with acceptable quality and for minimizing risk to public health. This is of underlined importance regarding DPR, as real risks of higher contaminant levels in plant feedwater (e.g., during epidemics or after industrial accidents), along with the public's perception of reuse, require a high level of operational certainty. Consistent and assured reliability levels can be met only with a holistic asset management framework, including robust design, effective and transparent operational management, a carefully managed maintenance strategy, and proven response procedures. As the perceived "human element" in the process, operators must have sound, reliable operational plans, systems, and processes to ensure safety and reliability—essential elements for advancing public acceptance of recycling for potable use. Therefore, plants must have adequate training and

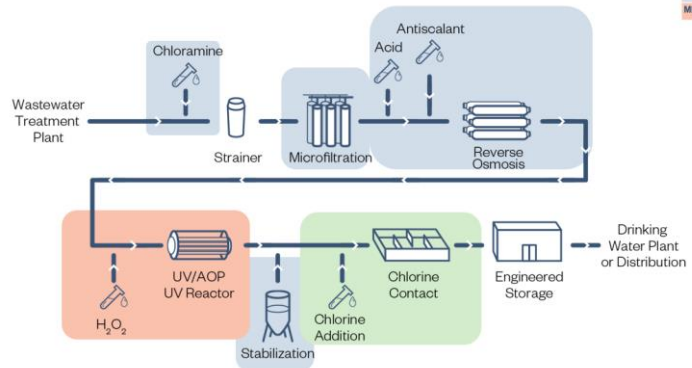
Indirect Potable Reuse
 Indirect potable reuse is practiced in many areas of the United States and uses an environmental buffer, such as a reservoir, to help filter water.

14 Opflow February 2017 2017 © American Water Works Association www.awwa.org/opflow

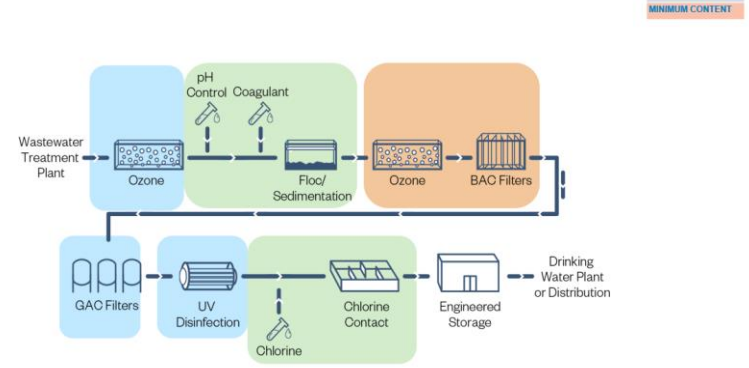
Water Research Foundation DPR Initiative



RO Based DPR Process



Non RO Based Treatment



WRF Project – Developing Curriculum Content



PROJECT NO.
Reuse-15-05/4772

Curriculum and Content for Potable Reuse Operator Training

Identify what is already available.

Involve stakeholders in specifying competencies, content, curricula, benchmarks.

Develop content and curricula.

Process Applications Inc

8 Training Modules Developed



This slide thumbnail features a background image of a water filtration rack with multiple white membrane modules. The top left corner contains the WERF logo (Water Environment & Reuse Foundation). The top right corner displays the logos for Hazen, Carollo (Engineers...Working Smarter With Water™), and Santa Clara Valley Water District. The main title, 'Reuse-15-05: DPR Operator Training', is centered in a dark blue bar. Below it, the specific module title 'Membrane Filtration — DPR Supplement' is displayed in white text on a dark blue background.

Hazen Carollo Santa Clara Valley Water District

WATER ENVIRONMENT & REUSE FOUNDATION WERF

Reuse-15-05: DPR Operator Training

Membrane Filtration — DPR Supplement



This slide thumbnail features a background image of a water filtration rack with multiple white membrane modules. The top left corner contains the WERF logo (Water Environment & Reuse Foundation). The top right corner displays the logos for Hazen, Carollo (Engineers...Working Smarter With Water™), and Santa Clara Valley Water District. The main title, 'Reuse-15-05: DPR Operator Training', is centered in a dark blue bar. Below it, the specific module title 'Reverse Osmosis (RO) Membranes—DPR Supplement' is displayed in white text on a dark blue background.

Hazen Carollo Santa Clara Valley Water District

WATER ENVIRONMENT & REUSE FOUNDATION WERF

Reuse-15-05: DPR Operator Training

Reverse Osmosis (RO) Membranes—DPR Supplement



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Reuse-15-05: DPR Operator Training Template Cover Slide

UV Disinfection and UV Advanced Oxidation Module



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Hazen Carollo Santa Clara Valley Water District

WATER ENVIRONMENT & REUSE FOUNDATION WERF

Reuse-15-05: DPR Operator Training Template Cover Slide

Corrosion Control Module

AWT Operator Certification

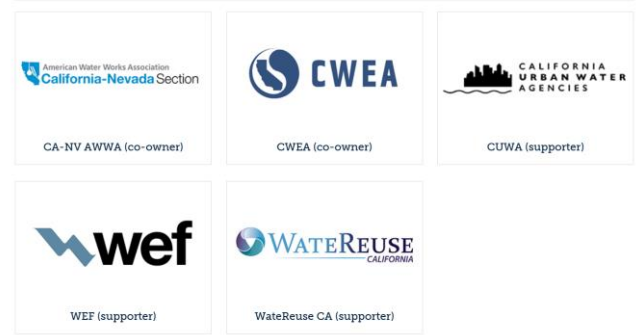
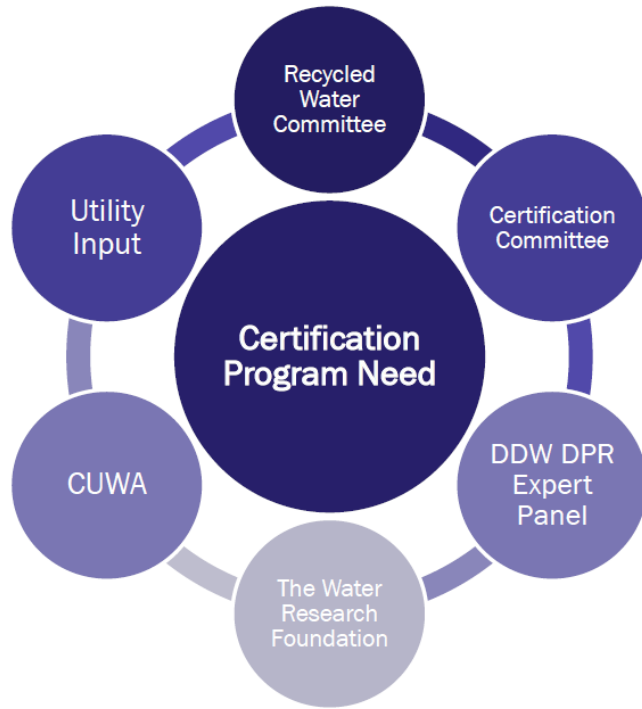


AWT Operator Certification

California-Nevada Section of the American Water Works Association (CA-NV AWWA) and the California Water Environment Association (CWEA) are jointly developing a new certification for operators in California and Nevada.

Goals of the Advanced Water Treatment Operator Certification:

1. Providing clean water and protecting public health
2. Providing an operator certification program requested by water agencies and State regulators
3. Maximizing water reuse in California



AWT 3
 AWT 4
 AWT 5
 First exam spring 2019

Developed by subject matter experts from utilities/engineers/industry

Thank You

Troy Walker

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