Background on National Potable Reuse Activities and The Water Research Foundation’s Assistance

Potable Reuse Commission Meeting
Toho Water Authority
Kissimmee, Florida
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Overview

• Background on The Water Research Foundation (WRF)

• Overview of Potable Reuse
  • Both “Indirect Potable Reuse” and “Direct Potable Reuse”
  • Water Quality, Technologies, and Implementation
  • Public Acceptance and Public Outreach

• Overview of “State DPR Regulatory Efforts”
  • TX, AZ, CO, CA

• Proposed WRF Support for Potable Reuse Commission
  • Use collaborative process with stakeholders
  • Develop recommendations on possible Florida DPR regulatory framework
The integrated organization represents the evolution of water research issues, the overlap between water and wastewater, and efficiencies to be gained through a consolidated research program.

Learn more at www.waterrf.org and www.werf.org
Overview of Potable Reuse
Why Potable Reuse?

• Limitations with nonpotable water reuse
  – Cost, storage, dual system

• (Large) increases in water supply
  – Uses existing infrastructure

• Improves “reliability”
  – Drought proof and locally controlled

• Sustainable supply
  – Diversified water portfolio
  – Optimizes a water supply
  – Less energy than alternatives
  – Local resource
“Water Reuse” Paradigm Shift

**PAST**
- Collect wastewater
- Move it quickly downstream
- Treat it to acceptable standards
- Dispose of wastes

**FUTURE**
- Manage resources to generate value
- Improve the environment
- “One water” approach to water management
Indirect Potable Reuse: Groundwater Augmentation

- Groundwater Supply Wells
- Potable Water Reuse
- Reclaimed Water Purification
- Community
  - Conventional Water Supply
  - Wastewater Treatment Plant
Indirect Potable Reuse: Groundwater Replenishment

Injection and spreading

Talbert Barrier (Injection Wells)

Kraemer-Miller Basins

Deep Aquifer

Shallow Aquifer

NON-WATERBEARING FORMATION

0 miles 5 10 15 20

0' 1,000' 2,000' 3,000'

Courtesy of Orange County Water District (CA)
Indirect Potable Reuse: Surface Water Augmentation

Source: AWWA Potable Reuse 101
IPR: Surface Water Augmentation

Upper Occoquan Services Authority Treatment and Augmentation of the Occoquan Reservoir (Virginia)

Gwinnett County Treatment and Augmentation of Lake Lanier (Georgia)
Direct Potable Reuse

Water Treatment  →  Urban Water Use  →  Wastewater Treatment

Environmental Buffer

Advanced Water Treatment
Direct Potable Reuse

No environmental buffer!

Maintain functionally of environmental buffer:
• Additional treatment
• Additional monitoring requirements

Source: Adam Olivieri and Jim Crook
Potable Reuse – Key Questions

• **Treatment requirements**
  • Need for criteria for pathogen and chemical control

• **On-line monitoring**
  • Performance monitoring

• **Treatment technologies**
  • Defining reliability

• **Source control**
  • Managing the collection system

• **Operations and operators**

• **Response time** (respond to off-spec water)

• **Public acceptance**
Potable Reuse Water Quality and Human Health Risks

• Microbial risk (mostly acute)
  – Viruses
  – Protozoa (Cryptosporidium and Giardia)
  – Pathogenic Bacteria

• Chemical risk (mostly chronic)
  – Natural and synthetic compounds
  – Regulated and Unregulated
  – Wastewater: Industrial, pharmaceuticals, personal care projects
  – PFOS and PFAS (recent EPA Health Advisory)
Potable Reuse: Treatments are Proven!

- **Micro/ Ultrafiltration (MF/UF)**
- **Reverse Osmosis (RO)**
- **Ultraviolet Light (UV)**
- **Advanced Oxidation**

- Tertiary Water
- Backwash
- Concentrate
- Advanced Treated Water
DPR Research Initiative (2012–2016)

• DPR Research Initiative
  – $6 million raised to the need to fill knowledge gaps
  – Leveraged to $24 million

• Funded 34 projects on topics
  – Regulatory, Utility, and Community Concerns

• Published reports and tools available at:
  www.werf.org/reuseresearch
DPR Framework Report

Contents:

1. Introduction
2. What is Direct Potable Reuse?
3. Key Components of Program
4. Public Health Protection
5. Source Control Programs
6. Wastewater Treatment
7. Advanced Water Treatment
8. Purified and Finished Water Management
9. Monitoring and Instrumentation
10. Residuals Management
11. Facility Operation
12. Public Outreach
13. Future Developments

Framework for DPR (2016)
DPR Framework Report Concept:

Components of a DPR Program

- **Technical**
  - High quality water
  - Reliable supply
  - Sustainable supply

- **Regulatory**
  - Public health protection
  - Enhanced monitoring
  - Ongoing oversight

- **Public outreach**
  - Reliable supply
  - Energy savings
  - Local control
Technical, Operational, and Management Barriers

Legend

M = Management barrier
O = Operational barrier
T = Technological barrier
ΣT = Sum of multiple technical barriers
“...the use of treated wastewater for beneficial purposes including irrigation, industrial uses, and drinking water augmentation – could significantly increase the nation’s total available water resources.”

NAs, 2012
• EPA supports water reuse as part of an integrated water resources management approach developed at the state and local level to meet the water needs of multiple sectors including agriculture, industry, drinking water, and ecosystem protection.

• EPA acknowledges the importance of potable water reuse and looks forward to working with our stakeholders as the practice continues to be developed and deployed as an important approach to ensure a clean, safe, and sustainable water supply for the nation.
Pubic Acceptance: Use Advanced Treated Recycled Water as an Addition to Drinking Water Supply

Source: San Diego PureWater
Survey Results Show that the Public are Supportive of Potable Reuse

How supportive are you of highly purified used water being delivered into groundwater, mixed with other qualities of water, and then disinfected or treated again before it is consumed? (Ventura, CA)

- Very Supportive: 55%
- Moderately Supportive: 29%
- Only Slightly Supportive: 9%
- Not Supportive At All: 6%

Overall Support: 84%
Public Tours of Facilities Help Inform the Public
DPR Pilot in Altamonte Springs FL
Secondary Filtered Effluent

1

Ozone (Xylem)

2

Biofiltration (Xylem)

3

Ultrafiltration (Toray/BiWater)

GAC Filtration (Calgon)

UV AOP (Trojan)
The use of Videos to Inform the Public
Brewing Beer with Recycled Water

"Quality not History"

Beer brewed from water produced by Clean Water Services, in Portland, OR

"The World’s Most Sustainable Beer"
Overview of “State DPR Regulatory Efforts”
Texas

• **IPR type projects** – Permitted under existing regulatory structures

• **DPR projects**
  – Addressed on a case-by-case basis by the Texas Council Environmental Quality (TCEQ)

• **Permitted DPR Facilities**
  – **Big Spring, TX** – Operational since 2013 operational in 2013.
  – **Wichita Falls, TX** – Permitted as an emergency water supply and ran between July 2014 and July 2015.
  – **El Paso Water (TX)** – DPR project is in design
Texas (continued)

• Texas Water Development Board (TWDB)
  – Provides scientific and technical information related to implementation
  – It is not a regulation
Arizona

- **Arizona Department of Environmental Quality (ADEQ)**
  - IPR (i.e., groundwater augmentation)
    - Addressed under existing regulations.
  - For DPR: Process underway to update Reclaimed Water Rules

- **“WateReuse Arizona” and “AZ Water”**
  - Developed a utility-based committee to provide ADEQ with recommendations on the development of DPR regulations.
  - Included utilities, academics, and consultants.
  - **Guidance Framework** document finalized in 2018
Interim Criteria for DPR Permit

- Source water characterization
- Pilot treatment system
- Microbial control technology
- Microbial logarithmic reduction targets
- Chemical control technology
- Monitoring plan
- Start-up plan
- Operation and maintenance plan
- Operator training
- Technical, financial, and management capability
### 2.6 IDENTIFICATION AND DESCRIPTION OF TECHNOLOGIES, PROCESSES, AND METHODOLOGIES FOR CHEMICAL CONTROL

Recommendations for Chemical Control (Edited from NWRI, 2018)

<table>
<thead>
<tr>
<th>No.</th>
<th>Recommendation</th>
<th>Regulation</th>
<th>Guidance or Permitting</th>
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<tbody>
<tr>
<td>1</td>
<td>A three-tiered approach can be used to control chemicals for DPR and include:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Tier 1 – SDWA and State Requirements (including DBPs and nitrate)</td>
<td>✓</td>
<td></td>
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<tr>
<td></td>
<td>2. Tier 2 – Unregulated Chemicals (including chemicals on CCLs and UCMRs) of interest from the Standpoint of Public Health</td>
<td></td>
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<tr>
<td></td>
<td>3. Tier 3 – Unregulated Chemicals that Are Useful for Evaluating the Effectiveness of Organic Chemical Removal by Treatment Trains.</td>
<td>✓</td>
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</tr>
<tr>
<td></td>
<td>The three tier monitoring approach can be required in regulations to guide chemical control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a</td>
<td>The details for implementing the requirement can be set in guidance/permitting.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Nitrate and Perchlorate are regulated under the SDWA and present a potential acute risk and, as a result, are of particular importance to DPR and should be monitored for in the advanced water treatment system.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Approved analytical methods are needed.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Conduct comprehensive analytical studies on the types and quantities of chemicals (including CECs of interest and emerging CECs) that can be present in the treated wastewater from the WWTP. The results would help determine how much removal is needed and what CECs or CEC indicator parameters need to be monitored.</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
• **Next Steps for DPR:**
  
  • Formed **Working Group in 2017**
  
  • **Purpose:** Provide recommendations to ADEQ for “Phase 2” rulemaking
  
  • **Topics:**
    • Reclaimed WQ standards
    • Infrastructure/technology
  
  • **Develop:**
    • ADEQ will prepare detailed criteria for DPR (late 2018)
Colorado

- In 2016, WateReuse Colorado formed a **DPR Regulatory Workgroup**
  - Recommendations for DPR regulations in

- **A DPR Outreach Workgroup** was formed
  - Goal: to develop messaging and materials to support Colorado utilities

- **WateReuse Colorado**
  - Provided funding to support workgroups

- **Next Steps – Grant from CWCB**
  - Assist regulators in develop DPR regulation, which would require legislative approval
Colorado “DPR Regulatory Workgroup”

- Workgroup members include representation from key local and national partners
  - Colorado regulators
  - Utilities,
  - Consultants
  - NGOs
  - Research
Flexibility and adaptability through three levels of regulatory documents

**Regulation**
- Non-compliance has consequences and requires public notification.
- Commission hearing process to modify.

**Policy**
- Interprets the Regulation, provides specifics.
- Can be modified at CDPHE staff level, approved by Commission.

**Guidance**
- Best practices and information on how utilities can best comply with the Regulation.
- Non-enforceable.
WateReuse CO DPR Outreach Efforts

- Global and National perspective on DPR
- Developed list of key audiences
- Audience communication and outreach strategy matrix
- Drafted Outreach Materials
“Pure Water Colorado” DPR Pilot: hosted by Denver Water!

Coming Soon!
California

- State Water Resources Control Board (SWRCB) finalized regulations for **groundwater recharge** (2014)

- SWRCB released draft regulations for **Surface Water Augmentation** for public comments (2017)

- Based on legislation SWRCB evaluated the **feasibility of developing DPR criteria**
  - SWRCB established an Expert Panel
  - Determined, yes, feasible to develop DPR criteria
  - Identified 6 specific research needs to be conducted concurrently with developing DPR criteria
1. Source Control and Final Water Quality Monitoring.

2. Probabilistic Quantitative Microbial Risk Assessment (QMRA) for Log Removals of Pathogens.

3. Monitoring Requirements in a Regulatory Permit to Measure Pathogens.

4. Feasibility of Collecting Information on Community Outbreaks.

5. Treatment Options to Provide “Averaging” of Chemical Peaks.

“Advancing Potable Reuse Initiative”

- **WRF receiving $4.5M Grant from CA SWB for recycled water**
  - $3M for Potable Reuse
  - $1.5M for Nonpotable Reuse
- **WRF Advancing Potable Reuse Initiative:**
  - Matching funding for potable reuse research
  - Establish potable reuse as a reliable and sustainable component of integrated water management
Proposed Water Research Foundation Support for Potable Reuse Commission
Proposed WRF Support of PRC

Why WRF?

• WRF is a 501c3 non-profit research organization.
  • Based on conducting scientific and technical research, WRF is viewed as credible and independent.

• WRF has had an active potable reuse research program
  • Focused on scientific, technical, engineering, and water quality topics.

• WRF and the project team has the experience!
  • We have been working on overcoming barriers and working on regulatory development for potable reuse (IPR and DPR) for over 15 years.
Scope and Outcomes

• **Potable Reuse Framework Outcomes (from White Paper)**
  2. Develop recommendations for legislation, rule development, and incentives for potable reuse.

• **WRF Scope**
  • Working with PRC and stakeholders, develop a list of consensus “recommendations on DPR regulations”.
  • Technical, managerial, and operational topics.

• **Outcome**
  • Written report documenting recommendations.
  • PCR would use “recommendations” to inform implementation of potable reuse in Florida – which would include formal DPR regulations by the state.
Approach

• 3 one-day interactive workshops
  • Work with PRC on attendees.
  • Work with PRC on agendas. Provide opportunities for stakeholder to present questions or concerns.

• Approach:
  • Workshop #1: WRF would provide a recommended list of topics and options (based on other state efforts and results of research).
  • Workshop #2: WRF would provide a summary of recommendations based on stakeholder input.
  • Workshop #3: Review and comment on Draft Report of recommendations.

• Outcome
  • Florida DPR Guidance Report (WRF Report)
Julie Minton, Project Manager

- Director of Strategic Initiatives, WRF.
- Program Director for WRF Water Reuse Issue Area.
- Project Manager on $24M DPR Research Initiative (2012-2016).
- Former Director of Research for WateReuse Foundation.
- In the past 9 years, Project Manager on over 15 water reuse projects.

Jeff Mosher, Facilitator

- Former Director of Research for WRF.
- Former Executive Director of National Water Research Institute.
- Former Director of Research for WateReuse Foundation.
- In the past 14 years, managed expert panels for over 12 potable reuse projects in CA, AZ, TX, NV, WA, NM, and VA.
- Worked on IPR and DPR regulatory development in CA, AZ, NM, CO, and NV.

Co-CEOs: - Melissa Meeker - Rob Renner
Water is nature’s amazing reusable resource.

Thank you for listening!