Potable Reuse – State of the Industry Supplement

EPA *Guidelines for Water Reuse* Series

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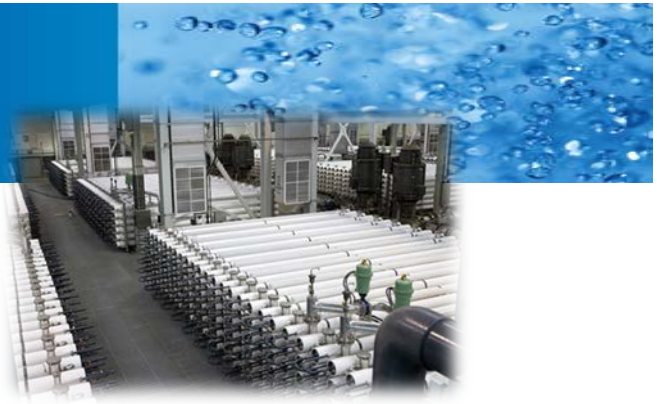
CDM Smith

WATER + ENVIRONMENT + TRANSPORTATION + ENERGY + FACILITIES

Overview

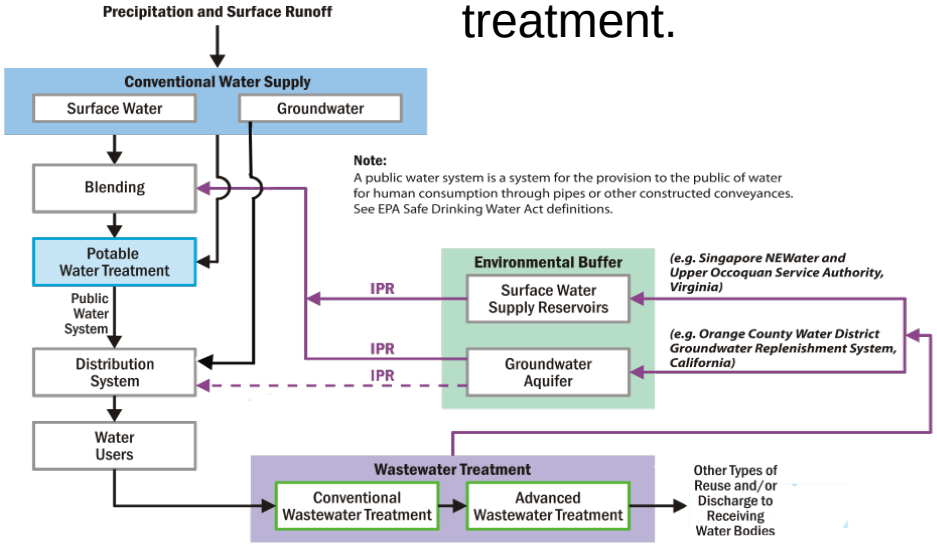


- Terminology
- History and Purpose of the EPA *Guidelines for Water Reuse*
- Content Overview
- Case Studies

Terminology

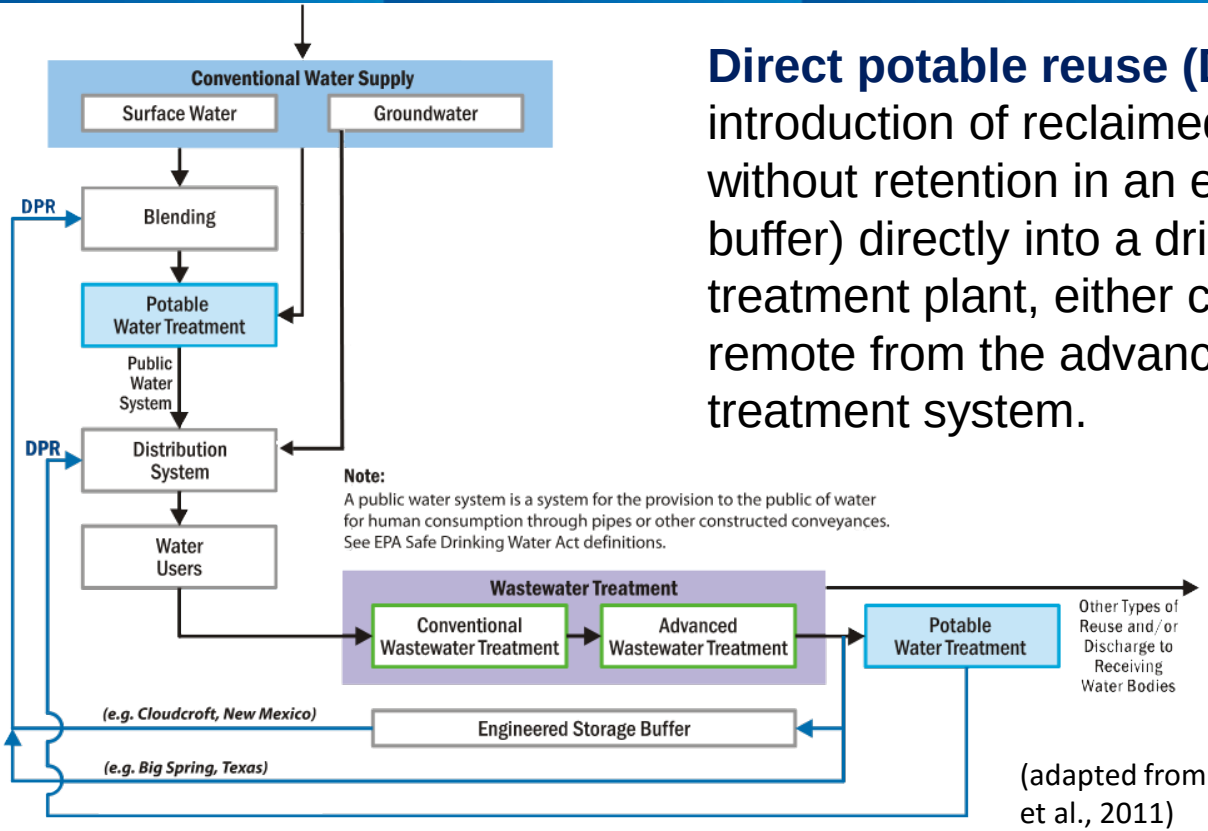
***De facto* reuse:** A situation where reuse of treated wastewater is practiced but is not officially recognized (e.g., a drinking water supply intake located downstream from a WWTP discharge point).

Indirect potable reuse (IPR): Augmentation of a drinking water source (surface or groundwater) with reclaimed water followed by an environmental buffer that precedes drinking water treatment.



(adapted from EPA 2012 and Tchobanoglous et al., 2011)

Terminology



Direct potable reuse (DPR): The introduction of reclaimed water (with or without retention in an engineered storage buffer) directly into a drinking water treatment plant, either collocated or remote from the advanced wastewater treatment system.

(adapted from EPA 2012 and Tchobanoglous et al., 2011)

History and Purpose of the EPA *Guidelines for Water Reuse*

History of EPA *Guidelines For Water Reuse*

1980

1992

2004

2012

What is in the 2012 *EPA Guidelines*?

- Chapter 1–Introduction
- Chapter 2–Planning and Management Considerations
- Chapter 3–Types of Reuse Applications
- Chapter 4–Water Regulatory Programs for Water Reuse
- Chapter 5–Regional Variations in Water Reuse
- Chapter 6–Treatment Technologies for Protecting Public and Environmental Health
- Chapter 7–Funding Water Reuse Systems
- Chapter 8–Public Outreach, Participation, and Consultation
- Chapter 9–Global Experiences in Water Reuse

2012 EPA Guidelines has minimum guidelines for all types of reuse including IPR

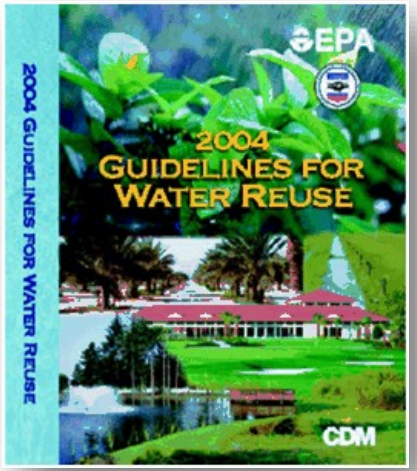
Regulations: Enforceable requirements adopted by federal agencies or states

Guidelines: Non-enforceable, does not impose legally-binding requirements on the EPA, states, local or tribal governments, or members of the public

EPA *Guidelines for Water Reuse*

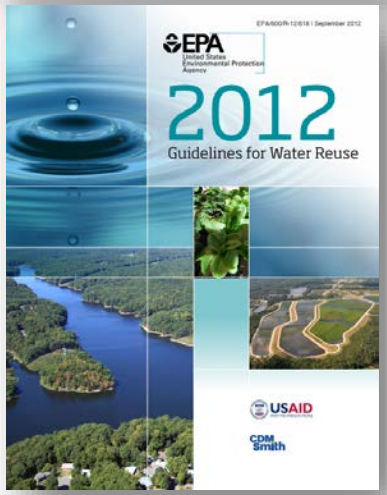
- "DPR will seldom be necessary."
- "While DPR may not be considered a viable option at this time, many states are moving forward with IPR projects."

2004



- "In many parts of the world, DPR may be the most economical and reliable method of meeting future water supply needs. While DPR is still an emerging practice, it should be evaluated in water management planning, particularly for alternative solutions to meet urban water supply requirements that are energy intensive and ecologically unfavorable. This is consistent with the established engineering practice of selecting the highest quality source water available for drinking water production."

2012



Increasing interest in potable reuse

- Create local water supply
- Avoid purple pipe costs and infrastructure disruption
- Provide greater "control" over water quality

California

By 2020, increase from ~0.65 to 1.5 MAF/year
By 2030, increase to 2.5 MAF/year – a 4X increase

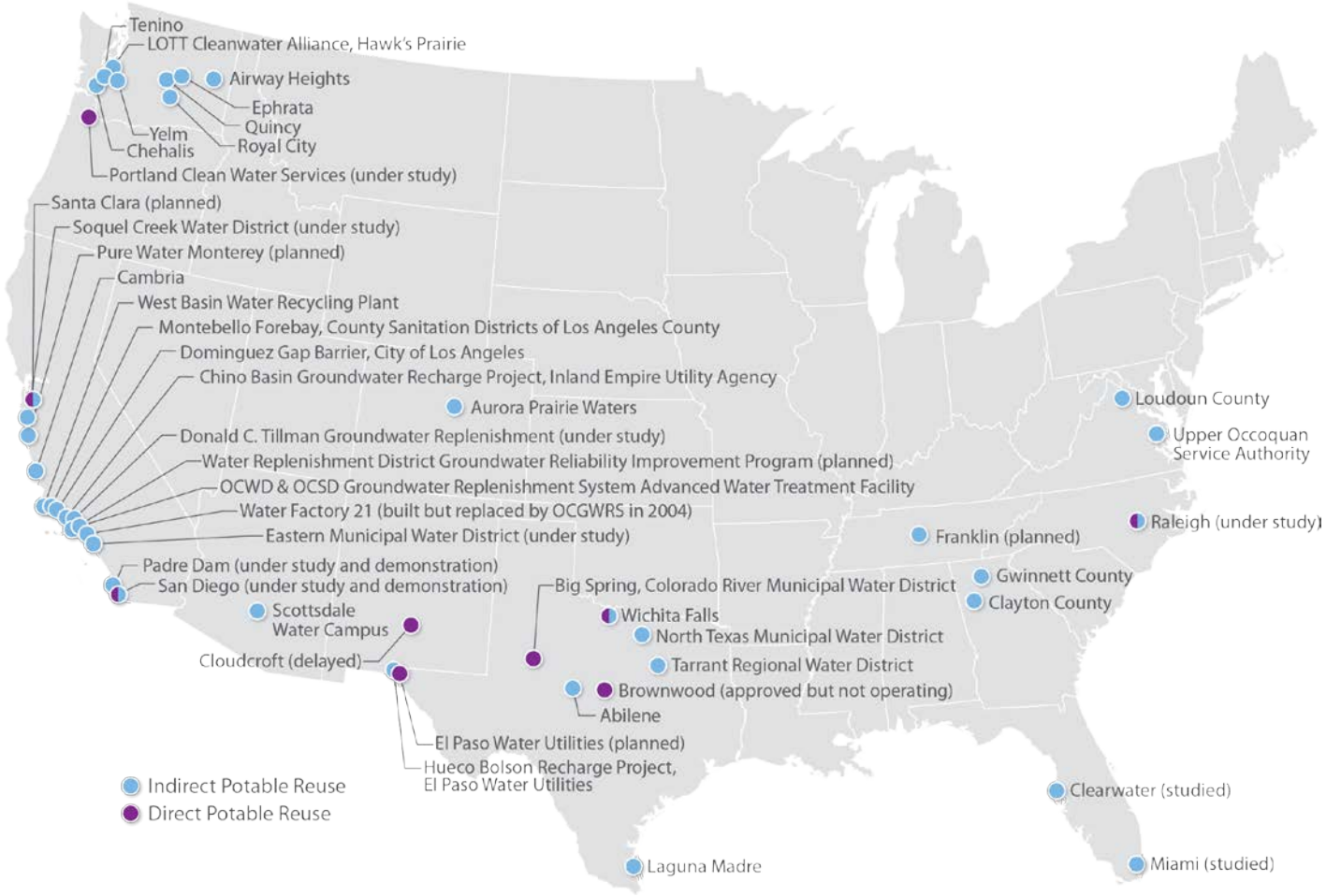
Florida

By 2018, 300 mgd must have advanced treatment
By 2025, 60 percent of flows must be reused

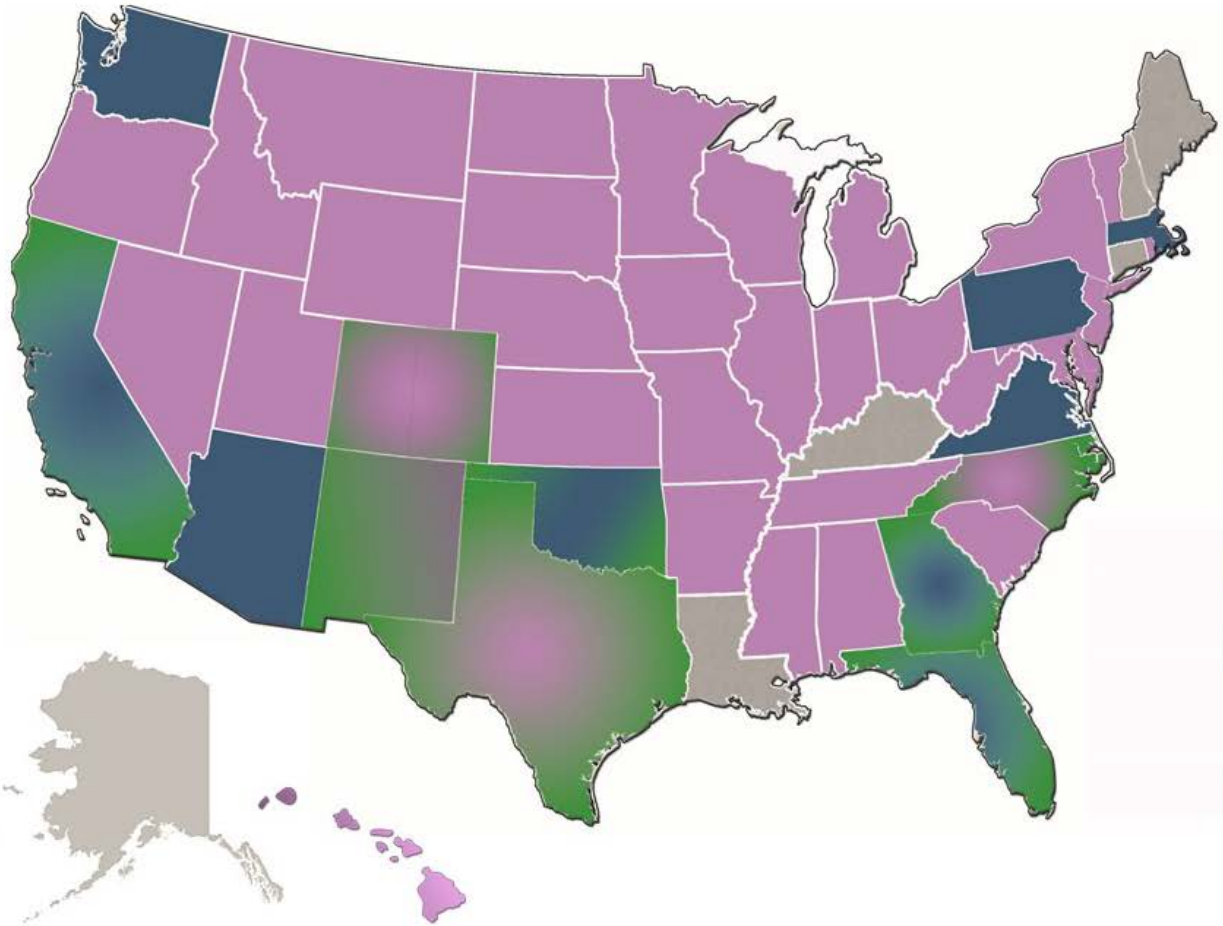
Cyanobacteria toxin event, Toledo, OH – August 2014

4-methylcyclohexanemethanol spill, Charleston, WV – January 2014

PLANNED potable reuse in U.S.



Regulatory Status Map



No Reuse Regulations

NPR Regulations

NPR and IPR Regulations

NPR Regulations & DPR Regulatory Efforts are Undergoing or Being Assessed

NPR/IPR Regulations & DPR Regulatory Efforts are Undergoing or Being Assessed

6

8

Number of US States or Territories with Regulations or Guidelines Addressing Potable Water Reuse

Category of Reuse	Number of States or Territories with Regulations or Guidelines Addressing Reuse Category in 2012	Number of States or Territories with Regulations or Guidelines Addressing Reuse Category in 2016
IPR	9	11
DPR	0	0 (8 states currently developing or evaluating DPR regulations or guidelines)

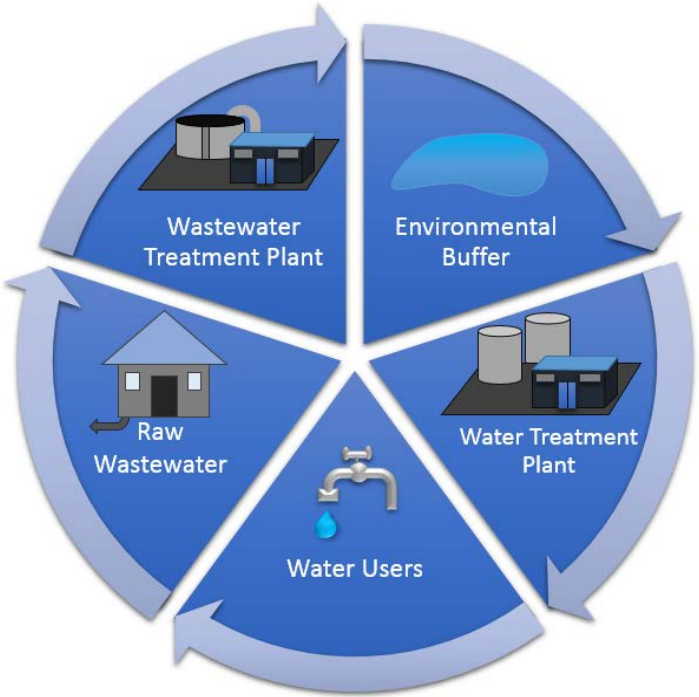
Supplement to EPA *Guidelines For Water Reuse*

2016

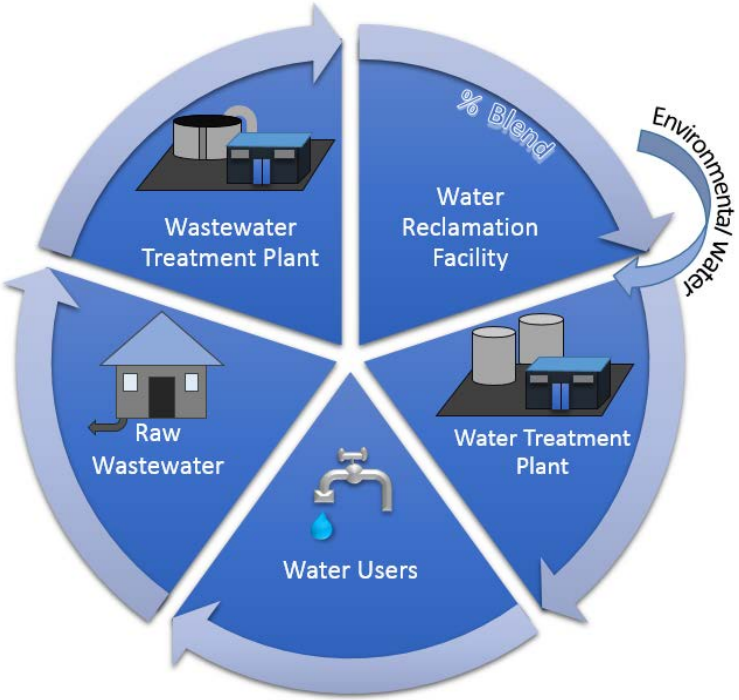
Supplemental discussion of state of the **practice** of **potable reuse**

Objective

"With the increasing interest in potable reuse, there is a need to collect existing data on the state of the industry to inform the decision making process regarding potable reuse practices. This document will serve as a supplement to the 2012 *Guidelines* to document current practices and approaches in potable reuse, including the existing technical and policy knowledge base."



Indirect reuse scenario governed by the CWA and SDWA



Planned potable reuse scenario

Technical Resource

Regulatory Document

Scope of the Document	
Not included	**Included – state of the industry**
National guidelines or regulations for potable reuse	Summary of federal laws impacting potable reuse and state regulatory frameworks for potable reuse
Promotion of potable reuse	Opportunities, challenges, and trends in potable reuse
Design or treatment requirements for potable reuse	Potable reuse applications, treatment technologies, research results, and case studies

Intended Audience of the Document	
Who	**Benefit**
Regulatory agencies	Resource document for reference when developing or revising potable water reuse standards.
Planners and decision-makers	Resource document for reference during evaluation, planning, design, or operation of potable water reclamation facilities.
Reclaimed water users	Resource document for better understanding potable reuse.

Organization of the document
Chapter 1 – Introduction
Chapter 2 – Potable Reuse Background
Chapter 3 – The Regulatory Framework for Potable Reuse in the U.S.
Chapter 4 – Constituents in Wastewater
Chapter 5 – Risk Analysis: Risk Assessment, Communication and Management
Chapter 6 – Relevant Treatment Technologies for Potable Reuse
Chapter 7 – Alternative Treatment Trains for Potable Reuse
Chapter 8 – Source Control
Chapter 9 – Environmental and Engineered Buffers
Chapter 10 – Training and Operations
Chapter 11 – Monitoring Framework for Potable Reuse
Chapter 12– Cost of Potable Reuse
Chapter 13 – Epidemiological Studies
Chapter 14 – Public Acceptance and Public Relations
Chapter 15 – Research
Appendix A – Case Study Examples of IPR and DPR in the U.S.
Appendix B – Summary of Potable Reuse Research Projects

Development of the 2016 supplement

- Cooperative Research and Development Agreement (CRADA)

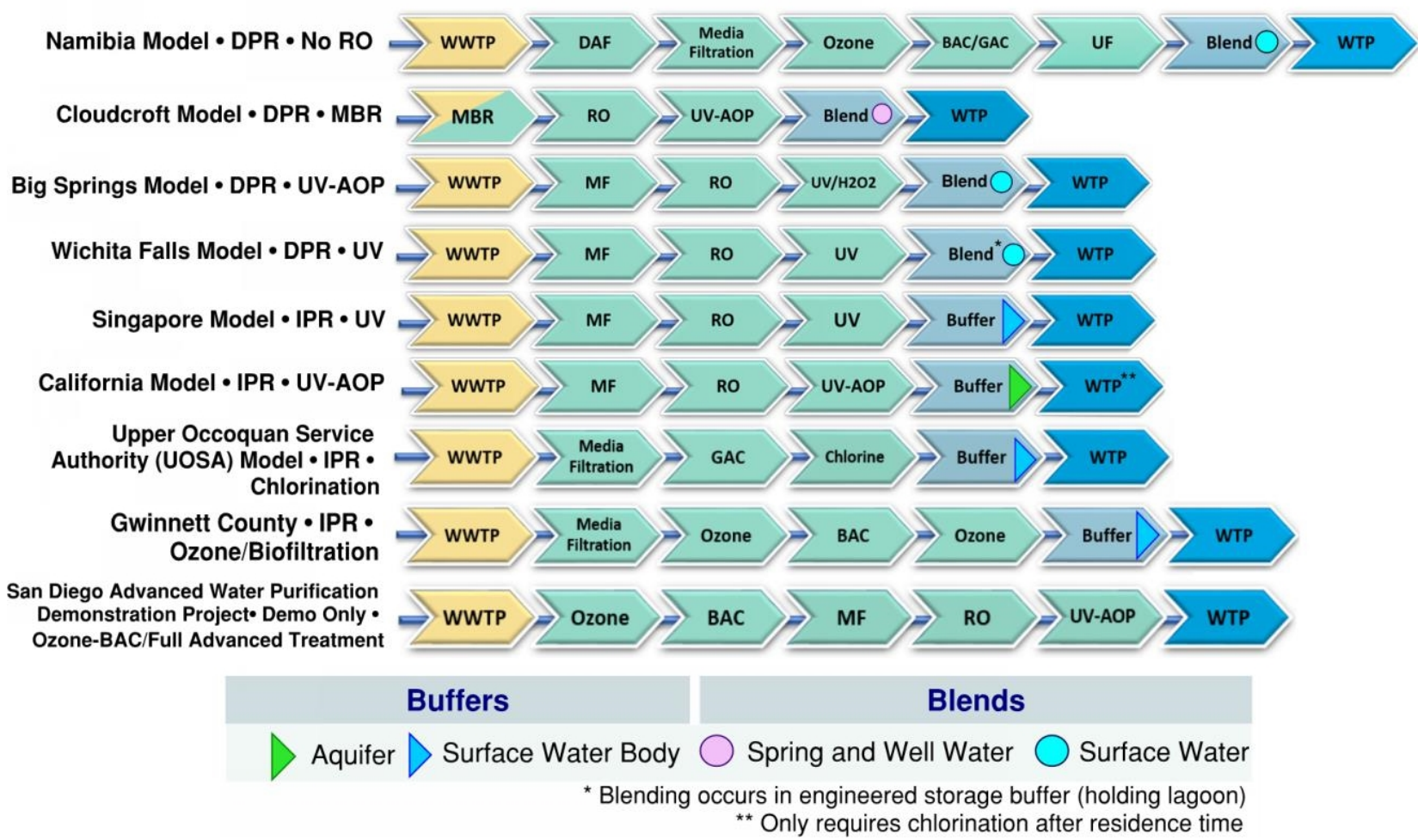
Task	CDM Smith	EPA Office of Water	Partners (experts)	Timeline
1 – Outline	Draft outline			1 month
2 – Draft	Write	Technical assistance, access to experts	Provide input	< 8 months
3 – Technical review	Coordinate process	Internal review and invite external review	Provide input	2 months
4 – Revisions	Revise document	Technical assistance, access to experts		2 months

Content Overview

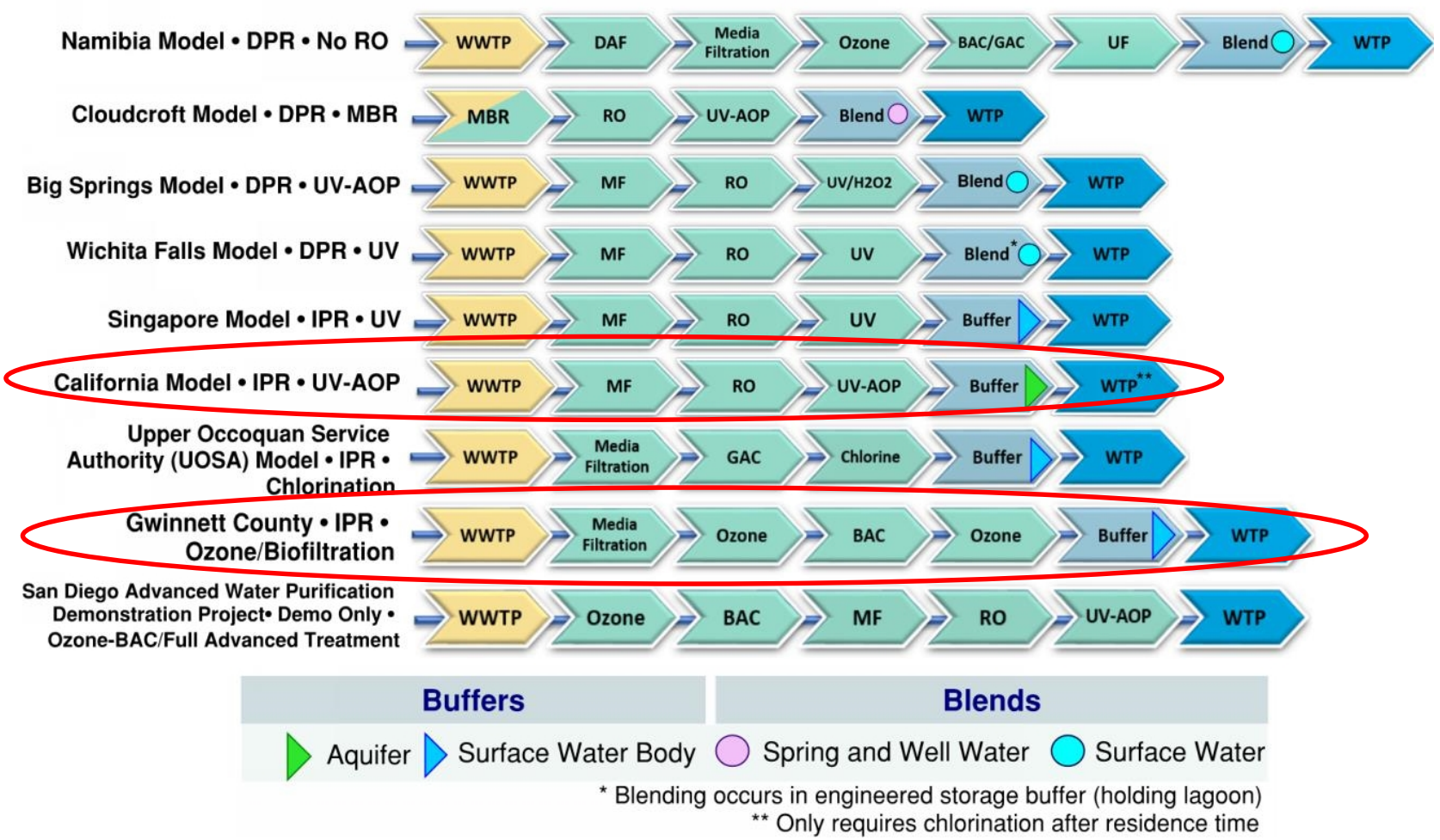
Potable reuse reports & themes

	Nickname	Year	US overview	Chemicals	Pathogens	Risk Assess.	Reg. Summ.	Treatment	Source Ctrl.	Buffers	Monitoring	Operations	Cost	Epidemio.	Public	Research	Case studies
1	WEF/AWWA	2008		✓	✓		✓	✓				✓			✓		✓
2	NWRI - A Path Forward	2011						✓	✓	✓	✓				✓	✓	✓
3	NRC	2012	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
4	State of the Science Report and Equivalency Criteria for Treatment Trains (WRRF 11-02-2)	2013		✓	✓		✓	✓		✓	✓					✓	✓
5	Australian Academy of Technological Sciences and Engineering – Australia-specific	2013	✓	✓	✓		✓	✓		✓			✓	✓	✓		✓
6	Direct Potable Reuse Resource Document (TWDB) – Texas-specific	2015		✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	
7	Framework for Direct Potable Reuse (AWWA, NWRI, WEF, and WateReuse)	2015				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
8	EPA Potable Reuse Supplement	2016	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Alternative Treatment Trains



Alternative treatment trains



What are the pros and cons of key treatment trains?

Factor	Full Advanced Treatment	Ozone-Biofiltration
Widespread?		
Cost		
Residuals generated?		
TDS removed?		 *
Water quality produced		 **

* Can do sidestream TDS removal

** Dependent on operator attention & ability to adapt to variations

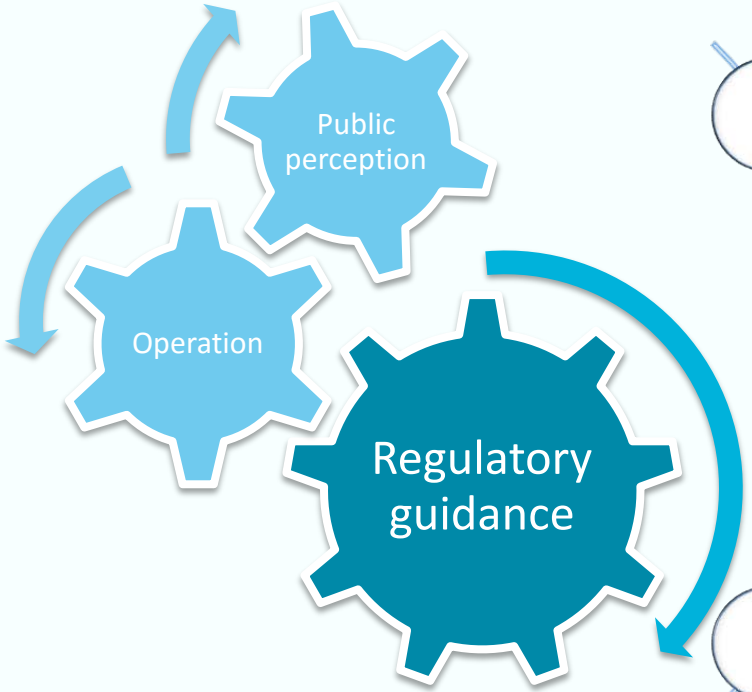
Case Studies

- **Los Alamitos Barrier Water Replenishment District of So. CA/Leo J. Vander Lans Advanced Water Treatment Facility (LVLWTF)**
- **Gwinnett F. Wayne Hill Water Resources Center, Chattahoochee River and Lake Lanier Discharge**
- **Village of Cloudcroft PURe Water Project – Direct Potable Reuse**
- **Orange County Groundwater Replenishment System (GWRS) Advanced Water Treatment Facility**
- **Colorado River Municipal Water District Raw Water Production Facility Big Spring Plant**
- **Wichita Falls River Road WWTP and Cypress WTP Permanent IPR and Emergency DPR Project**
- **Potable Water Reuse in the Occoquan Watershed (UOSA)**

RO system at Orange County Water District's Groundwater Replenishment System

F5 Concepts, Inc.

In Summary



- No federal regulations for reuse
- IPR regulated by states
- Some states are forming and implementing guidelines for DPR
- Supplemental document on the practice of potable reuse (EPA, 2016 DRAFT)
- Challenges remain for DPR

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Questions & Comments

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