

Colorado's Approach to DPR Regulatory Development

Jeff Mosher
Carollo Engineers

Arizona Water Reuse Symposium
Flagstaff, Arizona
July 29, 2019

WATER
OUR FOCUS
OUR BUSINESS
OUR PASSION



Background

Process

Components

Looking
Forward



Background

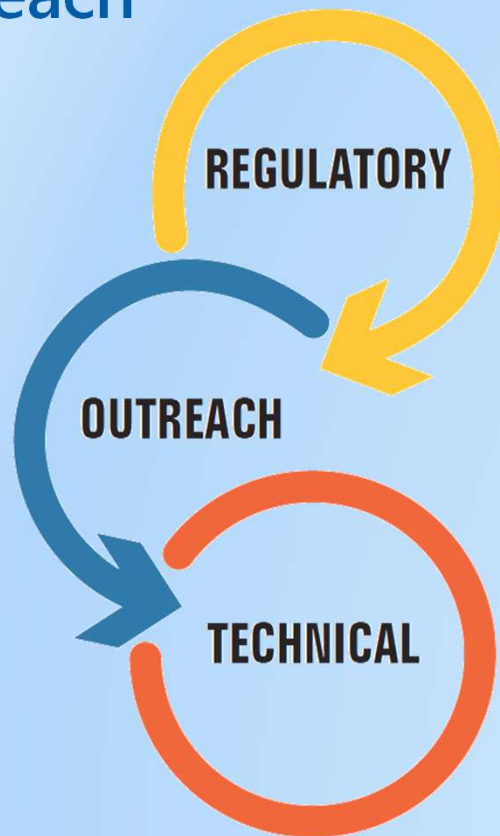
Process

Components

Looking
Forward



WaterReuse Colorado DPR Phase 1 Project Initiated Statewide Reg Development & Outreach



Set a clear framework for potential DPR regulations

Increase public understanding and acceptance

Adapt & use existing planning tools to help utilities assess potable reuse

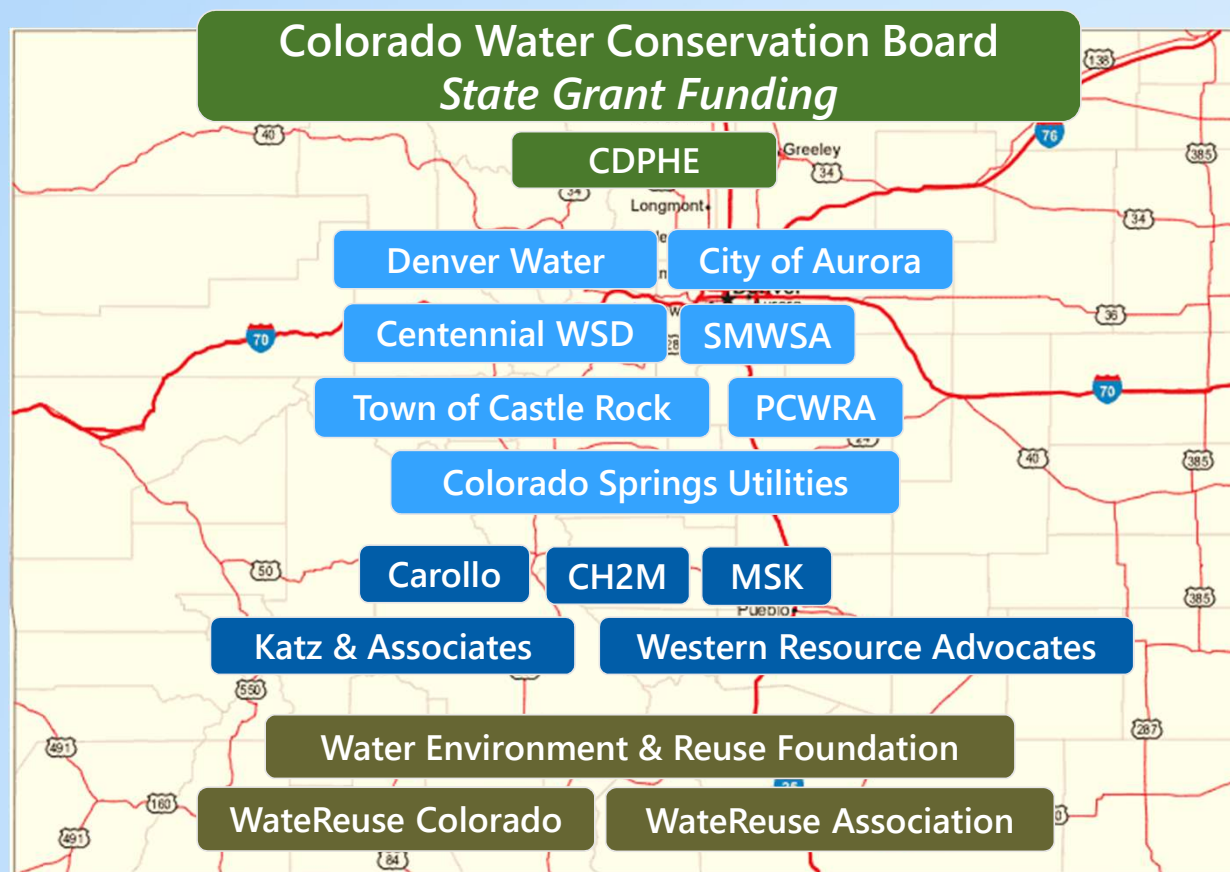
Collaboration of leading utilities and organizations

**State
Agencies**

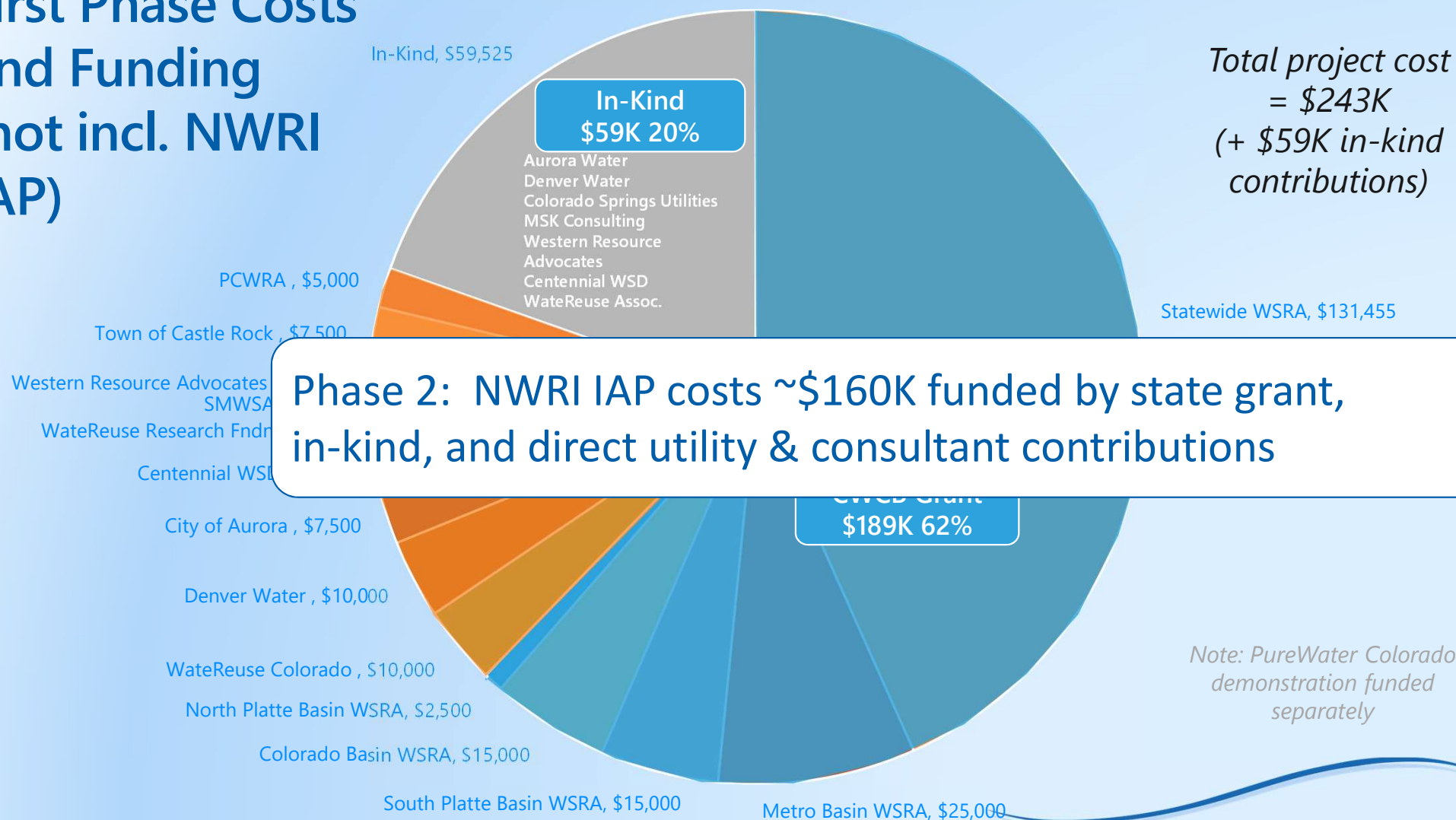
Utilities

**Consultants &
NGOs**

**Industry
Organizations**



First Phase Costs and Funding (not incl. NWRI IAP)



Background

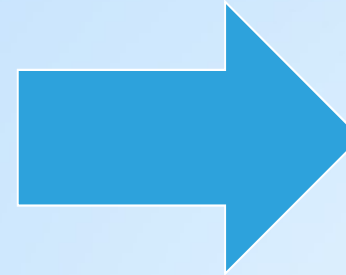
Process

Components

Looking
Forward



Colorado's Three-Tiered Approach



Flexibility



Adaptability

Phase 1 Endpoint: Regulatory Matrix Frames the Regulatory Components and Process

Reg / Policy / Guidance

Regulatory Matrix

CATEGORY	INCLUDING	REGULATION	POLICY	GUIDANCE
1. Terminology	<p>The Framework for Direct Potable Reuse (NWR/WEF/AWWA/State Reuse) provides a detailed list of terminology. Consider inclusion/option to maintain consistency within the industry. Example important definitions/terminology include:</p> <p>Source Control - First described national pretreatment program material. Next, define source control as it could apply to potable reuse projects.</p> <p>Potable Reuse - define the basic concept that any type of potable reuse is in water quality that is protective of direct potable reuse, indirect potable reuse. Context of the urban water key building blocks to convert and reuse, which includes treatment, distribution, and consumption.</p> <p>Environmental Buffer - define the buffer to IP and how the use of diversion and how the environment in the current context in Colorado.</p>	<p>Determine which definitions to DPRL.</p>	<p>Some terms should not have regulatory language in policy and guidance. These terms should be referred to as "terminology" and not "definitions."</p>	<p>To be determined at a later date</p>
2. Source Control	<p>Build on existing programs, with a different permit programs (which are NPDES permit compliance).</p> <p>Recognize that is "enhancement of industrial location and rigorously define."</p> <p>Define other emergency response for sampling and determining.</p>			
3. Wastewater Treatment	<p>Specify treatment targets and/or objectives:</p> <ul style="list-style-type: none">— Same as current discharge requirements— DBP minimization— Nitrogen Control <p>Recognize the value of flow equalization and efficiency.</p> <p>Recognize operational impacts of downstream purification processes.</p> <p>Develop an emergency response plan.</p> <p>Consider wastewater treatment options.</p>			

ADVANCING DIRECT POTABLE REUSE TO OPTIMIZE WATER SUPPLIES AND MEET FUTURE DEMANDS

EXECUTIVE SUMMARY | SEPTEMBER 2018

11 Categories

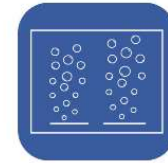
WATER REUSE COLORADO

carollo
Engineers...Working Wonders With Water®

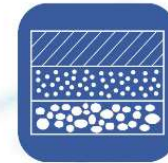
2018 PureWater Colorado DPR Demonstration Helped Advance Outreach and Reg Development



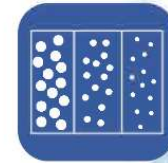
Barrier 1:
Ozonation



Barrier 2:
Biofiltration



Barrier 3:
Microfiltration



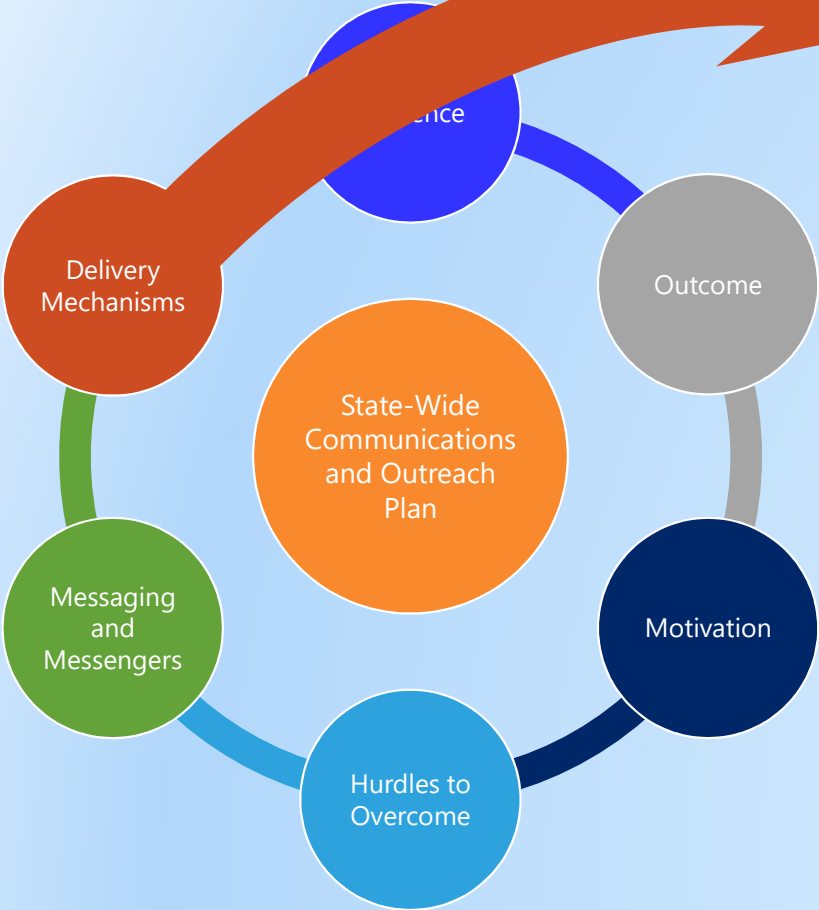
Barrier 4:
**Granular
Activated Carbon**



Barrier 5:
**UV/Advanced
Oxidation**



Communications and Outreach Plan focuses on Target Audiences and How to Motivate Them



Delivery Mechanisms and Strategy

Priority Audiences

AUDIENCE	COMMUNITY LEADERS (PUBLIC/WATER UTILITY CUSTOMERS)	COPIRE	INDUSTRIAL, FOOD/BEVERAGE, MANUFACTURING	MANAGERS/EXECUTIVES (AS IMPLEMENTERS)	MANAGERS/EXECUTIVES (AS INFLUENCERS)	ENVIRONMENTAL GROUPS
WRITTEN COMMUNICATION	• Television/news	prepared materials for presentations and handouts.	prepared materials for presentations and handouts.	prepared materials for presentations and handouts.	prepared materials for presentations and handouts.	prepared materials for presentations and handouts.
EVENTS	• Demonstration of tour groups.					
FACE-TO-FACE COMMUNICATION	• K-12 school outreach. • City council meetings/public forums. • Environmental group advocating for D implementation.					

Delivery Strategies

ADVANCING DIRECT POTABLE REUSE TO OPTIMIZE WATER SUPPLIES AND MEET FUTURE DEMANDS

EXECUTIVE SUMMARY | SEPTEMBER 2018

WATER REUSE COLORADO

carollo
Engineers...Working Wonders With Water®

Background

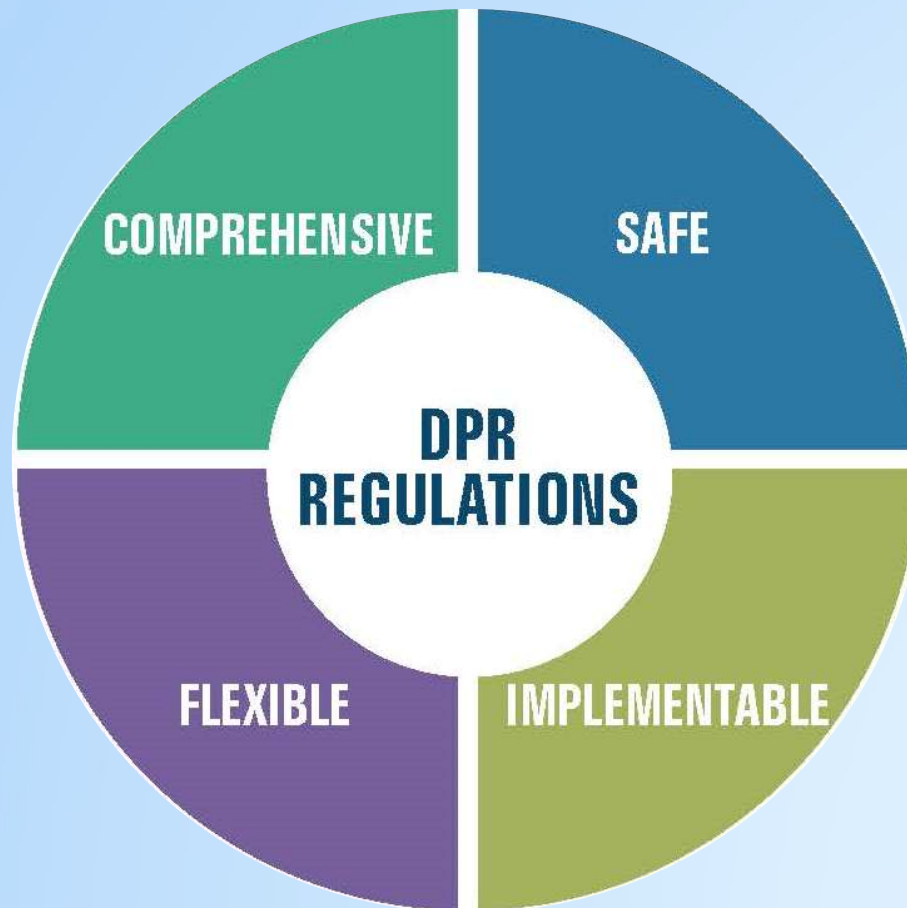
Process

Components

Looking
Forward



Key Goals for DPR Regulations



11 Critical Categories Identified for DPR Regulation

1. Definitions/Terminology

2. Source Control

3. Wastewater Treatment

4. Pathogen Disinfection/Removal

5. Chemical Pollutants

6. Advanced Treatment Processes

7. Monitoring Requirements

8. Reporting

9. Facility operations/ certification programs

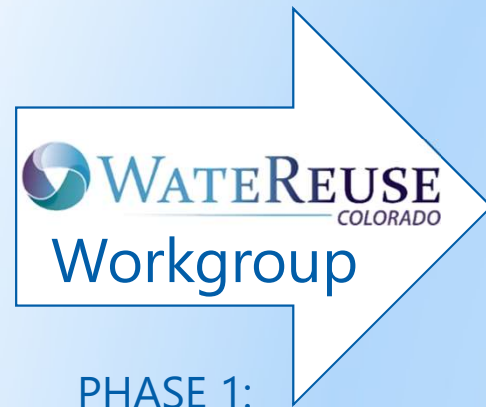
10. Education and outreach

11. Technical, Managerial and Financial (TMF) capacity

NWRI National
Water
Research
Institute
Advisory Panel

PHASE 2:
Late
2019

Pending
funding



PHASE 1:
Framework
completed 2018

Focus Areas for NWRI Independent Advisory Panel in Phase 2

Panelists



- **Panel Chair:** Larry Schimmoller, PE, Jacobs
- Christopher Bellona, PhD, Colorado School of Mines
- Richard Danielson, PhD, BioVir Laboratories
- Eric Dickenson, PhD, Southern Nevada Water Authority
- Ellen McDonald, PhD, PE, Alan Plummer Associates
- Kristina Mena, PhD, MSPH, University of Texas - Houston

Focus Areas for NWRI Independent Advisory Panel in Phase 2

Definitions and framework for 3 distinct “Types” of DPR

Terminology

Enhanced Source Control Optimized for DPR

Integration of Wastewater Treatment Plant Discharge Permit Compliance with DPR Systems

Pathogen Disinfection and Removal

Chemical Removal and Monitoring

Advanced Treatment Processes



Three “Types” of DPR Defined by the Panel

TYPE 1

Raw Water Blending. Blending with one or more approved raw source waters prior to treatment of the blended water at a drinking water treatment plant.

TYPE 2

Potable Water Blending. Blending of advanced purified water downstream of a drinking water treatment plant and prior to distribution by a potable water distribution system, either before or after the disinfection process.


TYPE 3

Potable Water Production. Advanced purified water into any potable water distribution system directly from an advanced water purification facility.

Requirements will depend on DPR “Type”

e.g., lower pathogen removal requirements for Type 1 reclaimed water purification because drinking water treatment plant will help meet overall pathogen goals.

Pathogen Disinfection and Removal

- Panel's preliminary recommendation for virus/Crypto/Giardia LRVs is **8/6/5.5 (minimum) based on secondary effluent quality** (not raw wastewater).
 - Secondary effluent must be **nitrified, denitrified, and filtered**
 - Panel recommends a **minimum of 3 separate types of pathogen barriers** (e.g. physical, chemical, UV).
- 

Chemical Removal and Monitoring

Panel recommends that regulated and unregulated contaminants be addressed as follows:

Level 1: SDWA MCLs and State Requirements, including DBPs. **(REGULATION)**

Level 2: Unregulated contaminants of interest for public health specific to potable reuse applications (for example, PFAS, NDMA, 1,4-dioxane). **(POLICY)**

Level 3: Unregulated contaminants that are useful to monitor treatment performance for the unit process (for example, sulfamethoxazole, iohexol, and sucralose). **(GUIDANCE)**

Development of DPR Regulations is Underway

Final Rulemaking to Start 2020-2021 Pending CDPHE Funding



Background

Process

Components

Looking
Forward





Ongoing Outreach from PureWater Colorado



Outreach Events and Scholarships

DENVER WATER | **100 YEARS** 1918 — 2018

WATER REUSE COLORADO

Materials Available for Future Outreach





Colorado's Future

A look at the technology behind the PureWater Colorado Demonstration Project

A safe, reliable, and sustainable drinking water supply for the present & future.

Partners:

- DENVER WATER 100 YEARS
- WATER REUSE
- carroll
- Calgon Carbon
- PALL
- xylem
- CHICAGO
- PureWater Colorado
- WaterReuse.org

The Process

- Step 1: Ozonation
- Step 2: Biofiltration
- Step 3: Microfiltration
- Step 4: Granular Activated Carbon
- Step 5: UV/Advanced Oxidation

Colorado's Future

In a demonstration of water purification with high quality performance, a water supply for the future, locally in Colorado.

Water Reuse Process

Water that is then treated at a water purification plant approach of water supply and quality.

Water Reuse Process

Water that is then treated at a water purification plant approach of water supply and quality.

Water Reuse Process

Water that is then treated at a water purification plant approach of water supply and quality.

Phase 1 deliverables are on WateReuse Colorado's web page

The screenshot shows the WateReuse Colorado website. The left sidebar contains navigation links: Colorado, Leadership, Meetings & Events, Reports & Resources, Strategic Direction, WateReuse Colorado Members, and Latest News. Under Latest News, there is a call for abstracts for the 34th Annual WateReuse Symposium, dated December 9, 2018. The main content area is titled 'WateReuse Colorado News and Current Events' and features a section for 'Recent Headlines'. The headline is 'WateReuse Colorado Advancing Direct Potable Reuse to Optimize Water Supplies and Meet Future Demands'. Below the headline, a paragraph describes the project and its deliverables. A red box highlights a list of deliverables: TM1: Regulatory Development, TM2: Communications and Outreach Plan, TM3: Treatment Train Planning Tools and Case Studies, and Executive Summary.

Colorado | WateReuse

https://watereuse.org/sections/watereuse-colorado/

Apps Vision Milk Concur Map Triplt Mile SW Blue-PI COI WOR ShPt DL WRA OWRB

Home \ Sections \ Colorado

WateReuse Colorado News and Current Events

Recent Headlines

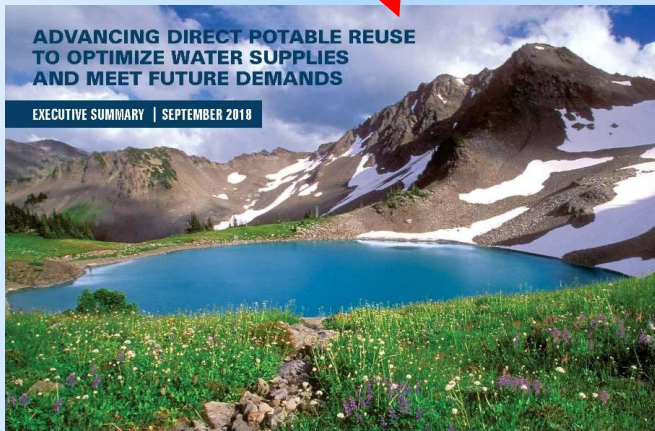
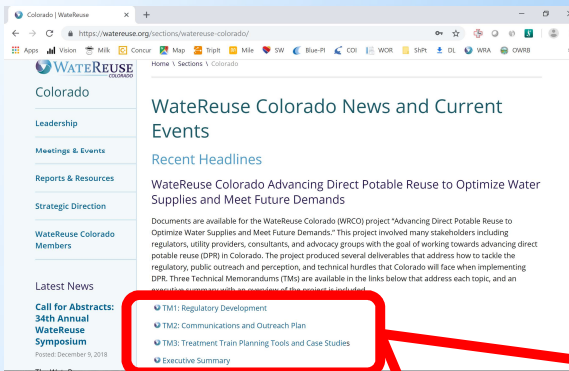
WateReuse Colorado Advancing Direct Potable Reuse to Optimize Water Supplies and Meet Future Demands

Documents are available for the WateReuse Colorado (WRCO) project "Advancing Direct Potable Reuse to Optimize Water Supplies and Meet Future Demands." This project involved many stakeholders including regulators, utility providers, consultants, and advocacy groups with the goal of working towards advancing direct potable reuse (DPR) in Colorado. The project produced several deliverables that address how to tackle the regulatory, public outreach and perception, and technical hurdles that Colorado will face when implementing DPR. Three Technical Memorandums (TMs) are available in the links below that address each topic, and an executive summary with an overview of the project is included.

- TM1: Regulatory Development
- TM2: Communications and Outreach Plan
- TM3: Treatment Train Planning Tools and Case Studies
- Executive Summary

Call for Abstracts: 34th Annual WateReuse Symposium
Posted: December 9, 2018

Phase 1 deliverables are on WateReuse Colorado's web page



WATERREUSE
COLORADO

carollo
Engineers...Working Wonders With Water®

Executive
Summary



WateReuse Colorado
Advancing Direct Potable Reuse to Optimize
Water Supplies and Meet Future Demands.

Technical Memorandum 1
DEVELOPMENT OF DPR
REGULATIONS IN COLORADO

FINAL | July 2018

carollo

TM 1
Reg Framework



WateReuse Colorado
Advancing Direct Potable Reuse to Optimize
Water Supplies and Meet Future Demands

Technical Memorandum 2
COMMUNICATIONS AND OUTREACH
PLAN FOR DIRECT POTABLE REUSE
IN COLORADO

FINAL | July 2018

carollo

TM 2
Outreach



WateReuse Colorado
Advancing Direct Potable Reuse to Optimize
Water Supplies and Meet Future Demands

Technical Memorandum 3
POTABLE REUSE PLANNING TOOLS
AND CASE STUDIES

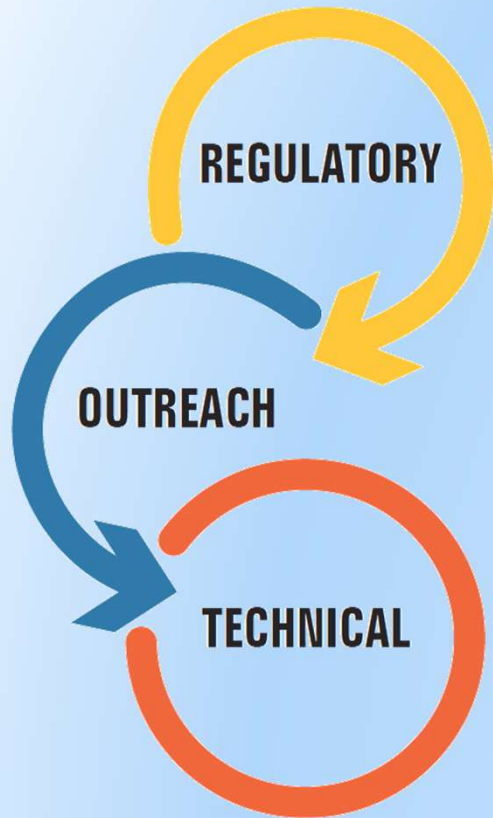
FINAL | September 2018

carollo

TM 3
Planning Tools

Should we Act or React?

Colorado is acting in advance to provide lead time & benefits



Well-prepared for future DPR projects – in advance of the need

DPR regulatory development is well underway – utilities will know the rules and costs to move forward with DPR

Model of success – partnerships and collaboration between utilities, regulators, equipment manufacturers, and consultants

Regulatory development, outreach, and public confidence are all interlinked

Colorado's Approach to DPR Regulatory Development

Questions?

Jeff Mosher
Carollo Engineers

WATER
OUR FOCUS
OUR BUSINESS
OUR PASSION

