



JANUARY 2016 & ANNUAL MEETING MINUTES

RMWEA/RMSAWWA Joint Water Reuse Committee / WaterReuse Colorado

January 7, 2016 at 1:00 pm

Plum Creek Water Reclamation Authority WWTP

Plum Creek Water Reclamation Authority

4255 N US Highway 85, Castle Rock, CO 80108

Call in number 888-809-4012, Passcode 7641593#

Attendees:

Dave Takeda	MSK Consulting
Damian Higham	Denver Water
Brenley McKenna	Denver Water
Yelena Sandler	Arcadis
Laura Belanger	Western Resource Adv.
Tara Kelley	Colo. Springs Utilities
Bob Jurenka	USBR
Julie Tinetti	Centennial W&S
Weston Martin	PCWRA
Allegra da Silva	MWH Global
Phil Brandhuber	HDR

Richard Leger	Aurora Water
Jason Assouline	CH2MHill
Donene Dillow	Colo Springs Utilities
John Rehring	Carollo
Tim Grotheer	Centennial WSD
Jose' Velazquez	TetraTech
Bob Dye	Meridian
Caroline Verlander	TetraTech
Bret Eastberg	City of Westminster
Daniel Stewart	Martin/Martin, Inc.
Bobby Anastasov	City of Aurora

Phone Participants: Jodi Villa, Kennedy Jenks; Liz Lemonds, CDPHE; Ben Nucci, Brownstein Hyatt Farber Schreck LLP; Steve Ravel, HMM

1. Presentation by Andy Salveson on National Framework for DPR (via webinar/call in)

Presentation attached. The Framework, which is national in scope, provides detailed guidelines for DPR and is equally applicable to IPR. The document is available online for free at (<https://www.watereuse.org/watereuse-research/framework-for-direct-potable-reuse/>). Andy said people should feel free to contact him with questions. The report provides health standards and general recommendations for all components of implementing potable reuse but leaves it up to the states to determine what will work best for them.

Allegra also mentioned that the EPA is finalizing a potable reuse document that builds on the National Framework report, digging deeper into alternatives to RO. This document will provide info on how states can think about how developing regulations within the context of existing CWA and SDWA regulations and includes a number of case studies. It should be out within 6 months.

2. CDPHE-WQCD Items

a. Regulation 84 Updates

- i. Update on possible new uses effort/WQF workgroup (Damian)

CDPHE held a Reg 84 stakeholder meeting yesterday. Toilet flushing, edible crops, and TDS were discussed. CDPHE said that addressing TDS would be a big lift and would entail multiple regulations, not just Reg. 84. Toilet flushing, which is similar to Reg 86 (Graywater), is more manageable to address. Edible crops would be a big lift and would require additional studies unless we want to have standards similar to California's. There is another meeting planned tentatively for March 23 to follow up on edible crops. CDPHE also wants to understand the need for Reg 84 changes better, whether there is demand or what the water supply gaps are that could potentially be met. Tara asked why this quantification is now needed when it wasn't in the past. Damian thought that isn't not a safety issue but more to demonstrate to the WQCC that there's a need. Liz also said she also thought it was related to CDPHE's need to prioritize Division resources. At the Reg 84 stakeholder meeting CDPHE resources and the fee bill were also discussed. Three of the five CWA permit sectors got fees set and no bills for fee structures will go forward this year for the other two sectors.

b. Graywater Non-Traditional Uses Update (Tara)

On Dec 15, the State Plumbing Board held a meeting at which CDPHE submitted 12 comments specific to modifications that would need to be made to Colorado plumbing code for it to be in line with Reg. 86. CDPHE isn't optimistic that the Plumbing Board will adopt these comments. It will be several weeks until the official rules are posted at which point we'll see if indoor toilet flushing is possible. Denver is developing indoor ordinances but no one was aware of anyone else currently pursuing these.

c. Marijuana growing with recycled water (Damian)

Damian noted that more information gathering needs to occur before decided whether or not to move this ahead, but there is some interest. Grow houses are big and efficient water users. One in every 11 commercial buildings in the City and County of Denver are commercial grow houses. This use could be a good fit with nutrients and many facilities are running treatment, including RO at the front end, so they can control their supply WQ.

3. Subcommittee Updates

a. Scholarships (Tanja/Tara) – discuss notifications for 2016, renaming the scholarship after Martha Hahn, and possible high school recipient.

Tara gave an overview and update of our scholarship program including our recent decision to rename one of the scholarships in honor of Martha Hahn and potentially making one available for graduating high school students. Jose' Velazquez, who is chair of the RMWEA scholarship attended and said he'd like us to think about how the WRCO and RMWEA/RMSAWWA scholarships could come together. Tara will share info with Jose and they will communicate about discussion potential coordination on scholarship moving forward. We decided that rather than initiate sweeping changes to the WRCO scholarship program this year, we'd continue the status quo (from previous years) and coordinate with RMWEA/RMSAWWA, with Damian and Richie volunteering to be our liaisons, for 2017 and beyond. Tara or Tanja will get the notice together to get out in March and maybe distribution list will be improved and perhaps additional funds.

b. Website (Steve) – no update

c. Education/Outreach/Public Relations:

- i. Inter-organizational activities (Laura) – Dave to report on donation made by the Cottonwood Institute

We received a \$250 contribution from Cottonwood Institute students from their bake sale. They did a project on gray water and picked us after Kristin Maharg, with the Colorado Foundation for Water Education recommended us. Dave spoke with their teacher and offered to have one of us go speak with them but nothing has yet been set up.

On a similar note, Allegra noted that she is setting up a water experiment for the upcoming Girls in Science day on Saturday, March 5 at the Denver Museum of Nature and Science (<http://www.dmns.org/museum-news/girls-and-science/>).

- ii. Webinars (Abbey) – No update

d. Annual Awards (Abbey) – No update

- e. Industrial Reuse Committee (Abbey) – Via email prior to the meeting, Abbey shared that a webinar on beverage production is available. It aired mid-December.

f. Potable Reuse (Dave)

- i. Potable Reuse Guidelines Update (John) – See item #1

- g. WRCO DPR Project and Funding (including WSRA Grant (Laura/John) – A huge thanks to everyone who is supporting the project both through cash and in-kind support. We have secured WSRA funding from the North Platte and Colorado Basin Roundtables (BRTs) and have gotten through the first step for both the Metro and South Platte BRTs. They will decide next week and we will then ask the CWCB for statewide funding at their March meeting. If funding is successful, the project will kick off in May or June.

- h. Membership (Richard) – The State has permission to become a member of WRCO and the Town of Castle Rock will also be joining as a new member.

- i. Regulations/Local Codes (Tara) – No Update

- j. Reuse Rendezvous (Damian) - We are having an event planning meeting this afternoon. We are organizing an event to capitalize on the prominence of reuse in the Water Plan and to put some focus on potable reuse. The event will be held on April 14 at MolsonCoors headquarters downtown. A huge thanks to Jodi for putting that together. We need some help so if anyone wants to volunteer contact Laura. Phil said he'd help with the poster content. Laura asked if we need to approve more funds for the event to make sure we have another to cover it. We currently have \$2,500 approved for initial expenditures.

Frank motioned to approve up to \$2,500 for initial expenditures related to the Reuse Rendezvous. Richie seconded the motion. The motion passed unanimously.

Damian motioned that we fund up to an additional \$7,500 for Reuse Rendezvous expenditures, in addition to the \$2,500 already approved, for a total of \$10,000. Richie seconded the motion. The motion passed unanimously.

- k. Colorado Water Congress (Laura) – We are having a WRCO booth at Water Congress which is located in one of the most prominent spots. Laura asked if anyone had any booth materials or swag we could use. Damian said he'd see if Denver Water has any booth materials we might be able to use and if their print shop might be able to help print a poster.

Laura also went over the agenda (attached) for the Water Congress pre-conference Municipal Reuse workshop track on January 27. She asked for input about promoting this and will send out a WRCO email and will contact the Joint Reuse Committee to see if they will send out an eblast.

4. Other Business

- a. CWA/SDWA Nexus Workgroup (Damian) – No update
- b. State Water Plan (Laura) – It's finished. There's a pretty good reuse section that highlights the important role reuse, including potable, will play in helping meeting the future M&I gap.
- c. Promoting 20th Annual Reuse Research Conference in Denver – May 2016 (Laura) - The Conference will be held on May 23 & 24 at the Westin. Abbey and Rich are the co-chairs. National has asked for help to promote this event. Richie will check to see if we can get a small event poster to put up at our WRCO booth at Water Congress.

Bob Jurenka noted that the Bureau of Reclamation is in Denver and they will be attending the conference pretty heavily. He also noted that the Bureau is trying to be involved more in at the local level, primarily in research. They have two programs, Desalting/Water Purification Research and Research Projects Science and Technology. There should be some good opportunities to work with them.

5. WRCO Items

- a. Approve November 2015 minutes and financials (Dave)
Richie motioned that the November 2015 minutes and financials be approved. Tara seconded the motion. The motion was approved unanimously.
- b. WRCO Treasurer's Report for this Month (Dave) – See attached financials.
The Treasurers report was not available but we have around \$61,000 and will begin receiving 2016 membership dues. Dave noted that proposed expenditures include CWC sponsorship (up to \$1500), DPR project sponsorship is \$10,000, plus to \$10,000 for reuse event.
- c. Tracking of Approved Motions/Actions (Laura) – We've started adding a table of actions to be completed and their status to the minutes (updated table below). We have completed many actions and are making headway as we should on outstanding items.
- d. Spending Policy (Dave) - Dave noted that we have three items we need to approve each January, Presidential spending authority, scholarships and the national representatives expenditures to attend the national board meeting. The proposed 2016 spending policy, was briefly discussed and we decided to keep the spending policy amounts that same as in 2015: the President of WateReuse Colorado will have the authority to spend up to

\$250.00 per event and not to exceed \$1,000.00 in any annual budget cycle; we will fund two \$1,500 scholarships, totaling \$3,000; and National Representative expenditures are allowed up to \$3,000 a year to conduct WateReuse Colorado business associated with National Board meetings.

Damian moved to approve the spending policy for 2016. Tara seconded the motion. The motion was approved unanimously.

- e. Central contact for items (Dave) – As the National Representative Richie has agreed that we can use his address for any WRCO business requiring an address. Dave also just finished setting up a WRCOPresident@Watereuse.org for WRCO business where an official WRCO email is more appropriate or professional. The cost of the email is \$16.00 a month. Questions were raised about that amount and we said we'd see how much we're using it and may consider cancelling it after the April Reuse event.
- f. Annual Report (Dave) – The annual report will be completed in February so should be available for our March meeting.
- g. Salinity Research - Brenley planted the seed about some salinity research she is interested in pursuing. She'll have more information on this for upcoming meetings. Richie noted that our landscaping document is finally completed. Brenley said it's not detailed enough for what she's thinking about. Tara and others asked who put the document together. Richie will find that out as well as what their qualifications are.
- h. Reuse Letter to the Editor and Meeting with Editorial boards – Laura asked the group if there is interest in WRCO drafting up a letter to the editor in response to recent unfavorable press about reuse. Tara noted that she has gotten feedback from City Forester recently about impacts but hadn't heard anything about this before. CSU, Denver Water and Westminster expressed interest in being involved in this. Generally there is interest in having the WRCO President draft a letter. Brenley will send recent reuse articles and some messaging information to Laura who will get this going.

6. WRCO Business

- a. 2016 Officer Elections (Dave) –
President: the Secretary automatically becomes the President so Laura Belanger will become the President (1 yr term)
Secretary: Brenley McKenna (1 yr term)
Treasurer: Jason Assouline (2 yr term)
Director At-Large (3 yr term w/no term limits): John Rehring, Abbey Antolovich, Jodi Villa, Yelena Sandler.

We need 20 percent of all voting members present and we have a quorum.

Richie made a motion to approve the entire slate as read by Dave. Damian seconded the motion. The motion was approved unanimously.

- b. Social Media Policy (John) – We do not have written policy. The policy is "Use Common Sense".

7. WRA/WRRF Items

- a. WateReuse Association updates (Richard)

There was board meeting on December 8th and the next meeting is in March. There will be a merger of WRA, WRRF, WERF. Melissa is now the Executive Director of these organizations that are all being merged. The two research foundations will still be separate and run by two boards this year. At one point they will become one organization with one board and one name.

- b. Legislative/lobbying effort update (Damian) – what will our goal(s) be?
No update
- c. Research (John) - Several new WaterReuse Research Foundation research products were published in 2015. John highlighted the following projects, noting that potable reuse and industrial reuse continue to be two key focus areas for the foundation. A full listing is available at <https://www.watereuse.org/research/research-projects/>.
 - Framework for Direct Potable Reuse (Project: 14-20)
 - Enhancing the Soil Aquifer Treatment Process for Potable Reuse (Project: 12-12)
 - The Value of Water Supply Reliability in the CII Sector (Project: 09-04)
 - Development of New Tracers to Determine Groundwater Travel Time near Managed Recharge Operations (Project: 09-11)
 - Establishing Nitrification Reliability Guidelines for Water Reuse (Project: 10-15)
 - Comparison of Chemical Composition of Reclaimed and Conventional Waters (Project: 06-06)
 - Model Communication Plans for Increasing Awareness and Fostering Acceptance of Direct Potable Reuse (Project: 13-02)

Damian noted that he has Denver Water's White Paper on Edible Crops.

HDR noted that they are initiating a project to summarize the pathogen log removal credits documented in the literature for treatment technologies suitable for use with DPR. The project will also consider the applicability of the findings to arid in-land states like Colorado.

8. AWWA/RMWEA/WEF Items

- a. AWWA Water Reuse Committee Updates (Tara)
The Program for the 2016 AWWA Annual Conference (ACE16) (to be held June 19-22, 2016 in Chicago, IL) reuse track has been finalized. The schedule of presentations is attached. There will be four separate tracks: IPR/DPR Case Studies, Reuse Case Studies, Operations and Demonstration Testing for Potable Reuse, and Regulatory Issues for IPR and DPR.
- b. WEF Water Reuse Committee Updates (Frank) - No Update
- c. RMWEA/RMSAWWA Annual Conference - Jose' Velazques, who is on the Technical Committee for the RMWEA/RMSAWWA Annual Conference, said they would love for WRCO to propose a reuse tract. This is a special session in Keystone. Abstracts will be due in April. Allegra will coordinate with Jose about this. Jose' thought the Water Congress reuse workshop track could serve as a good start.

9. Upcoming Conferences

- a. AWWA Int'l Potable Reuse Symposium, January 25-27, 2016 – Long Beach, CA
- b. Colorado Water Congress, January 27-29, 2016 – Hyatt DTC

- c. Membrane Technology, February 1-5, 2016 – San Antonio, TX
- d. Sustainable Water Management, March 7-10, 2016 – Providence, RI
- e. WateReuse California, March 14-16, 2016 – Santa Rosa, CA
- f. WateReuse Research, May 23-24, 2016 – Westin Downtown Denver
- g. ACE16, June 20-22, 2016 – Chicago, IL
- h. 31st Annual WateReuse Symposium, September 11-14, 2016 – Tampa, FL
- i. 2016 RMSAWWA/RMWEA Joint Annual Conference, September 11-14, 2016 -
Keystone, Colorado
- j. WEFTEC 2016, September 24-28, 2016 – New Orleans, LA
- k. Water Infrastructure, October 30-November 2, 2016 – Phoenix, AZ
- l. WQTC, November 13-17, 2016 – Indianapolis, IN

10. Future Meeting Schedule

March 3	Aurora
May 5	Plum Creek
July 7	Aurora
September 1	Plum Creek
November 3	Aurora

Outstanding Action Items

Status	Minutes	Item	Lead WRCO Member	Action
Pending	11/5/2015	2 c ii	Laura	Contact 2015 scholarship winners to schedule presentations
Pending	11/5/2015	2 d	Abbey and Tara	Abbey and Tara will develop recommendations and an awards schedule for 2016 to be discussed at the March meeting. Items will then be added to 2016 WRCO calendar.
Pending	11/5/2015	2 d	Abbey	Abbey will pull together a simple nomination form.
Pending	11/5/2015	5 b	Richie, Dave, Frank	Richie, Dave and Frank review the bylaws and bring recommendations to March meeting. Address how our nominee for Joint Reuse Ctte Rep is made and term length.
Pending	11/5/2015	Planning mtg	Brenley	Brenley will keep us informed about DW's feasibility study regarding a research facility (where DPR among other things will be studied).
Pending	11/5/2015	Planning mtg	Liz, Richie	Liz will send list of potential treaters/users to Richie who will contact them about interest in talking to WRCO.
Pending	11/5/2015	Planning mtg	Abbey	Abbey will look at CDPHE's Leadership Awards to see which companies have received those for possible outreach.
Pending	11/5/2015	Planning mtg	Liz, John	Consider if can add some school age materials in Task 2 of DPR project. Liz to provide CO Science Standards. See WRCO utility member existing materials.
Pending	11/5/2015	Planning mtg	Dave	After call for papers is out in Feb, check in with Joint Reuse Ctte about presenting at their September Annual Conference, perhaps offering to run the reuse track.
Pending	11/5/2015	Planning mtg	?	Attempt to set up a meeting at the RMSAWWA/RMWEA Annual Conference
Pending	11/5/2015	Planning mtg	Dave	Reach out potable reuse hire being made by AWWA
Pending	11/5/2015	Planning mtg	Dave	Talk to contact at Capitol to let them know we're available if can provide assistance
Pending	11/5/2015	Planning mtg	Dave	At end of WRCO DPR Project (in 2017) consider a WRCO sponsored follow up to DPR Project survey
Pending	1/7/2015	3 a	Damian, Richie	Damian and Richie will work with Jose Velazquez to coordinate scholarships for 2017 and beyond
Pending	1/7/2015	3 k	Damian	See if Denver Water has booth materials we might can use and if their print shop might be able to help print a poster.
Pending	1/7/2015	3 k	Laura	Send out a WRCO email and will contact the Joint Reuse Committee to see if they will send out an eblast.
Pending	1/7/2015	4 c	Richie	Richie will check to see if we can get a small event poster for the May Denver WaterReuse Research Conference to put up at our WRCO booth at Water Congress.
Pending	1/7/2015	5 e	Laura	After April Reuse Event, reassess if still need WRCOPresident email @ \$16/month
Pending	1/7/2015	5 g	Richie	Find out who put our landscaping document together and what their qualifications are.
Pending	1/7/2015	5 h	Laura, Tara, Damian, Brenley, Bret	Work on a Letter to the Editor and possibly setting up mtgs w/editorial boards. Brenley will send recent reuse articles and some messaging information to Laura to get this going.
Pending	1/7/2015	5 h	Allegra	Allegra coordinate with Jose Velazquez about WRCO developing a reuse track for the RMWEA/RMSAWWA Annual Conference in September.

2016 WRCO/Joint Reuse Committee Schedule (01/07/2016 Version)

January 2016

- [Jan 7: WRCO/Joint Reuse Cttee Mtg, Plum Creek Water Reclamation Authority](#)
- Jan 25 – 27: AWWA Int'l Potable Reuse Symposium, Long Beach, CA
- Jan 27: Colorado Water Congress Reuse Workshop Track
- Basin Roundtable presentations and votes on WSRA funding requests (CO, Metro, SPlatte)

February

- Feb 1: CWCB WSRA Grant Application due
- Begin working on August Workshop (In odd years. Doing in 2016?)
- Scholarship and Awards Committees develop announcements and schedule

March

- Mar 1: WRCO/JRC Scholarship Program Advertisement
- [Mar 3: WRCO/Joint Reuse Cttee Mtg, City of Aurora Municipal Center](#)
- Mar 16/17: Present at CWCB board meeting. CWCB votes on WSRA grant applications
- Early in month: Scholarship and Awards announcements out

Apr/May

- **April 14: Reuse Rendezvous**
- May 1: Scholarship Applications Due
- [May 5: WRCO/Joint Reuse Cttee Mtg, Plum Creek Water Reclamation Authority](#)
- Contracting with CWCB, Carollo and other DPR Project Funders
- Decide if will conduct an August member survey

May/June

- DPR Project Kickoff. Set up project calendar
- June 15: Award Cttee Final Decision on Scholarships Due

July

- [Jul 7: WRCO/Joint Reuse Cttee Mtg, City of Aurora Municipal Center](#)
- Revisit strategic planning "Action Items"
- Revisit research committee priorities
- Review scholarship applications

August

- Workshop (In odds years. Note doing in 2016)
- Present Scholarships and Awards at workshop or other event/mtg (late Aug/early Sept)
- Member survey?

September

- [Sep 1: WRCO/Joint Reuse Cttee Mtg, 2015 Plum Creek Water Reclamation Authority](#)
- Sep 11 – 14: 31st Annual WateReuse Symposium, Tampa, FL
- Sep 24 – 28: WEFTEC, New Orleans, LA
- Notice of Elections

October (or November)

- Officer nominations: Board/others think about and talk to potential nominees

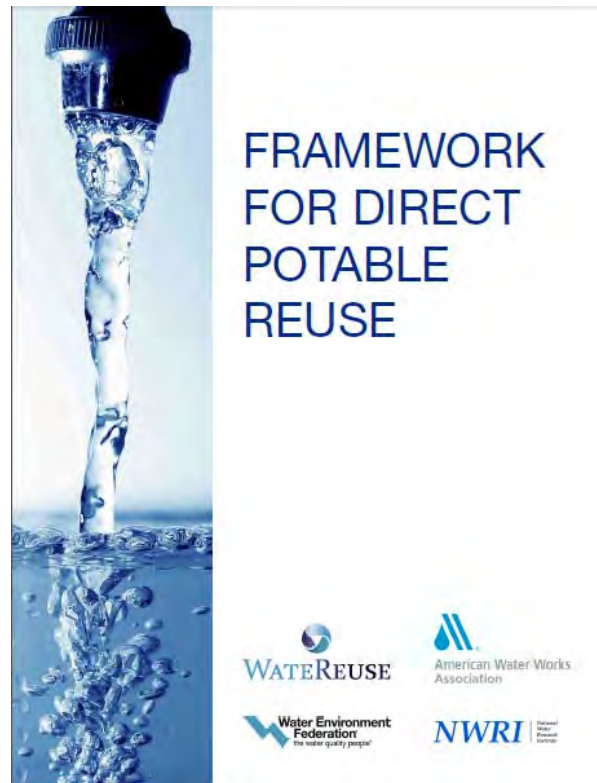
November

- [Nov 3: WRCO/Joint Reuse Cttee Mtg, City of Aurora Municipal Center](#)
- Nov mtg minutes **must** include notice of January annual meeting and elections (both must be noticed at least 30 days in advance)
- Strategic Planning Mtg (Incoming President/Secy prepares agenda and runs)
- Initiate Workshop (odd years)
- Discuss next year's budget
- Determine if need committee to consider proposed bylaw changes

January 2017 (2016 Pres will prepare this agenda and run this meeting, new Pres takes over these duties at the March 2017 meeting. See 2015 Jan mtg minutes for Jan format)

- Renew Spending Policy
- Elections
- Bylaws Review or Amendment

DIRECT POTABLE REUSE FRAMEWORK DOCUMENT



Presentation by Andrew
Salveson, Carollo Engineers
(asalveson@carollo.com)

FRAMEWORK DOCUMENT INDEPENDENT ADVISORY PANEL

George Tchobanoglous, Panel Chair
Joseph “Joe” Cotruvo
James “Jim” Crook
Ellen McDonald
Adam Olivieri
Andrew “Andy” Salveson
R. Shane Trussell

NATIONAL WATER RESEARCH INSTITUTE
Fountain Valley, California

ORGANIZATION OF DPR FRAMEWORK DOCUMENT

1. Introduction
2. What is Direct Potable Reuse?
3. Key Components of a Successful/Sustainable DPR 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 Requirements
10. Residuals Management
11. Facility Operation
12. Public Outreach
13. Future Developments

FORMAT FOR DPR FRAMEWORK DOCUMENT

Chapter 1

Introduction

The nation's water supplies are derived from a variety of sources, including local and imported surface water, groundwater, desalinated brackish water and seawater, and recycled water. As a result of population growth, urbanization (especially along coastal regions), and climate change, public water supplies are becoming stressed and the opportunity to develop new groundwater or surface water sources is becoming more difficult, if not impossible. For many of these communities, conservation efforts have reduced the per-capita demand, but are insufficient to meet the overall water need. Consequently, new strategies are needed to help meet future water demands and to develop more sustainable water supplies. One way to meet the increasing demand is to augment public water supplies by means of potable reuse of a community's treated wastewater, which is the focus of this framework document. The following subjects are presented in this introductory chapter:

- What is the difference between direct and indirect potable reuse?
- What is the purpose of framework document?
- What is the scope of framework document?
- What is the organization of framework document?

1. INTRODUCTION

- What is the difference between direct and indirect potable reuse?
- What is the purpose of the framework document?
- What is the scope of the framework document?
- What is the organization of the framework document?

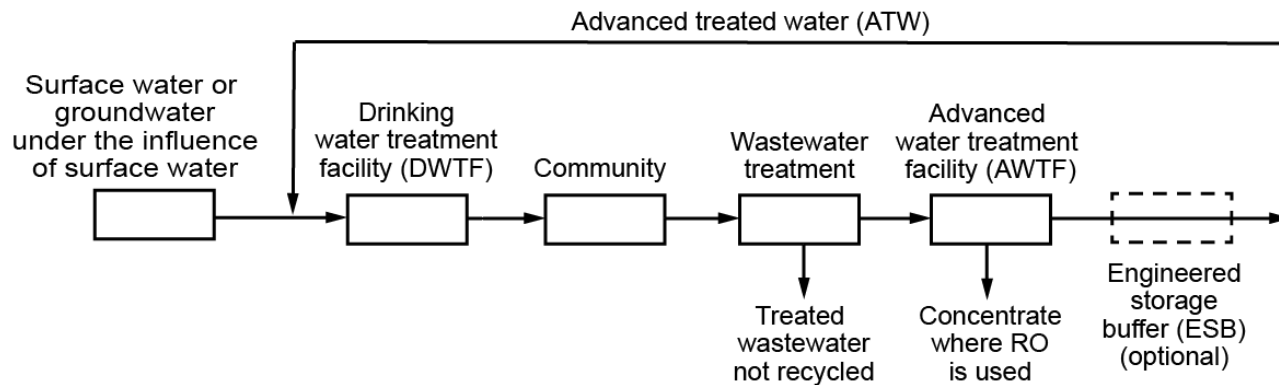
1. PURPOSE OF FRAMEWORK DOCUMENT

To provide an overview of the key elements that make up a DPR program and a framework for assessing the specific topics and issues that need to be addressed in the development of future DPR Guidelines.

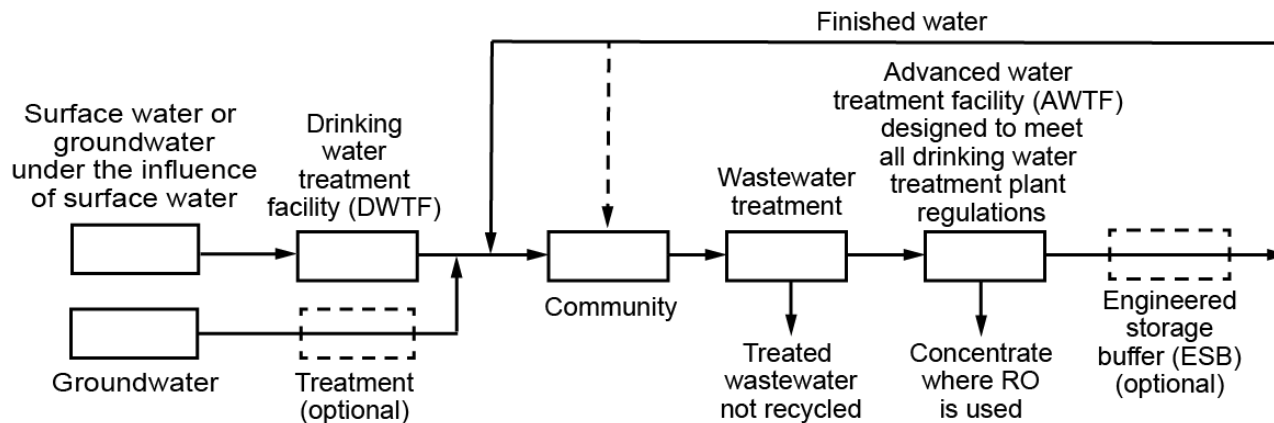
2. WHAT IS DIRECT POTABLE REUSE?

- What is DPR?
- What is IPR?
- What is needed to consider treated wastewater as a new water source?
- What DPR projects are available?
- What does DPR cost?
- What are the energy implications?
- How does DPR compare to other water sources and measures?

2. OVERVIEW: DIRECT POTABLE REUSE

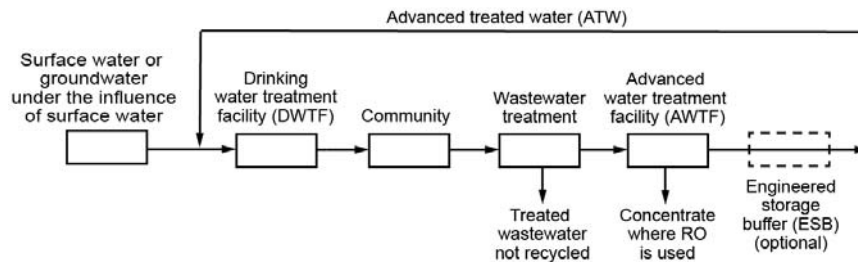


DPR with *Advanced Treated Water (ATW)*

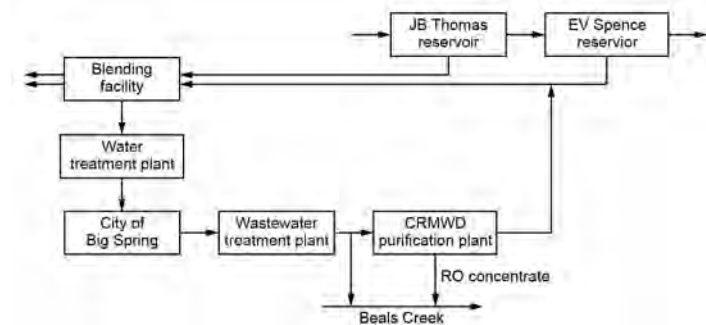


DPR with *Finished Water*

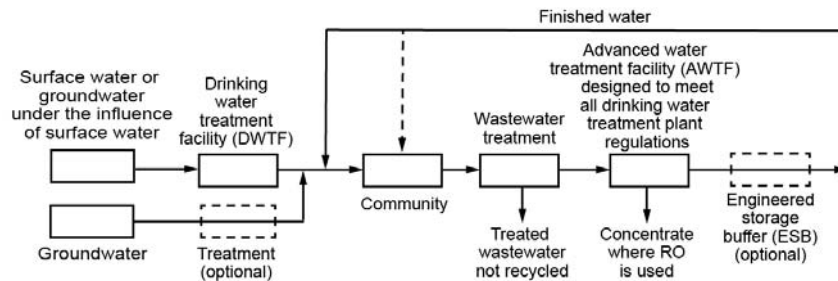
2. OVERVIEW: DIRECT POTABLE REUSE



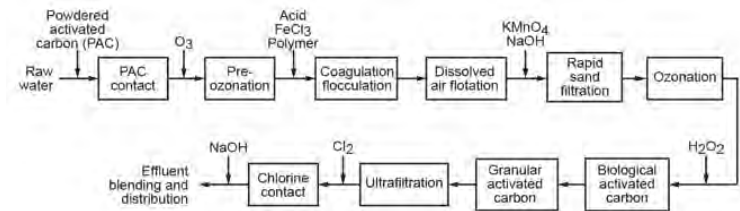
DPR with *Advanced Treated Water (ATW)*



Big Spring, Texas

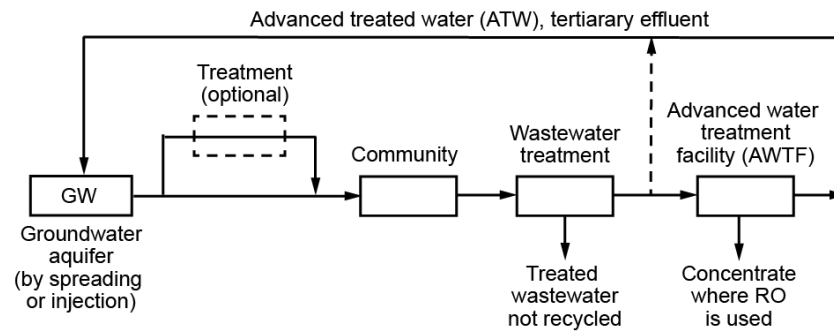


DPR with *finished Water*

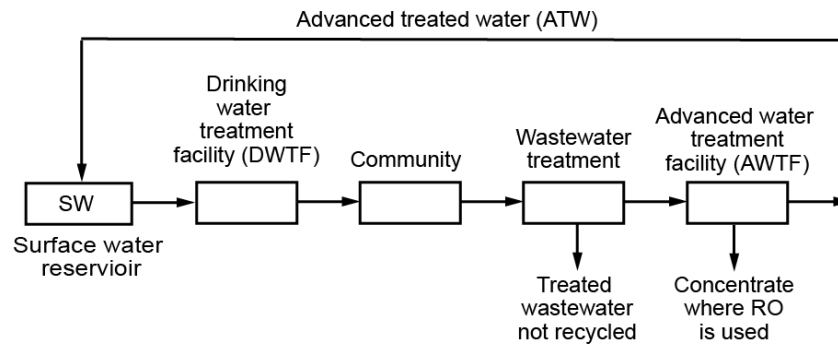


Windhoek, Namibia

2. OVERVIEW: INDIRECT POTABLE REUSE



Typical injection well - OCWD



San Vicente reservoir, San Diego, CA

WHAT DOES DPR COST?

Supply option	Cost, \$/AF			
	Treatment	Residuals Management	Concentrate or brine management	Conveyance and blending facilities
AWT (IPR) with RO	685 - 900	10 - 50	70 - 700	100 - 1,000
AWT (DPR) with RO	700 - 1,000	10 - 50	70 - 700	100 - 1,000
AWT (IPR) without RO	500 - 700	10 - 50	-	100 - 1,000
AWT (DPR) without RO	500 - 800	10 - 50	-	100 - 1,000
Brackish groundwater desalination (inland)	900 - 1,250	20 - 100	70 - 700	300 - 2,000
Sea water desalination	1,800 - 2,100	20 - 100	100 - 200	400 - 3,000
Imported water	400 - 1,300		-	100 - 600
Water use efficiency, conservation, and use restrictions	450 - 950			100 - 400

Note: $\$/10^3 \text{ gal} \times 325.89 = \$/\text{AF}$

DPR ENERGY IMPLICATIONS

Technology/Water Source	Energy Required			Carbon footprint kg CO _{2e} /AF
	Range, kWh/AF	Typical		
		kWh/AF	kWh/10 ³ gal	
Secondary treatment without nutrient removal	330 – 520	450	1.38	244
Tertiary treatment with nutrient removal effluent filtration	520– 670	600	1.84	325
Advanced water treatment	1,050 - 1,140	1080	3.31	585
Ocean desalination	3,100 – 4,900	3,900	11.97	2,112
Brackish water desalination	1,00 – 2,000	1,900	5.83	1,029
California State Project water ^e	3,000 – 5,300	3,300	10.13	1,787
Colorado River water	2,000 - 2,600	2,000	6.14	1,083
Conventional water treatment	120 - 130	124	0.38	43
Membrane based water treatment	140 - 150	145	0.45	79

Note: kWh/10³ gal x 325.89 = kWh/AF

4. PUBLIC HEALTH PROTECTION

- What is public health protection?
- What are the results of health assessments?
- What are the applicable water quality and treatment regulations?
- What are log-reduction values and how do they apply to DPR?
- What regulations would apply to a new third water source?

4. LOG-REDUCTION VALUES FOR DPR

Microbial Group	Criterion (log ₁₀ reduction)	Possible surrogates	Source used to develop criteria
Enteric virus	12	MS2 bacteriophage	SWTR (U.S. EPA, 1989a); CDPH (2011); NRC (2012); NRMMC–EPHC–NHMRC (2008)
<i>Cryptosporidium spp.</i>	10	Latex microspheres, AC Fine Dust, inactivated <i>Cryptosporidium</i> oocysts, aerobic spores	Interim ESWTR (U.S. EPA, 1998); LT2 ESWTR (U.S. EPA, 2006); CDPH (2011); NRC (2012); NRMMC–EPHC– NHMRC (2008)
Total coliform bacteria	9	NA ^c	Total Coliform Rule (U.S. EPA, 1989b); NRC (2012) risk assessment for salmonella

PROPERLY ENGINEERED POTABLE WATER REUSE IS SUPPORTED BY NATIONAL HEALTH EXPERTS

Organization	Confidence in the Safety of Potable Water Reuse?
State of California Division of Drinking Water (formerly CDPH)	Yes, formal regulations finalized in 2014
National Research Council	Yes, 2012 report documents safety of potable water reuse and demonstrates comparative safety of potable reuse to conventional water supplies
California Medical Association	Yes, CMA demonstrates support for potable reuse in 2012
Texas Commission on Environmental Quality	Yes, multiple approved projects based upon a case by case analysis
Arizona, Virginia, Colorado, New Mexico, etc.	Yes, many states have potable reuse projects safely producing water based upon different regulatory approaches

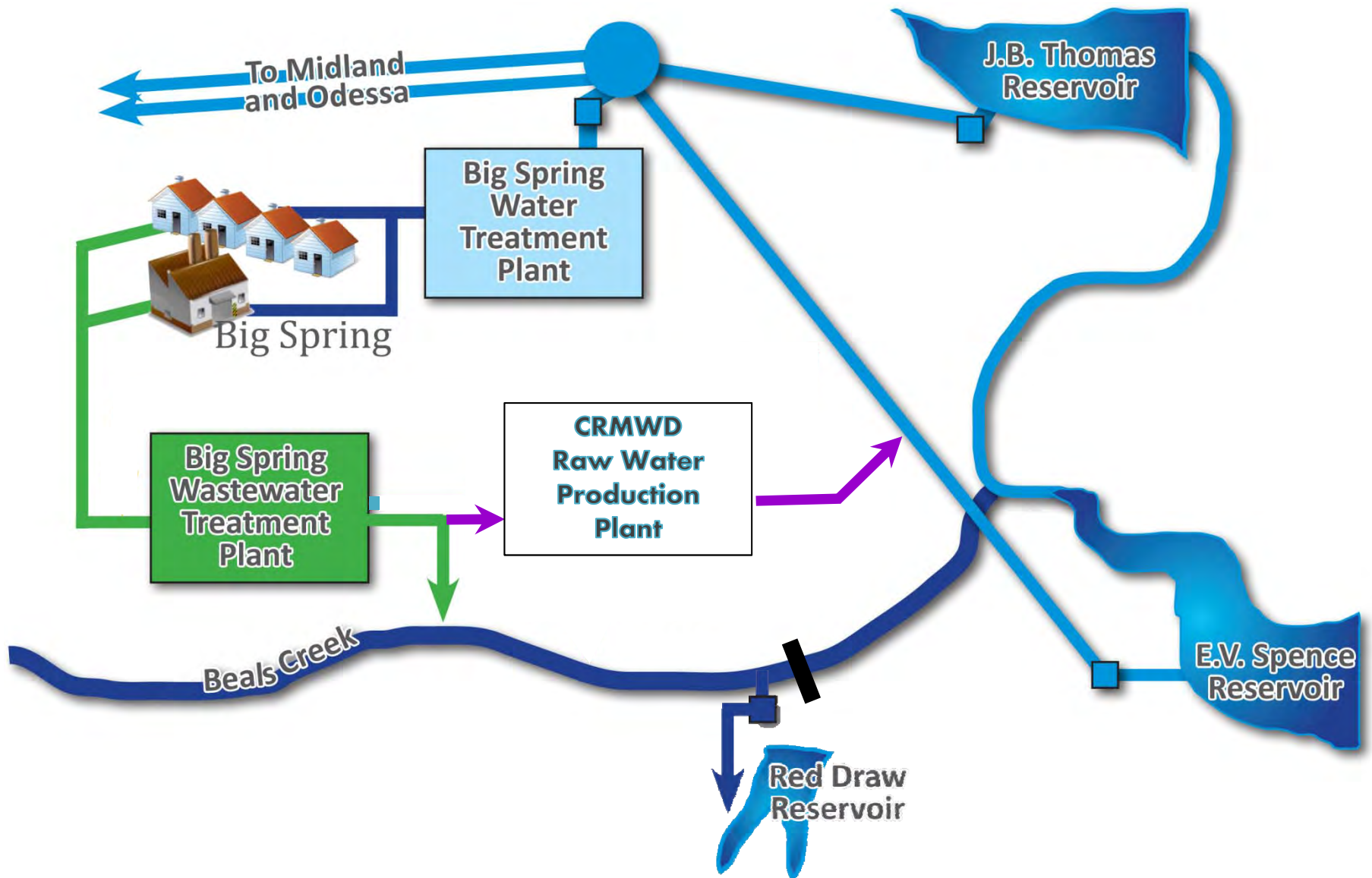


NATIONAL RESEARCH COUNCIL (2012) DOCUMENTS MARGINS OF SAFETY FOR CECS

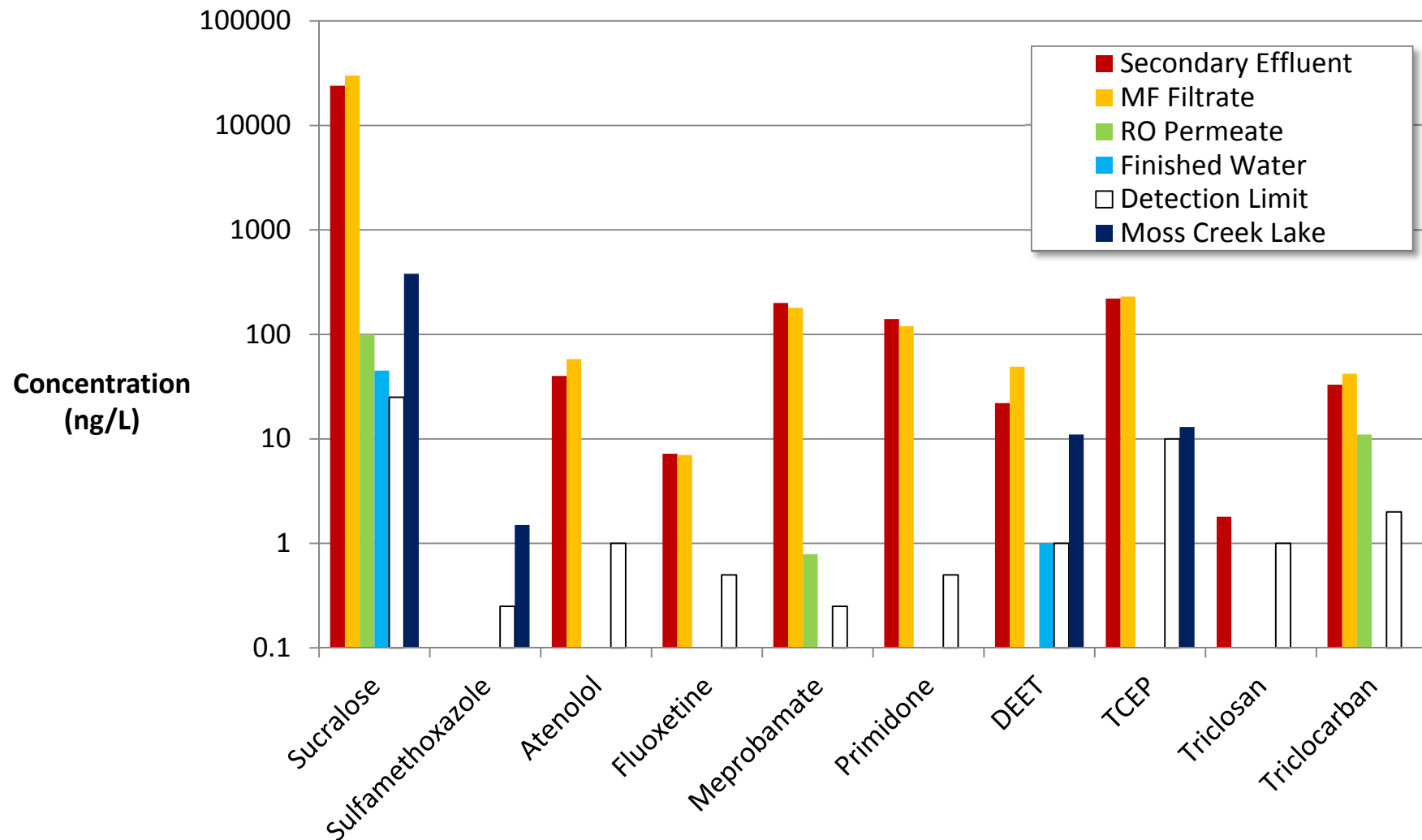
Table 1 Margin of Safety Estimates for Constituents Treated with MF/RO/UV AOP⁽¹⁾ Groundwater Replenishment Feasibility Study Soquel Creek Water District		
Constituent	Risk-Based Action Level	Margin of Safety (MOS⁽²⁾) MF/RO/UV AOP Train
Ibuprofen	120,000 µg/L	>280,000,000
Carbamazepine	186,900 µg/L	>190,000,000
Gemfibrozil	140,000 µg/L	>140,000,000
Sulfamethoxazole	160,000 µg/L	>160,000,000
Meprobamate	280,000 µg/L	>930,000,000
Primidone	58,100 µg/L	>58,000,000
Caffeine	70,000 µg/L	>23,000,000
17-β Estradiol	3,500 µg/L	>35,000,000
Triclosan	2,100 µg/L	>2,100,000
TCEP	2,100 µg/L	>210,000
PFOS	200 ng/L	>200
PFOA	400 ng/L	>80

MOS = (Action Level) /
(Measured Concentration)

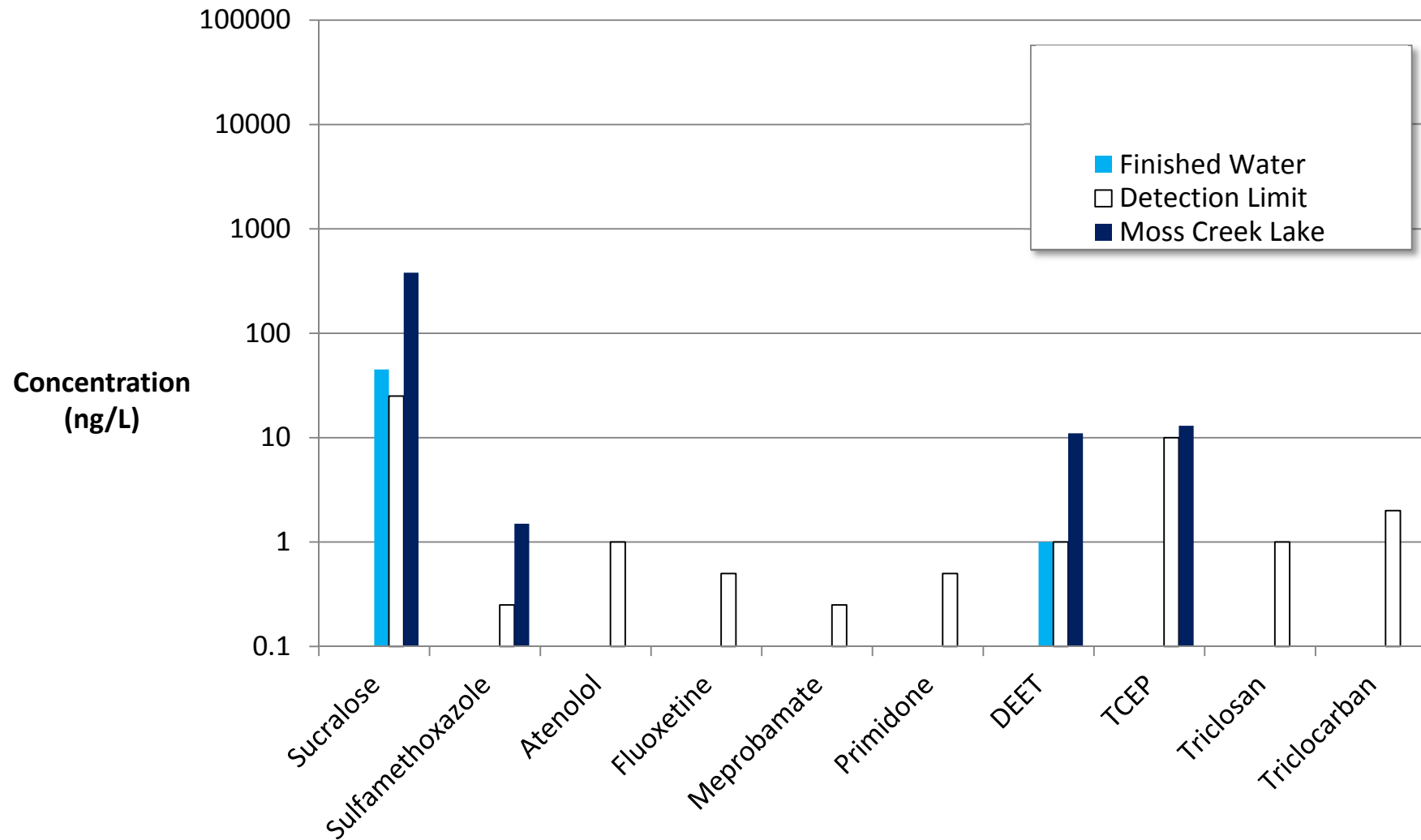
DPR IN BIG SPRING (TX)



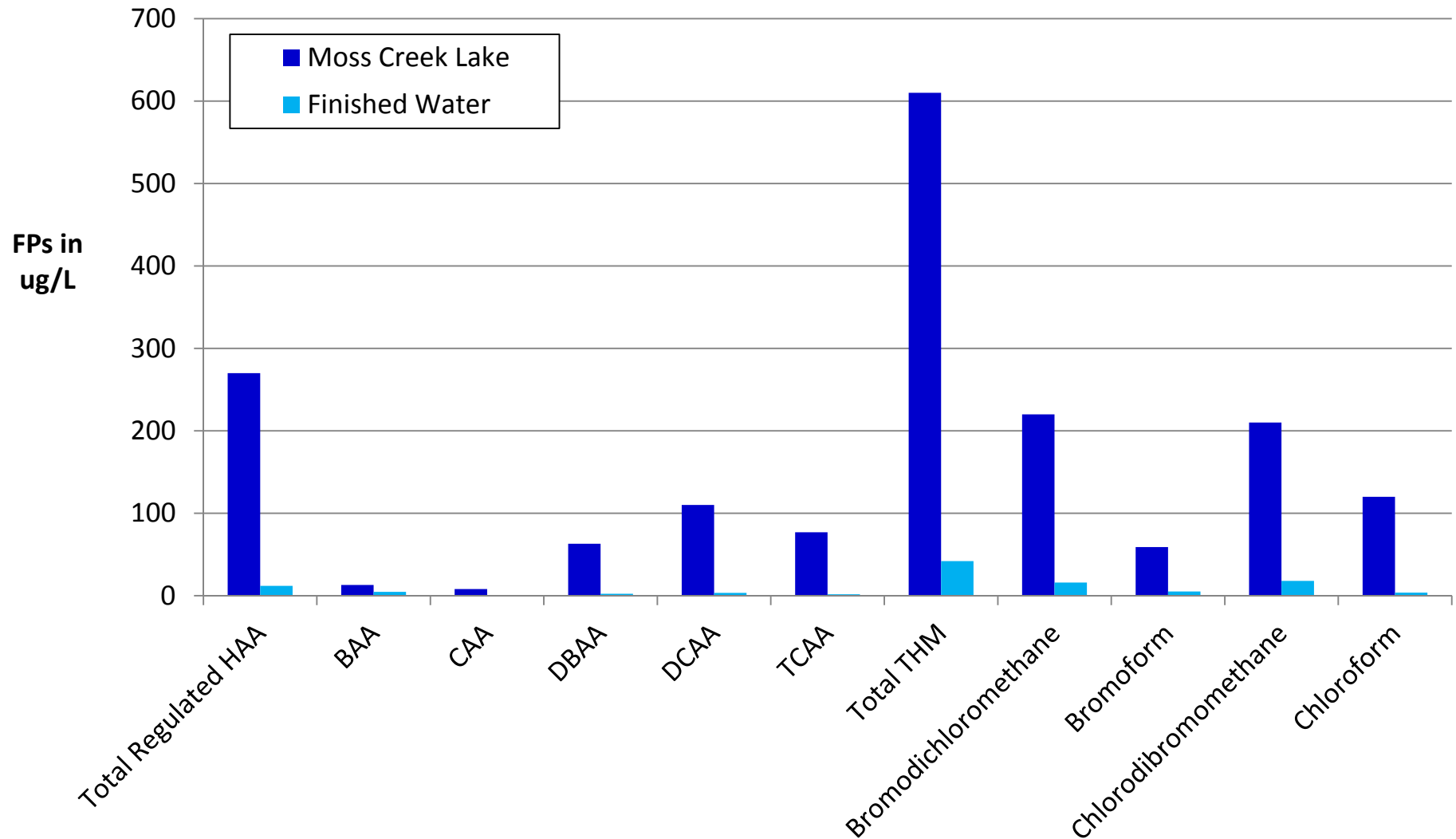
DPR FINISHED WATER IMPROVES BLENDED WATER QUALITY WRT TRACE ORGANICS



DPR FINISHED WATER IMPROVES BLENDED WATER QUALITY WRT TRACE ORGANICS



FORMATION POTENTIAL TESTS ILLUSTRATE THE DBP ADVANTAGE OF RWPF WATER



5. SOURCE CONTROL PROGRAMS

- What is the importance of source control program for potable reuse
- What are the Federal Pretreatment Standards
- What is the legal framework for a source control program
- What are the principal elements of a source control program
- What are realistic source control program expectations

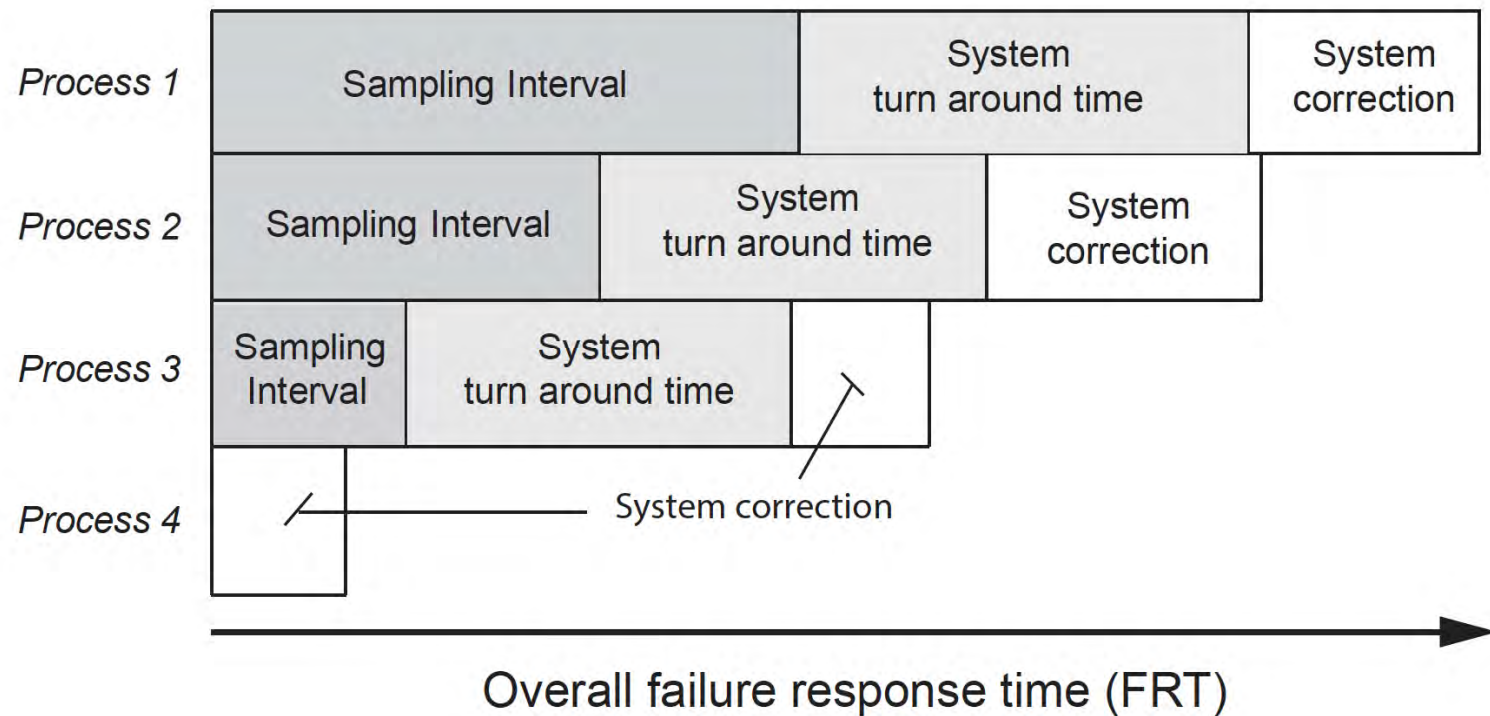
7. ADVANCED WATER TREATMENT

- What are the objectives of advanced water treatment?
- What are typical examples of treatment trains for advanced water treatment?
- What are the performance levels for advanced treatment processes, including determination of pathogen log reduction credit?
- What is the reliability of various treatment trains based on redundancy, robustness, and resilience?
- What happens to the flows when AWT plant must be taken off-line?
- What is use of engineered storage buffers (ESB)?

7. RELIABILITY OF VARIOUS TREATMENT TRAINS

Term	Definition as pertaining to DPR	Notes
Redundancy	The use of multiple unit processes to attenuate the same type of constituent	More unit processes in series, even with reduced individual performance, can result in improved overall performance
Robustness	The combination of technologies that address a broad variety of constituents	Broad spectrum treatment is required due to the original water source (wastewater)
Resiliency	The capacity of a DPR system to adapt successfully in the face of threats or disaster	Resilience can mean the ability to simply shut off, or the ability to adjust the level of treatment in response to single or multiple process performance failures

7. USE OF ENGINEERED STORAGE BUFFERS (ESB)



11. FACILITY OPERATION

- What is the importance of facility operation with respect to the production of purified of finished water?
- Why is facility startup and commissioning important?
- What are operator requirements for DPR facilities?
- What are the requirements for an effective facility management program?
- What is an operation plan and how is it developed?

11. OPERATOR REQUIREMENTS FOR DPR FACILITIES

- Production of ***advanced treated water*** in an AWWTF not certified as a drinking water plant
Licensed wastewater operators, but licensed drinking water operators are recommended.
- Production of ***finished water*** in an AWWTF permitted as a drinking water plant
Licensed wastewater and drinking water operators. Licensed drinking water operators are required by law for a finished water AWT facility.
- Production of ***advanced treated*** or ***finished water*** in an AWWTF
- Perhaps a new category of certification “Advanced Treatment Technologies Operator” which encompasses water quality, water treatment, and wastewater treatment technologies should be established.

12. PUBLIC OUTREACH

- What constitutes public outreach?
- What are the challenges associated with DPR outreach?
- What is involved in the development of a communication plan?
- What examples of potable reuse outreach programs are available?

LETS MOVE AHEAD WITH DPR



***THANK YOU
FOR LISTENING***

Find the Framework at: watereuse.org

For more information, please contact:

Andrew Salveson, Carollo Engineers (asalveson@carollo.com)

**Colorado Water Congress
January 27, 2016 Wednesday Workshop
Municipal Reuse Track Sessions**

Morning Workshops

Reuse: What it is and Why it's Important to Colorado's Future

9:00 – 9:45

Eric Hecox (South Metro Water Supply Authority)

Laura Belanger (Western Resource Advocates and WateReuse Colorado)

Reuse occurs at many different scales including the basin, regional, provider, and household levels. While reuse doesn't create new water, it can help stretch supplies and provides different efficiencies at the various levels. Interest in municipal reuse is growing among communities with legally reusable supplies and the important role reuse will play in helping close the municipal and industrial gap is recognized in the Colorado Water Plan and the Basin Implementation Plans. Join us for this introduction to Colorado reuse and discussion of its potential to help meet future demands.

Current and Envisioned Reuse Projects: Challenges, What Works, What Doesn't, and Lessons Learned

9:45 – 11:00

Moderator: Eric Hecox

Joe Stibrich (Aurora)

Jim Yahn (North Sterling Irrigation District)

Tara Kelley (Colorado Springs Utilities)

Tim Grotheer (Centennial Water and Sanitation District)

Join our panel of municipal and agricultural interests as we discuss the history of reuse in Colorado, the legal and regulatory structure in which reuse can occur, where reuse is heading in Colorado and nationwide, and existing and envisioned Colorado reuse projects. Panelists will discuss challenges, successes, and changes they'd like to see as we look to increase reuse to help meet the needs of our growing population. Audience questions are encouraged.

The Colorado Reuse Regulatory Picture

11:00 - 11:30

Nicole Rowan (Colorado Department of Public Health and Environment)

The regulatory structure in which municipal reuse may occur can be confusing but is important to understand when communities are considering reuse projects. At a level useful to water supply and policy professionals, the Colorado Department of Public Health and Environment will provide an overview of the various regulatory pieces that drive reuse. The Safe Drinking Water Act, Clean Water Act, Reclaimed Water, Gray Water, anti-degradation, and nutrients standards and how these regulations all fit together will be covered.

Break & Lunch from 11:30 – 1:30

Potable Reuse – What’s the Story?

John Rehring (Carollo Engineers)

Phil Brandhuber (HDR)

1:30 – 2:10

Much of the reuse that occurs in Colorado is for non-potable purposes, primarily for outdoor irrigation, and is seasonally and volumetrically limited. To increase reuse opportunities in Colorado, potable reuse is key. Advances in treatment technologies, national implementation and public perception, combined with water supply limitations around the West are leading a rapidly-growing number of communities to consider indirect and direct potable reuse as viable supply options. We will discuss that state of potable reuse, where it’s heading and what’s happening nationwide and in Colorado, including an overview of recommendations from a peer reviewed 2015 white paper, *Considering the Implementation of Direct Potable Reuse in Colorado*.

Purified Recycled Drinking Water – Let’s Get the Conversation Going

2:10 – 3:30

Moderator: Barbara Biggs (CDM Smith)

John Rehring (Carollo Engineers)

Ron Falco (CDPHE)

Doug Scott (Meridian) - *tentative (is trying to reschedule an out of state meeting)*

Sarah Dominick (Denver Water)

Indirect potable reuse currently occurs in Colorado and interest in direct potable reuse (DRP) is growing though we don’t currently have regulations in place specifically for DPR. This panel of experts will discuss potable reuse and what it will take us to get to DPR from what we allow in CO now. Discussion will include treatment technologies, costs, public perception and acceptance, the regulatory environment, and a project WateReuse Colorado is working on to advance DPR as a viable supply option. Audience questions are encouraged.

WateReuse Association
WateReuse CO Income Statement
January through December 2015

	<u>Jan - Dec 15</u>
Income	
4050 · Membership	
4300 · MEMBERSHIP DUES	
4311 · 30% of WateReuse CO Dues	15,101.97
Total 4300 · MEMBERSHIP DUES	<u>15,101.97</u>
4325 · State Section Membership	
4325.60 · Colorado	2,500.00
Total 4325 · State Section Membership	<u>2,500.00</u>
Total 4050 · Membership	<u>17,601.97</u>
 Total Income	 <u>17,601.97</u>
 Gross Profit	 17,601.97
 Expense	
5300 · SECTION EXPENSES	
5800 · WateReuse CO Expenses	
5800.05 · Awards	1,810.36
5800.10 · Board Meeting	1,185.39
5800.12 · Donation	750.00
5800.18 · Liability Insurance	500.00
5800.25 · Membership Credit Card Fees	97.12
5800.41 · Scholarship	3,000.00
5800.45 · Sponsorship	2,000.00
Total 5800 · WateReuse CO Expenses	<u>9,342.87</u>
Total 5300 · SECTION EXPENSES	<u>9,342.87</u>
 Total Expense	 <u>9,342.87</u>
 Net Income	 <u><u>8,259.10</u></u>

WateReuse Association

WateReuse CO - Balance Sheet

As of December 31, 2015

	<u>Dec 31, 15</u>
ASSETS	
Current Assets	
Cash	
Cash	8,557.63
Total Cash	<u>8,557.63</u>
Other Current Assets	
1315 · Prepaid Expenses	
1323 · WateReuse CO - Prepaid Expense	1,093.12
Total 1315 · Prepaid Expenses	<u>1,093.12</u>
Total Other Current Assets	<u>1,093.12</u>
Total Current Assets	<u>9,650.75</u>
TOTAL ASSETS	<u><u>9,650.75</u></u>
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Other Current Liabilities	
2400 · Pre-Paid Dues	
2408 · Pre-Paid Dues - WateReuse CO	1,985.55
Total 2400 · Pre-Paid Dues	<u>1,985.55</u>
2416.10 · Pre-Paid SS Membership	
2422 · Pre-Paid SSM - CO	250.00
Total 2416.10 · Pre-Paid SS Membership	<u>250.00</u>
2456 · Pre-Paid WRCO	
2456.50 · 2016 Potable Reuse Study	9,000.00
Total 2456 · Pre-Paid WRCO	<u>9,000.00</u>
Total Other Current Liabilities	<u>11,235.55</u>
Total Current Liabilities	<u>11,235.55</u>
Total Liabilities	11,235.55
Equity	
3210 · WateReuse CO Reserves	51,452.17
Net Income	8,259.10
Total Equity	<u>59,711.27</u>
TOTAL LIABILITIES & EQUITY	<u><u>70,946.82</u></u>

ACE16 - Water Reuse Committee

Session 1 of 4

Session Title: IPR/DPR Case Studies					
Moderator: Adam Arnold (Tangent Company)					
Session Description: (250 characters or less) This session will investigate key IPR and DPR programs, including testing for inland potable reuse, reservoir augmentation in San Diego, implementing reuse in Perth Australia, and finding new water sources to expand the OCWD GWR project.					
PRESENTATION ORDER		Abstract # or Invited	PRESENTATION TITLE	Time allotted per presentation (typ. 30, 45, or 60 minutes)	PRESENTERS
3-hour session duration	#1	46253	Pilot Testing Results For A Direct-To-Distribution DPR Treatment Train	30	Mr. Daniel Nels Olson, PE (Arcadis)
	#2	46171	Potable Reuse For Inland Applications: Pilot Testing Results From A New Potable Reuse Treatment Scheme	30	Mr. Lawrence J. Schimmoller (CH2M)
	#3	46507	Water Quality Based Evaluation Of Direct Potable Reuse Treatment Trains For Land-Locked Communities	30	Ms. Ashley Pifer, PE, PHD (Garver)
	#4 (as needed)	46769	In Search Of....More Water For GWRS	30	Mr. R. Bruce Chalmers (CDM Smith)
	#5 (as needed)	46562	Losing The IPR- DPR Label – In San Diego It'S All About Surface Water Augmentation	30	Ms. Julie L. Labonte, PE (MWH)
	#6 (as needed)	46726	Beenyup Advanced Water Recycling Plant-The Perth, Australia Groundwater Replenishment Scheme	30	Mr. Jim C. Lozier P.E.(CH2M)
(CH					

ACE16 – Water Reuse Committee

Session 2 of 4

Session Title: Reuse Case Studies					
Moderator: Jim Scott					
Session Description: (250 characters or less) An introduction to Potable Reuse will be provided, along with potable reuse case studies for disinfection and wetlands recharge, reuse at northeast universities, and an innovative mobile reuse program for the military.					
PRESENTATION ORDER		Abstract # or Invited	PRESENTATION TITLE	Time allotted per presentation (typ. 30, 45, or 60 minutes)	PRESENTERS
3-hour session duration	#1	46840	Potable Reuse – Where We've Been And Where We're Headed	30	Mr. Sunny Y.C. Wang, PE (Brown & Caldwell)
	#2	46600	Achieving 6-Log Virus Removal With RO Membranes: Evaluation Of Various Failure Conditions	30	Dr. Justin M. Sutherland Ph.D. (Carollo)
	#3	46669	The World's Largest Reuse To Wetlands Project: The How Behind The What.	30	Michael Bomar (Tetra Tech)
	#4 (as needed)	46571	The Waterhub At Emory: Campus-Wide Reclamation And Reuse	30	Mrs. Lindsay Davis (Sustainable Water)
	#5 (as needed)	46369	Creating A Robust Reuse Program In The Northeast	30	Mr. Jay Sheehan (Woodward & Curran)
	#6 (as needed)	46609	Mobile Expeditionary Water Reuse System	30	Mr. Paul Brezovec (Concurrent Technologies Corporation)

ACE16 – Water Reuse Committee

Session 3 of 4

Session Title: Operations and Demonstration Testing for Potable Reuse					
Moderator: Michael Crow (Santa Clara Valley Water District)					
Session Description: (250 characters or less) Operation results from the Big Spring, Texas DPR project will be presented, along with discussions of operator training, maintaining reliable reuse plan operation, and pilot and demonstration process performance using innovative process trains.					
PRESENTATION ORDER		Abstract # or Invited	PRESENTATION TITLE	Time allotted per presentation (typ. 30, 45, or 60 minutes)	PRESENTERS
3-hour session duration	#1	46611	Conclusions From Water Quality Testing At The Raw Water Production Facility DPR Project In Big Spring, TX	30	Ms. Eva K Steinle-Darling, PHD, PE (Carollo)
	#2	46392	Indirect Potable Reuse – Maintaining Reliable Operational Control	30	Mr. Troy Walker (Hazen & Sawyer)
	#3	46276	Reuse Operator Training: Bridging The Gap Of Special Needs	30	Mr. Robert E. Boysen (Hazen & Sawyer)
	#4 (as needed)	46475	Performance And Operational Insights From A Florida Groundwater Recharge Pilot: Clearwater's Experience	30	Ms. Emilie A. Moore P.E. (Tetra Tech)
	#5 (as needed)	46731	Innovative Potable Reuse Program At Padre Dam: Groundwater Recharge And Surface Water Augmentation	30	Dr. Brian Pecson, PHD (Trussell Technologies)
	#6 (as needed)	46709	Demonstration Of Direct Potable Reuse Using Multi-Stage Ozone-Biological Filtration (BAF)	30	Jennifer Hooper (CDM Smith) for Katherine Bell (MWH)

ACE16 – Water Reuse Committee

Session 4 of 4

Session Title: Regulatory Issues for IPR and DPR					
Moderator: Bruce Chalmers (CDM Smith)					
Session Description: (250 characters or less) This session will present the status of current IPR and DPR regulatory arena, looking at the recent DPR supplement to the EPA Guidelines, as well as a presentation of legal obstacles, the cost of safety and reliability, and NSF approval requirements.					
PRESENTATION ORDER		Abstract # or Invited	PRESENTATION TITLE	Time allotted per presentation (typ. 30, 45, or 60 minutes)	PRESENTERS
2.5-hour session duration	#1	46776	Interpreting The Intersection Between The Clean Water Act And The Safe Drinking Act – What Else Is Needed For Potable Reuse?	30	Dr. Katherine Y. Bell, PE, DEE (MWH)
	#2	46667	Safe, Safer And Safest: How To Decide?	30	Mr. Phillippe A. Daniel, PE, BCEE (HDR)
	#3	46052	A Fix For A Thirsty World	30	Mrs. Heather Payne (UNC School of Law)
	#4 (as needed)	46823	NSF/ANSI 350 Onsite Residential And Commercial Water Reuse Treatment Systems Certification	30	Ms. Sharon Steiner (NSF International)
	#5 (as needed)	NA	TBD – Presentation from a State or Federal Regulator or a roundtable discussion with the presenters above	30	TBD - Invited Speaker or Roundtable

ACE16 – Water Reuse Committee

Abstract #	PAPER TITLE	AUTHOR OR PRESENTER