WATEREUSE SYMPOSIUM

DENVER MARRIOTT CITY CENTER • DENVER, CO • SEPTEMBER 15–18, 2013

SYMPOSIUM PROGRAM

THE WORLD'S PREMIER CONFERENCE DEVOTED TO SUSTAINING SUPPLIES THROUGH WATER REUSE & DESALINATION

www.watereuse.org/symposium28

American Water Works Association

WateReuse Association

Sustainable Solutions for a Thirsty Planet®

Water Environment Federation®
the water quality people®

WE ARE VERY EXCITED TO ANNOUNCE THE 2013 WATEREUSE SYMPOSIUM MOBILE APP

It is a native application for smartphones (iPhone and Android), a hybrid web-based app for Blackberry, and there's also a web-based version of the application for all other web browser-enabled phones.

Sponsored by

BLACK & VEATCH
Building a world of difference.

The Mobile App provides easy-to-use interactivity that will enhance your Symposium experience:

- The Dashboard keeps you organized with up-to-the-minute info
- Browse the technical program by time or speaker and easily organize schedules with one click
- View speaker bios
- View, download, and e-mail presentations from the mobile app
- Interactively locate your sessions with the Maps feature
- Rate the sessions you attend and comment on them, too
- Connect with Sponsors and Exhibitors and view, download, or e-mail their handouts
- Use Photo Gallery to save and share your show experiences
- Connect with your colleagues with the Friends feature
- Receive important real-time communications during the Symposium
- View local dining options including the address, phone number, rating and a map with directions

Downloading the WateReuse Mobile App is easy!

- For iPhone (plus, iPod Touch & iPad) and Android phones: visit your App Store or Android Market on your phone and search for WateReuse.
- For all other phone types (including BlackBerry and all other web browser-enabled phones): While on your smartphone, point your mobile browser to **http://m.core-apps.com/watereuse13**. From there you will be directed to download the proper version of the app for your particular device, or, on some phones, you simply bookmark the page for future reference.

MARK UDALL
COLORADO

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WASHINGTON, DC 20510
(202) 224-5941

United States Senate

WASHINGTON, DC 20510

September 15, 2013

WateReuse Association
28th Annual WateReuse Symposium
Denver Marriott City Center
1701 California Street
Denver, CO 80202

Dear Friends:

Thank you for attending the 28th Annual WateReuse Symposium. It is a pleasure for me to extend my warmest greetings and welcome you to the Mile High City.

The WateReuse Association has arranged an impressive program of speakers, tours and panels. This symposium presents a unique opportunity to engage and learn from each other about the future of water stewardship and management. I know you have an exciting and valuable four days ahead of you.

As a Coloradan and life-long Westerner, the importance of protecting our water resources was instilled in me from an early age. As a member of the U.S. Senate Committee on Energy and Natural Resources, I have had the opportunity to advocate for the active management and stewardship of this critical resource.

The ongoing drought and dwindling water resources facing much of the West highlight the need for water reuse, reclamation and desalination as important tools in providing communities in Colorado and across the country with clean and reliable water supplies. Safe and dependable water is key for the future of our communities, agriculture, environment and overall economy.

This reality only emphasizes the importance of the technologies and policies showcased at this symposium, not only to Colorado and the United States, but to regions around the world that are struggling with water shortages and quality issues.

I would like to thank all the speakers and awardees for their active engagement in water reuse, reclamation, and desalination efforts. I encourage you all to take full advantage of the events that the WateReuse Association and its co-sponsors have arranged for you over these next few days. After this symposium is over, I hope you can help bring awareness of these new technologies to your local communities as they continue to learn new ways to manage this precious resource.

Please look to me as a partner on these important issues going forward; my door is always open to you.

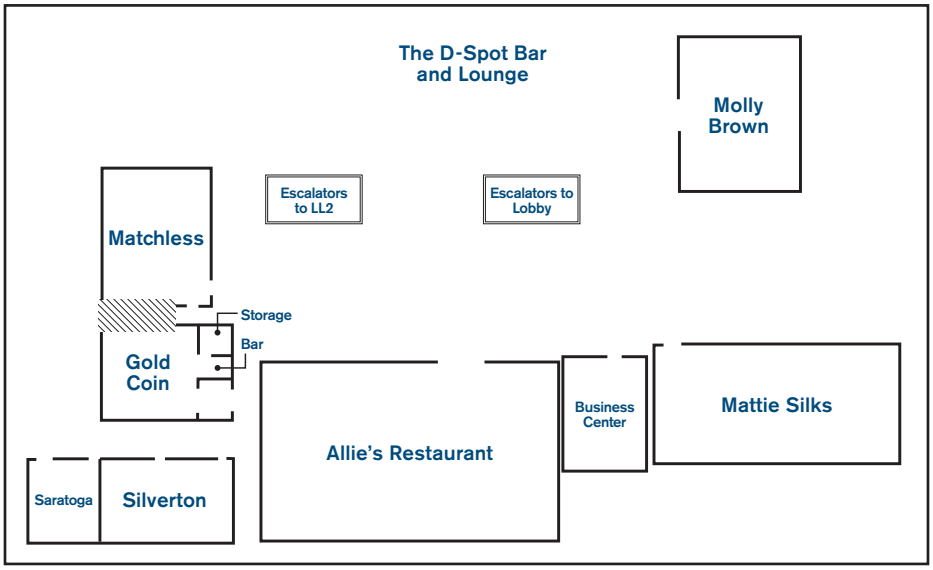
Sincerely,

Mark Udall

Mark Udall
U.S. Senator

HOTEL MAP

LOWER LEVEL 1



LOWER LEVEL 2

SCHEDULE OF EVENTS

SUNDAY, SEPTEMBER 15		
12:00 p.m. – 6:00 p.m	Registration Open	*Colorado Ballroom Foyer*
1:00 p.m. – 5:00 p.m.	**Technical Tour:** Denver Water Recycling Facility and Denver Museum of Nature and Science	*Buses will depart from the 18th and California Hotel Entrance*
1:30 p.m. – 3:00 p.m.	**Technical Sessions**	
	• A1: Produced Water—Part 1 • B1: Public Outreach: Beyond the Basics—Part 1 • C1: Industrial Reuse Applications—Part 1 • D1: Water Reuse in Colorado – Part 1	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
3:00 p.m. – 3:30 p.m.	Networking Break	*Colorado Ballroom Foyer*
3:00 p.m. – 3:30 p.m.	Poster Presentations	*Colorado Ballroom Foyer*
3:30 p.m. – 5:00 p.m	**Technical Sessions**	
	• A2: Produced Water—Part 2 • B2: Public Outreach: Beyond the Basics—Part 2 • C2: Industrial Reuse Applications—Part 2 • D2: Water Reuse in Colorado—Part 2	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
4:00 p.m. – 5:00 p.m.	Potable Reuse Committee Meeting	*Matchless Room*
4:00 p.m. – 5:00 p.m.	International Committee Meeting	*Molly Brown Room*
5:30 p.m. – 7:00 p.m.	Exhibit Hall Open	*Colorado Ballroom A–E*
5:30 p.m. – 7:00 p.m.	Welcome Reception	*Colorado Ballroom A–E*
MONDAY, SEPTEMBER 16		
7:00 a.m. – 3:30 p.m.	Registration Open	*Colorado Ballroom Foyer*
7:00 a.m. – 3:30 p.m.	Exhibit Hall Open	*Colorado Ballroom A–E*
7:00 a.m. – 8:00 a.m.	Continental Breakfast	*Colorado Ballroom A–E*
8:00 a.m. – 9:45 a.m.	**Opening Session and Awards Presentation**	*Colorado Ballroom F–J*
9:45 a.m. – 10:15 a.m.	Networking Break and Raffle	*Colorado Ballroom A–E*
9:45 a.m. – 10:15 a.m.	Poster Presentations	*Colorado Ballroom Foyer*
9:45 a.m. – 10:15 a.m..	Book Signing with Nikolay Voutchkov, author of *Desalination Engineering: Planning and Design*	*Colorado Ballroom A–E*
10:15 a.m. – 12:15 p.m.	**Technical Sessions**	
	• A3: Reuse: Cost Effective Operations—Part 1 • B3: Reuse: Effective Planning Strategies—Part 1 • C3: Environmental Concerns: Pathogens • D3: Creative Concentrate Management	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
12:15 p.m. – 1:30 p.m.	Networking Luncheon with the Exhibitors	*Colorado Ballroom A–E*
1:00 p.m. – 5:30 p.m.	**Technical Tour:** Colorado School of Mines' Reclamation Test Site and Molson Coors Sustainability Presentation	*Buses will depart from the 18th and California Hotel Entrance*
1:30 p.m. – 2:10 p.m.	**Exhibitor Forum:** Aqua-Aerobic Systems—Ultrafiltration of Reuse Applications	*Nat Hill Room*
1:30 p.m. – 2:10 p.m.	**Exhibitor Forum:** Purifics—CUF Technology: Making Water Reuse Achievable for Your Organization	*Matchless Room*

SCHEDULE OF EVENTS

2:20 p.m. – 3:00 p.m.	**Exhibitor Forum:** Xylem—DURON UV System: Shining New Lights on Original Ideas	*Molly Brown Room*
1:30 p.m. – 3:00 p.m.	**Technical Sessions**	
	• A4: Reuse: Cost Effective Operations—Part 2 • B4: Reuse: Effective Planning Strategies—Part 2 • C4: Innovations in Disinfection Technologies—Part 1 • D4: Planning Innovation in Desalination	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
3:00 p.m. – 3:30 p.m.	Networking Break and Raffle	*Colorado Ballroom A–E*
3:00 p.m. – 3:30 p.m	Poster Presentations	*Colorado Ballroom Foyer*
3:30 p.m. – 5:00 p.m.	**Technical Sessions**	
	• A5: Reuse: Cost Effective Operations—Part 3 • B5: Reuse: Effective Planning Strategies—Part 3 • C5: Innovations in Disinfection Technologies—Part 2 • D5: Desalination Energy Reduction Technologies	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
5:30 p.m. – 10:30 p.m.	An Evening at Coors Field	*Meet and depart from Hotel lobby*
TUESDAY, SEPTEMBER 17		
7:00 a.m. – 2:00 p.m.	Registration Open	*Colorado Ballroom Foyer*
7:00 a.m. – 3:30 p.m.	Exhibit Hall Open	*Colorado Ballroom A–E*
7:00 a.m. – 8:00 a.m.	Continental Breakfast	*Colorado Ballroom A–E*
7:00 a.m. – 8:00 a.m.	Graywater Committee Meeting	*Colorado Ballroom H*
8:00 a.m. – 10:00 a.m.	**Technical Sessions**	
	• A6: Decentralized Reuse—Part 1 • B6: Reuse: Effective Planning Strategies—Part 4 • C6: Coaching the Regulators—Part 1 • D6: Frontiers of Desalination Membrane Technology and Science	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
10:00 a.m. – 10:30 a.m.	Networking Break and Raffle	*Colorado Ballroom A–E*
10:00 a.m. – 10:30 a.m.	Poster Presentations	*Colorado Ballroom Foyer*
10:30 a.m. – 12:00 p.m.	**Technical Sessions**	
	• A7: Decentralized Reuse – Part 2 • B7: Panel Discussion: Public-Private Collaboration Creates Resilient Industry • C7: Coaching the Regulators—Part 2 • D7: Lowering Your Carbon Footprint	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
12:00 p.m. – 1:30 p.m.	Lunch on Your Own	
12:00 p.m. – 1:30 p.m.	National Legislative Committee Meeting	*Colorado Ballroom G*
12:00 p.m. – 1:30 p.m.	Industrial Reuse Committee Meeting	*Colorado Ballroom H*
12:00 p.m. – 4:00 p.m.	**Technical Tour:** Aurora Water's Binney Water Treatment Plant	*Buses will depart from the 18th and California Hotel Entrance*

1:30 p.m. – 3:00 p.m.	**Technical Sessions**	
	• A8: Panel Discussion: Decentralized Reuse • B8: Linking Reuse and Groundwater—Part 1 • C8: Innovative Reuse Applications • D8: Direct Potable Reuse	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
3:00 p.m. – 3:30 p.m.	Networking Break and Raffle	*Colorado Ballroom A–E*
3:00 p.m. – 3:30 p.m	Poster Presentations	*Colorado Ballroom Foyer*
3:30 p.m. – 5:00 p.m.	**Technical Sessions**	
	• A9: Panel Discussion: Reuse in the Food and Beverage Industry • B9: Linking Reuse and Groundwater—Part 2 • C9: Creative Disposal Options • D9: Panel Discussion: Public Acceptance of Direct Potable Reuse	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
5:30 p.m. – 10:00 p.m.	Dinner and Discovery at the Denver Zoo	*Buses will depart from the 18th and California Hotel Entrance*
WEDNESDAY, SEPTEMBER 18		
7:30 a.m. – 9:00 a.m.	Registration Open	*Colorado Ballroom Foyer*
7:30 a.m. – 9:00 a.m.	**Breakfast Panel Discussion:** National Legislative and Water Policy Outlook	*Colorado Ballroom A–E*
9:00 a.m. – 11:00 a.m.	**Technical Sessions**	
	• A10: Do Microconstitutents Matter? • B10: Reuse: Effect Planning Strategies—Part 5 • C10: Successful Urban Reuse Retrofits • D10: Improving Sustainability	• *Denver Ballroom 1–2* • *Denver Ballroom 4–6* • *Mattie Silks* • *Denver Ballroom 3*
11:00 a.m. – 12:30 p.m.	**Closing Plenary Session**—Water Reuse: To Infinity and Beyond	*Colorado Ballroom A–E*

PLENARY SESSIONS

Opening Session and Awards Presentation

Monday, September 16th
8:00 a.m. – 9:45 a.m.
Room: Colorado Ballroom F–J

The 28th Annual WateReuse Symposium will open with a welcome address from **Kelly Brough**, President and CEO of the Denver Metro Chamber of Commerce. She will speak about the importance of long-term sustainable water supplies to the health and success of businesses and local economies.

Attendees will then have an opportunity to hear updates from **David LaFrance**, Executive Director of AWWA and **Sandra Ralston**, President-Elect of WEF.

The Keynote Address will be given by **Brad Udall**, the Director of the Getches-Wilkinson Center for Natural Resources, Energy and Environment at the University of Colorado School of Law.

As the new director of the Getches-Wilkinson Center for Natural Resources, Energy, and the Environment, Brad Udall brings a wealth of experience with him. Previously, Udall was the director of the CU-Boulder–NOAA Western Water Assessment. He brings a successful career in natural resources policy to the helm of the Getches-Wilkinson Center. Udall has worked closely with the Natural Resources Law Center over the years, sponsoring work by the center and speaking at the center's annual conference on numerous occasions. He has held a research faculty position for over 10 years at CU's Cooperative Institute for Research in the Environmental Sciences. Udall has also served on NGO boards including the Parkinson's Action Network and the Colorado Coalition of Land Trusts. In addition, he has served as an executive director with the Eagle Valley Land Trust. Udall has authored numerous peer-reviewed publications on water management and climate change which have been published by the federal government and by several major journals.

Following the Keynote Address, we will present the 2013 WateReuse Awards. The WateReuse Awards recognize projects and people across the United States and abroad that have made significant contributions to advancing water reuse and/or desalination. The awards typically recognize projects that advance alternative sources of water supply or offer a novel approach to meeting local water needs.

Breakfast Panel Discussion:
National Legislative and Water Policy Outlook

Sponosred by HDR Engineering

Wednesday, September 18th
7:30 a.m. – 9:00 a.m.
Room: Colorado Ballroom A–E

Moderator: **John Rossi**, Western Municipal Water District

Speakers:

- **Mark Limbaugh**, The Ferguson Group
- **Melissa Meeker**, CSA Ocean Sciences
- **Gary Darling**, Delta Diablo Sanitation District
- **Dean Marrone**, Bureau of Reclamation

The panel discussion will provide an update on federal legislative and related issues including several bills related to recycling and desalination infrastructure funding. Panelists will share their insights as to the changing landscape in federal assistance for project funding. Learn how the Association is approaching these challenges.

Closing Session–
Water Reuse: To Infinity and Beyond

Wednesday, September 18th
11:00 a.m. – 12:30 p.m.
Room: Colorado Ballroom A–E

Moderator: **Albrey Arrington**, Loxahatchee River District

Speakers:

- **Torin McCoy**, Environmental Sciences Branch Chief, NASA Johnson Space Center
- **Layne Carter**, Senior Environmental Engineer, NASA Marshall Space Flight Center
- **Daniel Gazda**, Senior Scientist, Wyle Laboratories, Johnson Space Center

Water reuse is a key to sustainability of crews on the International Space Station (ISS). Since 2009, crews have utilized a U.S. system (U.S. Water Recovery System) that recovers humidity condensate and urine distillate, and reclaims it as essentially 100% of the water needed by the crew and systems. This high-profile direct potable reuse scenario was enabled by many years of careful research, design, and planning.

NASA experts will describe that history, and will discuss the outcome/lessons learned from implementation of this system in an extreme environment. Moreover, experts will highlight pertinent issues such as the challenge of pharmaceutical and personal care products. The audience will come away with a firmer understanding of how water reuse is an enabling technology for human spaceflight, and will gain an appreciation for why spaceflight water reuse represents our current earth-based water resource challenges in microcosm.

Registration Desk Hours

The Registration Desk is located in the Colorado Ballroom Foyer at the Denver Marriott City Center Hotel and will be open during the following times:

Sunday, September 15th ..... 12:00 p.m. – 6:00 p.m.

Monday, September 16th ..... 7:00 a.m. – 3:30 p.m.

Tuesday, September 17th ..... 7:00 a.m. – 2:00 p.m.

Wednesday, September 18th ..... 7:30 a.m. – 9:00 a.m.

Conference Bookstore

The Symposium will feature an onsite bookstore which will offer WateReuse Foundation research reports and publications of the WateReuse Association. The bookstore is located in the Exhibit Hall.

Committee Meetings

WateReuse committee meetings are open to all attendees and allow for collaboration on key issues of common interest.

Potable Reuse Committee Meeting
Sunday, September 15th ..... 4:00 p.m. – 5:00 p.m.
Matchless Room

International Committee Meeting
Sunday, September 15th ..... 4:00 p.m. – 5:00 p.m.
Molly Brown Room

Graywater Committee Meeting
Tuesday, September 17th ..... 7:00 a.m. – 8:00 a.m.
Colorado Ballroom H

National Legislative Committee Meeting
Tuesday, September 17th ..... 12:00 p.m. – 1:30 p.m.
Colorado Ballroom G

Industrial Reuse Committee Meeting
Tuesday, September 17th ..... 12:00 p.m. – 1:30 p.m.
Colorado Ballroom H

Exhibit Hall Raffle

Stop by the Exhibit Hall and participate in the daily raffle drawings for your chance to win great prizes! Drawings will be held during the morning and afternoon breaks on both Monday and Tuesday. The more exhibitors you visit, the greater your chance to win!

Exhibit Hall Raffle information and tickets can be found in your registration packet.

Kids Recycled Water Art & Writing Contest

Sponsored by Denver Water

Winning entries from the 28th Annual WateReuse Symposium Recycled Water Art and Writing Contest will be on display throughout the conference. The purpose of the art and writing contest was for students to promote the importance of water management and the infinite possibilities for conserving, protecting, and advancing technologies and projects that result in greater water reuse, recycling and efficient management of water resources. The winning entries will also be recognized during the Opening Session and Awards Presentation on Monday, September 16.

Professional Development Hours (PDHs)

The WateReuse Association is pleased to offer Professional Development Hours (PDHs) for the 28th Annual WateReuse Symposium. More and more certification and licensing authorities, companies, government agencies, and organizations are requiring that professionals earn a certain number of continuing education or professional development hours each year. A Professional Development Hour is generally defined as one clock hour that is spent engaged in an activity that contributes to the advancement or enhancement of professional skills or scientific knowledge of a professional engineer.

Professional Development Hours are available for individuals successfully completing concurrent technical sessions throughout the conference. PDHs are acquired on a contact hour basis with one PDH equaling one hour attended. It is the attendee's responsibility to keep his or her own record of PDHs and submit them to the WateReuse office. Forms for tracking Professional Development Hours will be available at the conference.

Terminology and education credit requirements and restrictions vary widely. All participants are responsible for checking with their license/certification authority to ensure that the WateReuse technical concurrent sessions meet specific requirements.

NOTE: The form for tracking Professional Development Hours is located in your registration packet. These forms can be dropped off at one of the drop boxes located throughout the conference or mailed to the WateReuse Association office after the conference.

GENERAL INFORMATION

PowerPoint Presentations

PowerPoint Presentations can be found on the Symposium Mobile App and will also be available online after the conference.

- For iPhone (plus, iPod Touch & iPad) and Android phones: visit your App Store or Android Market on your phone and search for WateReuse.
- For all other phone types (including BlackBerry and all other web browser-enabled phones): While on your smartphone, point your mobile browser to http://m.core-apps.com/watereuse13. From there you will be directed to download the proper version of the app for your particular device, or, on some phones, you simply bookmark the page for future reference.

Once you've downloaded the App, downloading the PowerPoint Presentations is easy!

There are a few different routes you can take to get to the Presentations:

- You can go under the "Sessions" icon and once you choose a particular session, you will then choose the individual presentation you are looking for. Under the individual presentations, scroll to the bottom and find the PowerPoint Presentation listed as PDFs.
- You can go under the "Speakers" icon and find a particular speaker you are looking for. Once you've clicked on the speakers name, you can scroll down to see all of the presentations they will be giving. Click on the name of the presentation you are interested in and then scroll to the bottom and find the PowerPoint Presentation listed as PDFs.

If you don't have access to the Mobile App through your phone or iPad, a link will be sent out after the conference where you can access the PowerPoint Presentations through a website.

The PowerPoint Presentations will only be available for conference attendees to download therefore, a password is required.
The password is WateReuse.

Book Signing with Nikolay Voutchkov

Monday, September 16th | 9:45 a.m. – 10:15 a.m.
Room: Conference Bookstore, Colorado Ballroom A–E

Desalination expert Nikolay Voutchkov will sign copies of his new book *Desalination Engineering: Planning and Design* on Monday at 9:45 a.m. at the conference bookstore located in the Exhibit Hall.

This WateReuse Association and Water Environment Federation publication provides comprehensive information on the planning and engineering of brackish and seawater desalination projects for municipal water supplies. After a brief overview of widely used desalination technologies, *Desalination Engineering* focuses on reverse osmosis desalination. The book discusses basic principles, planning and environmental review of projects, design and selection of key desalination plant components, desalinated water post-treatment, and concentrate management. guidelines on sizing and cost estimation of desalination plant facilities are also included in this practical resource.

Mr. Voutchkov has over 25 years of experience in the field of desalination and water reuse, and currently works as an independent technical advisor to public utilities implementing large desalination projects in Australia, USA, and the Middle East; and to private companies and investors involved in the development of advanced membrane technologies.

Exhibitor Forums

The Exhibitor Forums will allow exhibitors to showcase the latest advances in the industry and highlight new products and developments. The Exhibitor Forums are open to all attendees and we encourage you to participate in these face-to-face forums.

Monday, September 16th | 1:30 p.m. – 2:10 p.m.
Aqua-Aerobic Systems

Forum Title: Ultrafiltration for Reuse Applications
Presenter: Dave Holland, Senior Application Engineer
Room: Nat Hill

As reuse quality requirements tighten, low-pressure membranes are frequently used for tertiary filtration. As a result, reuse plants have to invest more capital, use more power and chemicals, and recycle more flow. To minimize these extra expenses, we have developed a multiple-barrier system that

uses fewer membranes and operates at higher recoveries, resulting in lower capital, operating, and maintenance costs. This system handles large loading variations and is very effective in achieving ultra-low phosphorus levels.

Purifics ES Inc.
Forum Title: CUF Technology: Making Water Reuse Achievable for Your Organization
Presenter: Brian Butters, President
Room: Matchless

Water reuse should be integrated into every organization's operations. It's good for the environment, strengthens customer relationships and, if done right, improves the bottom line. Brian Butters, President of Purifics ES Inc., will describe how CUF technology restores even the most challenging water while eliminating installation challenges, minimizing maintenance needs, and reducing capital and operating costs. Too good to be true? Here is your chance to find out.

Monday, September 16th | 2:20 p.m. – 3:00 p.m.
Xylem
Forum Title: DURON UV System: Shining New Lights on Original Ideas
Presenter: Keel Robinson, Business Development Manager
Room: Molly Brown

WEDECO is a leading manufacturer of efficient UV disinfection for nearly 40 years. The latest innovation for the wastewater and reuse markets is the new DURON UV disinfection system. Please join us for an interactive discussion to learn about the new inclined open channel DURON UV system featuring enhanced 600W Ecoray lamps, intelligent OptiDose UV system automation, a simple and safe integrated automatic module lifting system, and many other advancements that improve UV system implementation.

Dinner and Discovery at the Denver Zoo

Sponsored by ConocoPhillips

Tuesday, September 17th | 5:30 p.m. – 10:00 p.m.

Join us for an unforgettable evening under the stars at the Denver Zoo. Enjoy great food, music and networking with friends and colleagues while encountering the animals and strolling through the beautiful gardens. In addition, we will have the unique opportunity to visit the Toyota Elephant Passage where we will have an exclusive elephant demonstration as well as a presentation on the use of recycled water in the exhibit given by the Denver Zoo staff.

The Toyota Elephant Passage at the Denver Zoo is the first large animal exhibit complex in the country to achieve the LEED Platinum certification, the highest level, from the U.S. Green Building Certification Institute.

The Toyota Elephant Passage promotes the five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. Toyota Elephant Passage uses recycled water, efficient HVAC systems, natural day lighting and ventilation and other "green" construction practices including an innovative waste to energy process. Toyota Elephant Passage's state-of-the-art water filtration system recycles most of the 1.1 million gallons of water running through the outdoor pools. The source of the water for the outdoor pools is provided by Denver Water's recycled water system. Although the Toyota Elephant Passage exhibit holds more water than the rest of the zoo combined, the impact is minimal, due to the use of both the state-of-the-art filtration system and recycled water. To retain heat at lower elevations of a room longer than forced air systems, Toyota Elephant Passage uses radiant-heated floor systems. These systems will last the life of the building without requiring maintenance, and save energy, money and time for repairs. They will also be used in several outdoor spaces, providing a safe walking environment for guests and animals during winter months.

Buses will depart from the 18th and California hotel entrance.

Schedule of Events:

5:30 p.m. – 6:15 p.m.	Shuttle Buses depart from the Denver Marriott City Center taking attendees to the Denver Zoo
6:45 p.m. – 7:15 p.m.	Presentation on the use of Recycled Water in the Toyota Elephant Passage and Elephant Demonstration
7:15 p.m. – 9:30 p.m.	Dinner, Drinks and Music by Denver Water's own— the Flea Bitten Band
9:30 p.m. – 10:00 p.m.	Shuttle Buses depart from the Denver Zoo taking attendees back to the Denver Marriott City Center

2013 AWARD WINNERS

Kids Recycled Art & Writing Contest Winners

Art Winners

1st Place
Jake Dowing
Title of Art Submission: *A Drop of Water Never Dies Tell the Stories of its Many Lives*
Grade: 6th
School: Hamilton Middle School

2nd Place
Sydney Thompson
Title of Art Submission: *A Drop of Water Never Dies Tell the Stories of its Many Lives*
Grade: 7th
School: Hamilton Middle School

3rd Place
Raul Antonio Silva
Title of Art Submission: *A Drop of Water Never Dies Tell the Stories of its Many Lives*
Grade: 7th
School: Hamilton Middle School

Writing Winners

1st Place
Lexie Swartwood
Title of Writing Submission: *The Water Cycle*
Grade: 6th
School: Devinny Elementary School

2nd Place
Miranda McDermott
Title of Writing Submission: *I am Water…*
Grade: 6th
School: Devinny Elementary School

3rd Place
Colby Luongo
Title of Writing Submission: *Water is Life*
Grade: 6th
School: Devinny Elementary School

2013 WateReuse Award Winners

WateReuse Project of the Year–Large

Reedy Creek Improvement District (Reedy Creek, FL)
The Reedy Creek Improvement District (RCID) is a special district in the State of Florida and provides municipal services to roughly 25,000 acres in Central Florida, comprising the Walt Disney World Resort and its affiliates. RCID has owned and operated a single wastewater treatment facility since 1971. RCID has been a leader in the use and promotion of reclaimed water for non-potable purposes and has striven to set the example in its actions and deeds. They have beneficially used all of its effluent since July of 1990. In 1993, RCID began operation of its public access reuse system, and has provided a reliable and high quality reclaimed water for nonpotable purposes to its customers since that time. Almost 10 mgd, 80% of the available supply is used for irrigation of areas within RCID. The District has also recently initiated the use of reclaimed water for toilet flushing in the Park. Reclaimed water and between 25 and 30% of the total RCID water resource needs are met with reclaimed water, depending on the weather and demands. Treated water not used for irrigation or other reuse applications is applied to rapid infiltration basins (RIBs) which recharge the local aquifers, and thus enable the District to achieve complete reuse of its effluent. RCID ceased all effluent discharge to surface waters in the summer of 1990, and has not discharged since.

WateReuse Project of the Year–Small

Winter Park Estates Wastewater Treatment Facility (Orange County, FL)
Winter Park Estate Wastewater Treatment Facility is a small 0.75 MGD reuse facility located in Orange County, Florida. All of the high quality reclaimed water produced is used for irrigation at two nearby golf courses, one city ballpark and one cemetery. The facility is currently under plans for expansion to provide reclaimed water to local neighborhoods for home irrigation.

The facility staff is committed to running the facility to the highest level of operation with no reported permit exceedences. Because the Winter Park Estates WWTF has irrigation only customers and no other forms of effluent disposal, it only treats the amount of reclaimed water demand. Excess wastewater influent is diverted to the City of Orlando's Iron Bridge Treatment Facility. This set up makes the best use of available local supply and demand for reclaimed water and provides the city with savings on their potable water supply.

WateReuse Public Education Program of the Year

LOTT's East Bay Public Plaza (Olympia, WA)

The LOTT Clean Water Alliance has been actively producing, distributing, and using Class A Reclaimed Water since 2005. LOTT's public education program has been enhanced significantly over the past three years with a series of reclaimed water features in the downtown Olympia, Washington area. The newest and boldest features were built as focal points of the East Bay Public Plaza, which LOTT built specifically for educational purposes—designed to showcase reclaimed water in a positive and uniquely participatory way. An actively flowing stream is the first interactive recreational water feature in the state of Washington to be permitted using reclaimed water. It's perfect for dipping your toes and splashing around! Designed to mimic a natural stream, it begins at a waterfall and ends by disappearing near East Bay's marine waters where it is recirculated. The stream is fed partly by engineered seeps and springs, mimicking the way groundwater feeds many local streams. On warm sunny days, hundreds of people have been enjoying the stream. Located between the stream and LOTT's WET Science Center, a demonstration wetland was designed to showcase another beneficial use of reclaimed water—enhancing wetlands. This wetland is creating a healthy ecosystem that supports a variety of plants, insects, and wildlife. Together, these water features not only mimic a natural stream and wetland, but the water that feeds them also mimics nature's recycling processes, with water that has been used, cleaned, disinfected, and is ready to be used again.

WateReuse Customer of the Year

The Living Machine—San Francisco Public Utilities Commission Headquarters (San Francisco, CA)

Last fall, the SFPUC moved into its new headquarters—a LEED Platinum building with an on-site treatment system called a Living Machine® that treats and reuses all of the building's wastewater to satisfy 100% of the water demand for the building's low-flow toilets and urinals. This system reduces total water use by approximately 65%, and saves 1.5 million gallons of potable water per year.

Typically, wastewater treatment is hidden from public view. What is most unique about this system is that the treatment process occurs in constructed wetlands in the public right-of-way—along the sidewalk and in the lobby. Each day thousands of San Franciscans pass by the wetlands demonstrating that multi-benefit water infrastructure solutions can be seamlessly integrated into a Cities' urban fabric. The SFPUC has hosted weekly tours to professional organization, foreign delegations, local schools and interested residents, bringing the concept of on-site water recycling to the forefront. In addition, the SFPUC administers the City's Non-potable Water Program, providing a regulatory pathway and guidance for other large developments in San Francisco to follow their lead.

This project is located in one of the densest neighborhoods in the second densest city in America, and has shown there are other on-site treatment methods available beyond tucking an MBR in the basement. This demonstration project where the SFPUC serves as the producers and customer for an on-site system, as brought new fervor to the ideas of decentralized wastewater treatment and system resiliency in San Francisco.

WateReuse Person of the Year

A. Randolph Brown, City of Pompano Beach Utilities (Pompano Beach, FL)

Fifty years ago, no one could have imagined the potable water demand today, let alone the volume of reclaimed water used in Florida. Yet our reuse pioneers worked against public opinion, regulations and sometimes common sense. Most worked quietly and steadfastly, barely making a ripple in our professional journals. As they retired others took their places, and reuse volumes grew.

Randy Brown, Utilities Director for the City of Pompano Beach, will tell you that he has not done enough to be considered for the 2013 WateReuse Person of the Year award. However, he has been one of these quiet (and sometimes not so quiet) reuse warriors. His work with reclaimed water truly began over a decade ago on the Missouri River, where running a water plant sometimes blurred the lines between indirect and direct potable reuse. Since 2004, when Randy became Utilities Director for Pompano Beach, he has more than doubled the number of customers, including adding 500 new residential customers in a built-out urban area. He also more than doubled the distribution system size and daily usage.

While he fought to expand the system to serve people who did not want reclaimed water, in a county that had regulations in place making reclaimed water use difficult, he worked at the state level as a member of the Reclaimed Water Policy Work Group. As chair of the Southeast Florida Utility Council, and later on the WateReuse Association Board, he has been a steady voice for both non-potable and potable reuse.

WateReuse International Award

Eastern Treatment Plant Tertiary Upgrade Project (Melbourne, Australia)

The recent addition of a $418M advanced tertiary treatment upgrade to Melbourne Water's Eastern Treatment Plant makes it one of the largest and most sophisticated treatment facilities of its kind in the world. The new plant produces an average and peak capacity of 350 MLD and 700 MLD respectively of Class A recycled water, which can be used for a wide range of non-potable applications within the drought susceptible Melbourne area. Any treated water not utilised for reuse applications is discharged via the existing plant outfall, where the significantly improved discharge water quality delivers major benefits to the receiving marine environment and the nearby popular bathing and surfing beaches.

The tertiary treatment process uses multiple disinfection barriers consisting of ozone, UV and chlorine. To verify the performance of these processes on secondary effluent a number of unique investigations were carried out in a custom built, state of the art trials plant. These resulted in new precedents being created for how these processes might be used on secondary effluent source water in future reuse schemes.

The project, which was delivered by an alliance of Bauldestone, Black & Veatch, KBR, Melbourne Water and United Group, has been a major success for Melbourne Water through achieving its environmental obligations and strategic goals for the Eastern Treatment plant while being delivered on time and on budget using a collaborative delivery model. As recognition of the project's significance it was recently awarded the Global Water Intelligence Water / Wastewater Project of the year in Seville.

SUNDAY

SUNDAY, SEPTEMBER 15, 2013

12:00 p.m. – 6:00 p.m.	Registration Open *(Colorado Ballroom Foyer)*			
1:00 p.m. – 5:00 p.m.	**Technical Tour**: Denver Water Recycling Facility and Denver Museum of Nature and Science (buses will depart from the 18th and California Hotel Entrance)			
	A1 Produced Water–Part 1	**B1** Public Outreach: Beyond the Basics–Part 1	**C1** Industrial Reuse Applications–Part 1	**D1** Water Reuse in Colorado–Part 1
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Frank Johns, Tetra Tech*	*Patsy Tennyson, Katz & Associates*	*Albrey Arrington, Loxahatchee River District*	*Steve Ravel, Hatch Mott MacDonald*
1:30 p.m. – 2:00 p.m.	Opportunities and Challenges for Wastewater Reuse in Oil and Gas Development *Tekla Taylor, Golder Associates*		Innovative Water Reclamation and Reuse to Meet Industrial Water Demands *Kevin Henderson, City of Dawson Creek and Peter Coxon, Urban Systems*	A History of Water Reuse in Colorado *Wayne Lorenz, Wright Water Engineers*
2:00 p.m. – 2:30 p.m.	Produced Water Treatment and Reuse in Queensland, Australia *Ron Cass, MWH*	Creating a Clearinghouse of Knowledge-Based Resources on Public Acceptance of Water Reuse *Bahman Sheikh, Water Reuse Consultant*	Denver Water Guidelines for Cost-Effective Use of Recycled Water in Cooling Water System *Jenny Murray, Denver Water, Paul Puckorius, Puckorius & Associates and Rick Fell, Jacobs Engineering Group*	Water Rights and Reuse–Limitations or Opportunities? *Kelly DiNatale, DiNatale Water Consultants*
2:30 p.m. – 3:00 p.m.	Turning Toxic Produced Water into Clean "Found" Water for Agriculture, Livestock & People *Chris Luiz, IX Power Clean Water*	Engaging Stakeholders to Increase Recycled Water Use in the City of Los Angeles *Evelyn Cortez-Davis, Los Angeles Department of Water and Power and Doug Walters, City of Los Angeles Department of Public Works*	Fighting Economics–Reclaimed Water Use in Cooling Towers *Dan Pedersen, Austin Water*	Promoting More Reuse through New and Expanded Uses *John Rehring, Carollo Engineers*
3:00 p.m. – 3:30 p.m.	Networking Break *(Colorado Ballroom Foyer)*			
3:00 p.m. – 3:30 p.m.	Poster Presentations *(Colorado Ballroom Foyer)*			

SUNDAY

	A2 Produced Water–Part 2	**B2** Public Outreach: Beyond the Basics–Part 2	**C2** Industrial Reuse Applications–Part 2	**D2** Water Reuse in Colorado–Part 2
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Frank Johns, Tetra Tech*	*Patsy Tennyson, Katz & Associates*	*Albrey Arrington, Loxahatchee River District*	*Stevel Ravel, Hatch Mott MacDonald*
3:30 p.m. – 4:00 p.m.	Osmotically Driven Membrane Processes for Treatment and Reuse of Oil and Gas Exploration Wastewater: Field and Lab Assessments *Bryan Coday, Colorado School of Mines*	The Potential Value of Direct Potable Reuse: A Triple Bottom Line Assessment *Robert Raucher, Stratus Consulting*	Maintaining Reuse While Challenges Keep Coming *Leita Bennett, Atkins North America*	Development of a New Brackish Groundwater Source for Drinking Water *Chris Douglass, Cherry Creek Valley Water & Sanitation District*
4:00 p.m. – 4:30 p.m.	Perspectives on Produced Water Treatment: Challenges, Trends, Environmental Issues and Opportunities *Alan Daza, Aquatech International Corporation*	Climate Change–Use it to Build Support for Reuse and Desalination Projects *Karen Raucher, Stratus Consulting*	Expanding Industrial Reuse to Commercial Car Washes and Laundries *Damian Higham, Denver Water*	Using Reclaimed Water Can Preserve Potable Water Quality *Scott Lehman, Pure Cycle Corporation*
4:30 p.m. – 5:00 p.m.	Panel Discussion: Produced Water	Serving the Underserved in Water Purification Outreach *Marsi Steirer, City of San Diego Public Utilities Department*	Super Capacitor Radial Deionization System for Flue Gas Desulfurization Wastewater Treatment *Behrang Pakzadeh, Southern Research Institute*	Water Reuse Outside of Regulation 84 *Elizabeth Lemonds, Colorado Department of Public Health and Environment*
4:00 p.m. – 5:00 p.m.	Potable Reuse Committee Meeting *(Matchless Room)*			
4:00 p.m. – 5:00 p.m.	International Committee Meeting *(Molly Brown Room)*			
5:30 p.m. – 7:00 p.m.	Exhibit Hall Open *(Colorado Ballroom A–E)*			
5:30 p.m. – 7:00 p.m.	Welcome Reception *(Colorado Ballroom A–E)*			

A1: Produced Water–Part 1

Room: Denver Ballroom 1–2

Opportunities and Challenges for Wastewater Reuse in Oil and Gas Development

Tekla Taylor, Golder Associates

Development of unconventional oil and gas in the US requires large volumes of water for hydrofracturing. Many operators have implemented innovative water conservation and reuse programs. This session explores the opportunities and challenges for reuse of produced water, industrial wastewater and reclaimed municipal wastewater in the Oil and Gas industry.

Produced Water Treatment and Reuse in Queensland, Australia

Ron Cass, MWH

Queensland's Bowen and Surat Basins are expected to provide a major supply of natural gas to Australia's eastern states and to produce natural gas for liquification and export to customers throughout Asia Pacific. Coal Seam Gas (CSG) is a natural gas occurring in underground coal seams, and held in the fractures of underground coal seams by water and ground pressure, and released by drilling into the coal seam and reducing the pressure by pumping out some of the water. This presentation is intended to provide an overview of the coal gas industry with specific respect to treatment and reuse alternatives of produced water highlighting the Queensland Australia experience.

Turning Toxic Produced Water into Clean "Found" Water for Agriculture, Livestock & People

Chris Luiz, IX Power Clean Water

Produced water from oil & gas operations is not often considered for reuse. But developments to eliminate organic hydrocarbons–the hardest to treat toxins from oil & gas operations–are now able to turn produced water into "found" water, a viable source for agriculture, livestock, and community water systems.

B1: Public Outreach: Beyond the Basics–Part 1

Room: Denver Ballroom 4–6

Creating a Clearinghouse of Knowledge-Based Resources on Public Acceptance of Water Reuse

Bahman Sheikh, Water Reuse Consultant

A compendium of public acceptance resources will make it unnecessary for agencies to conduct their own separate research into the available acceptance issues for water reuse and desalination. The information will be readily available to them via the interactive website that maintained by WateReuse Foundation.

Engaging Stakeholders to Increase Recycled Water Use in the City of Los Angeles

Evelyn Cortez-Davis, Los Angeles Department of Water and Power and Doug Walters, City of Los Angeles Department of Public Works

As the City of L.A. begins to implement various recycled water initiatives, including Groundwater Replenishment with advanced treated recycled water, engaging stakeholders will continue to play a crucial role in the program's success. This presentation will detail specific outreach activities that aim to secure understanding and support of the City's Recycled Water Program and specifically GWR.

C1: Industrial Reuse Applications–Part 1

Room: Mattie Silks

Innovative Water Reclamation and Reuse to Meet Industrial Water Demands

Kevin Henderson, City of Dawson Creek and Peter Coxon, Urban Systems

Water scarcity is a global issue that requires innovation at the local level to ensure we are making the most of what we have to support healthy and vibrant communities. Increasingly industrial and commercial water customers are placing heavy demands on community water systems that are already stretched. By utilizing reclaimed water, it is possible to meet the growing water needs of the private sector without additional source development or system expansion. In addition, new revenue streams can be created from a resource that was previously considered waste.

Denver Water Guidelines for Cost-Effective Use of Recycled Water in Cooling Water System

Jenny Murray, Denver Water, Paul Puckorius, Puckorius & Associates and Rick Fell, Jacobs Engineering Group

This presentation will cover Denver's Water experiences and successes of using recycled water for cooling tower water systems. It will include considerations when converting from a potable water source, water quality data, operational recommendations, and economical evaluations. It will also include Denver's Water experience serving cooling tower customers and how cooling towers fit into Denver Waters plans for its Recycled Water System

Fighting Economics—Reclaimed Water Use in Cooling Towers

Dan Pedersen, Austin Water

Austin Water's high quality potable water makes conversion of cooling towers to reclaimed water uneconomic, even though the reclaimed water rate is much less. This presentation will describe a cooling tower pilot project that could tip costs and economics in favor of reclaimed water use.

Water Rights and Reuse—Limitations or Opportunities?

Kelly DiNatale, DiNatale Water Consultants

A major consideration for the implementation of water reuse is the legal ability to reuse water. Water reuse in western states is governed by the water rights nature of the source water and water law that governs the ability to reuse water. Colorado water law is especially specific regarding water reuse. In addition, Colorado water law allows reuse in other ways, via plans for augmentation and exchanges that can minimize capital and operational costs compared to traditional "purple pipe" reuse.

Promoting More Reuse through New and Expanded Uses

John Rehring, Carollo Engineers

Expanding water reuse requires new customers and new applications. To promote increased reuse in Colorado, regulatory amendments were made to broaden existing nonpotable uses and authorize new uses. Justification for the changes included assessments of inhalation, ingestion, cross-connection, and environmental risks. Planning for implementation of these uses is now underway.

D1: Water Reuse in Colorado–Part 1

Room: Denver Ballroom 3

A History of Water Reuse in Colorado

Wayne Lorenz, Wright Water Engineers

Colorado has a unique water reuse history. Water rights have driven every reuse program in the state. Notable reuse programs have been ski area snowmaking, irrigation of crops, Colorado Springs early turf reuse, Denver's direct potable reuse research project, and others. Programs have evolved and have provided the foundation for Colorado reuse.

A2: Produced Water–Part 2

Room: Denver Ballroom 1–2

Osmotically Driven Membrane Processes for Treatment and Reuse of Oil and Gas Exploration Wastewater: Field and Lab Assessments

Bryan Coday, Colorado School of Mines

Forward osmosis (FO) is a membrane technology that can facilitate sustainable water reuse in the Oil and Gas industry. FO can achieve 85% water recovery while treating frac flowback and produced water of different chemical compositions. Membrane water throughput and rejection of salts, organic matter, and micro-pollutants are presented.

Perspectives on Produced Water Treatment: Challenges, Trends, Environmental Issues and Opportunities

Alan Daza, Aquatech International Corporation

This presentation will focus on the challenges, trends, environmental issues and ultimately opportunities in two (2) regions of the world where produced water has significantly different values to an industry: Coal Seam Gas (CSG) in Australia and the Oil Sands in Alberta Canada.

B2: Public Outreach: Beyond the Basics–Part 2
Room: Denver Ballroom 4–6

The Potential Value of Direct Potable Reuse: A Triple Bottom Line Assessment

Robert Raucher, Stratus Consulting

Direct potable reuse (DPR) can provide many advantages for water short communities. These advantages can be substantial, even when compared to the value derived from indirect potable reuse (IPR) or nonpotable reuse (NPR). However, there is understandable caution on the part of regulators, and communities, to embrace DPR. One piece of the puzzle that may help support efforts for DPR would be an objective assessment of the potential beneficial value of the approach, compared to alternative options for meeting public water supply needs. This presentation will summarize a Triple Bottom Line (TBL) assessment of the potential value of DPR in California.

Climate Change—Use it to Build Support for Reuse and Desalination Projects

Karen Raucher, Stratus Consulting

Research findings, based on a national survey, suggest that contrary to the sense expressed by many utility professionals, using messages about climate change actually increases public support for actions water utilities need to take to respond to our changing climate . This presentation will share our national survey findings as well as our findings on how to use risk communication templates to simplify message development.

Serving the Underserved in Water Purification Outreach

Marsi Steirer, City of San Diego Public Utilities Department

The City of San Diego developed and implemented a comprehensive outreach program as part of the Water Purification Demonstration Project. This presentation will describe unique activities employed to reach underserved demographics in the San Diego region.

C2: Industrial Reuse Applications–Part 2

Room: Mattie Silks

Maintaining Reuse While Challenges Keep Coming

Leita Bennett, Atkins North America

To meet strict Chesapeake Bay protection criteria, the Maryland Environmental Service provides reclaimed reuse water to its nearby cogeneration facility. This effort is now challenged by combining Reverse osmosis reject water with the plant's discharge and an expansion. This presentation will demonstrate the challenges met from these changes.

Expanding Industrial Reuse to Commercial Car Washes and Laundries

Damian Higham, Denver Water

This presentation will provide insight into the evaluation of using recycled water for laundry and car wash operations with special focus on the benefits of industrial water reuse programs and the industrial end user considerations regarding the economic and operational effects of conversion from drinking water to recycled water.

Super Capacitor Radial Deionization System for Flue Gas Desulfurization Wastewater Treatment

Behrang Pakzadeh, Southern Research Institute

Pilot testing of an innovative deionization system for wastewater treatment in the coal-fired power industry is underway at the Water Research Center. If successful, the system could provide significant cost and energy efficiency savings over conventional technologies to treat wastewater for reuse in plant cooling and other make-up water systems.

D2: Water Reuse in Colorado–Part 2

Room: Denver Ballroom 3

Development of a New Brackish Groundwater Source for Drinking Water

Chris Douglass, Cherry Creek Valley Water & Sanitation District

Having purchased water originating from a brackish groundwater source, East Cherry Creek Valley Water & Sanitation District was faced with the challenge of treating the water and disposing of its high TDS waste. This presentation will discuss the water's primary and secondary reverse osmosis treatment, the various brine disposal options considered, and the challenges involved in the chosen disposal option.

Using Reclaimed Water Can Preserve Potable Water Quality

Scott Lehman, Pure Cycle Corporation

Water distribution systems must be sized to accommodate both peak demands of customers and fire protection flows. By using reclaimed water for both landscape irrigation and fire protection, the potable water piping for new communities can be sized to minimize water quality deterioration associated with excessive hydraulic detention times in the distribution systems.

Water Reuse Outside of Regulation 84

Elizabeth Lemonds, Colorado Department of Public Health and Environment

This presentation will explore the use of non-potable water outside of Regulation 84, such as reusing water with an onsite wastewater system, reuse of water discharged from industrial processes, graywater, raw water reuse. The goal of the presentation will be to clarify the circumstances and rules for each of these different regulations, and to compare the best management practices and water quality for each.

MONDAY

MONDAY, SEPTEMBER 16, 2013

7:00 a.m. – 3:30 p.m.	Registration Open *(Colorado Ballroom Foyer)*
7:00 a.m. – 3:30 p.m.	Exhibit Hall Open *(Colorado Ballroom A–E)*
7:00 a.m. – 8:00 a.m.	Continental Breakfast *(Colorado Ballroom A–E)*
8:00 a.m. – 9:45 a.m.	**Opening Session and Awards Presentation** *(Colorado Ballroom F–J)*
9:45 a.m. – 10:15 a.m.	Networking Break and Raffle *(Colorado Ballroom A–E)*
9:45 a.m. – 10:15 a.m.	Poster Presentations *(Colorado Ballroom Foyer)*
9:45 a.m. – 10:15 a.m.	Book Signing with Nikolay Voutchkov, author of Desalination Engineering: Planning and Design *(Colorado Ballroom A–E)*

	A3 Reuse: Cost Effective Operations–Part 1	**B3** Reuse: Effective Planning Strategies–Part 1	**C3** Environmental Concerns: Pathogens	**D3** Creative Concentrate Management
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Don Vandertulip, CDM Smith*	*Cynthia Lane, American Water Works Association*	*Steve Ravel, Hatch Mott MacDonald*	*Marsi Steirer, City of San Diego Public Utilities Department*
10:15 a.m. – 10:45 a.m.	Trends in Potable Water Reuse, Advancements in the Multi-barrier Approach *Roman Gasull, Abengoa Water*	Ocean Outfalls and Water Reuse in Southeastern Florida: Impacts on the Regional Water Supply *Melissa Meeker, CSA Ocean Sciences*	Development of a Risk Management Strategy for Legionella in Recycled Water Systems *Mark LeChevallier, American Water*	Reshape Inland Concentrate Management Cost Curve using Pretreatment and Electrodialysis Reversal *Charlie He, Carollo Engineers*
10:45 a.m. – 11:15 a.m.	Water Fit For Use *Stan Vajdic, Nalco, an Ecolab Company*	Recycled Water Demand Prioritization and Management; Maximizing Beneficial Use *John Wuerth, Eastern Municipal Water District*	A Novel RNA Virus Detection System for Environmental Waters *Ranjani Ravi, University of Cincinnati*	Innovative Concentrate Reduction Treatment Processes for Chino II Desalter *Brandon Yallaly, Carollo Engineers and Jack Safely, Western Municipal Water District*
11:15 a.m. – 11:45 a.m.	Coming of Age: Reclaimed Water Infrastructure Condition Assessment *Tim Thomure, HDR Engineering*	Competition in the Water Utility Sector and Implications for Water Reuse *Wes Strickland, Brownstein Hyatt Farber Schreck, LLP*	The Use of Defined Substrate Technology for the Detection of Total Coliforms, Fecal Coliforms and *E.coli* *Gil Dichter, IDEXX Laboratories*	Barriers and Solutions to Concentrate Management for Inland Municipal Desalination *Robert Raucher, Stratus Consulting*
11:45 a.m. – 12:15 p.m.	Industrial Water Pollution and Economics of Zero Discharge Technology: A Case of Some Textiles and Pharmaceutical Industries *Anshvey Kaintura, TERI University*	Reuse as a Preferred Water Supply Option–An Environmental Perspective *Laura Belanger, Western Resource Advocates*	Monitoring of the Microbiota in the Cooling Tower System of a Petroleum Refinery Supplied with Water Reuse Treated *Vera Lucia dos Santos, Federal University of Minas Gerais*	Innovative Brine Management: Modeling and Assessing Impacts to Water Reuse and POTW's *Christopher Stacklin, Orange County Sanitation District*

12:15 p.m. – 1:30 p.m.	**Networking Luncheon with the Exhibitors** *(Colorado Ballroom A–E)*
1:00 p.m. – 5:30 p.m.	**Technical Tour:** Colorado School of Mines' Reclamation Test Site and Molson Coors Sustainability Presentation *(buses will depart from the 18th and California hotel entrance)*
1:30 p.m. – 2:10 p.m.	**Exhibitor Forum:** Aqua-Aerobic Systems–Ultrafiltration of Reuse Applications *(Nat Hill Room)*
1:30 p.m. – 2:10 p.m.	**Exhibitor Forum:** Purifics–CUF Technology: Making Water Reuse Achievable for Your Organization *(Matchless Room)*
2:20 p.m. – 3:00 p.m.	**Exhibitor Forum:** Xylem–DURON UV System: Shining New Lights on Original Ideas *(Molly Brown Room)*

MONDAY

	A4 Reuse: Cost Effective Operations–Part 2	B4 Reuse: Effective Planning Strategies–Part 2	C4 Innovations in Disinfection Technologies–Part 1	D4 Planning Innovation in Desalination
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Robert Raucher, Stratus Consulting*	*Tekla Taylor, Golder Associates*	*John Kmiec, Town of Marana Utilities Department*	*John Rehring, Carollo Engineers*
1:30 p.m. – 2:00 p.m.	Economics of a Nonpotable Water System *Wayne Lorenz, Wright Water Engineers*	Context, Understanding, Acceptance–Research Points the Way Forward *Linda Macpherson, CH2M HILL*	Reclaimed Water UV Disinfection–Emerging Technologies and Emerging Issues *Andrew Salveson, Carollo Engineers*	Consideration for the Co-Siting of Desalination Facilities with Municipal and Industrial Facilities *Val Frenkel, ARCADIS*
2:00 p.m. – 2:30 p.m.	Dual Use of Scotts Valley's Ocean Outfall for Transmission of Recycled Water to Pasatiempo Golf Club in Santa Cruz County, California *Bahman Sheikh, Water Reuse Consultant and Dana Ripley, Ripley Pacific Company*	To Implement Indirect Potable Reuse or a Dual Piping System? A Triple Bottom Line Approach to Finding the Best Use for Reclaimed Water *Richard Humpherys, Carollo Engineers*	Evaluation of Virus Removal Capabilities of MBR System in a Full Scale Water Reclamation Facility in Nevada *Ufuk Erdal, CH2M HILL*	The Phoenix, Beltway Politicians, and Privately Financed Infrastructure Projects, is the Carlsbad Seawater Desalination Project an Omen of Things to Come? *Neil Callahan, SAIC Energy, Environment & Infrastructure*
2:30 p.m. – 3:00 p.m.	Spot-check Bioassay of a Full-Scale Gravity-Flow Open-Channel Vertical UV System *Pedro DaCruz, Ozonia North America*	Indirect Potable Reuse Concept Study: Rancho California Water District Analyzes Several Options to Achieve Multiple Benefits *Scott Goldman, RMC Water and Environment and Andrew Webster, Rancho California Water District*	Ferrate Disinfection of Wastewater Effluent for Wetland Reuse and Rehabilitation *Brady Skaggs, Waldemar S. Nelson and Company*	Polymer Assisted Forward Osmosis for Desalination and Water Reuse *Xinying Wang, University of Illinois Urbana-Champaign*
3:00 p.m. – 3:30 p.m.	Networking Break and Raffle *(Colorado Ballroom A–E)*			
3:00 p.m. – 3:30 p.m.	Poster Presentations *(Colorado Ballroom Foyer)*			
	A5 Reuse: Cost Effective Operations–Part 3	**B5** Reuse: Effective Planning Strategies–Part 3	**C5** Innovations in Disinfection Technologies–Part 2	**D5** Desalination Energy Reduction Technologies
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Robert Raucher, Stratus Consulting*	*Tekla Taylor, Golder Associates*	*John Kmiec, Town of Marana Utilities Department*	*John Rehring, Carollo Engineers*
3:30 p.m. – 4:00 p.m.	High Recovery Reverse Osmosis for Water Reuse at the Kranji NEWater Factory *Richard Stover, Desalitech*	Water Reuse in Edmonton, Alberta Canada *Alan Rimer, Black & Veatch*	Evaluation of Oxidizing Agents for Disinfecting Oil Refinery Wastewater Aiming Reuse Purposes *Andrea Azevedo Veiga, PETROBRAS*	Energy Consumption Modeling in Seawater Desalination *Silvana Ghiu, Separation Processes*
4:00 p.m. – 4:30 p.m.	Incorporating Advanced Wastewater Treatment for Potable Reuse in Big Spring, Texas *Rob Haas, Trojan Technologies*	Solving Water Scarcity Through Public-Private Partnerships *Kelly Lange-Haider, Dow Chemical Company*	Panel Discussion: Pathogens and Disinfection Technologies	Selecting the Best Energy Recovery Device at Reverse Osmosis Treatment Plants *Tyler Nading, CH2M HILL*
4:30 p.m. – 5:00 p.m.	A Potable Reuse and Wetlands Improvement Concept for Drought-Challenged El Paso, Texas *Gilbert Trejo, ARCADIS and Carlos Dominguez, El Paso Water Utilities*	Regional Considerations Impact Water Reuse Management Options *Allegra da Silva, CDM Smith*		Reverse Osmosis: Where We Started and Where We Are Heading To *Val Frenkel, ARCADIS*
5:30 p.m. – 10:30 p.m.	An Evening at Coors Field *(meet and depart from Hotel lobby)*			

A3: Reuse: Cost Effective Operations–Part 1

Room: Denver Ballroom 1–2

Trends in Potable Water Reuse, Advancements in the Multi-barrier Approach

Roman Gasull, Abengoa Water

This presentation will offer a state-of-the-art technology review involved in the multi barrier approach to water reclamation, such as MBR, low fouling RO membranes, high efficiency RO systems and optimised advanced oxidation processes (AOPs). It also focuses on removal efficiency on emerging contaminants as well as on energy usage sustainability.

Water Fit For Use

Stan Vajdic, Nalco, an Ecolab Company

This presentation will focus on the Industrial End User's requirement for water reuse recycle systems. At the conclusion of the presentation the End User will have an increased awareness of the interplay between the mechanical, chemical, operational and automation functions that impact reuse recycle projects.

Coming of Age: Reclaimed Water Infrastructure Condition Assessment

Tim Thomure, HDR Engineering

Many reclaimed water systems have been in operation for over 25 years and are beginning to deteriorate. A comprehensive condition assessment program collects standardized data and optimizes maintenance strategies to prevent failures. Case studies from recent reclaimed water condition assessments offer lessons learned for other systems to consider.

Industrial Water Pollution and Economics of Zero Discharge Technology: A Case of Some Textiles and Pharmaceutical Industries

Anshvey Kaintura, TERI University

This work focusses on two major problems associated with water resources in Gujarat, namely, Industrial water pollution and water scarcity. An attempt has been made to assess the current technologies of wastewater treatment being used in textiles and pharmaceutical industries of Gujarat and also analyze the economic feasibility of zero discharge technology for these units.

B3: Reuse: Effective Planning Strategies–Part 1

Room: Denver Ballroom 4–6

Ocean Outfalls and Water Reuse in Southeastern Florida: Impacts on the Regional Water Supply

Melissa Meeker, CSA Ocean Sciences

In 2008, Florida passed laws requiring the elimination of six ocean outfalls in southeastern Florida and 60 percent reuse of the flows (178 mgd) by 2025. Innovative and creative solutions will have to be employed to satisfy these requirements that will involve integrated water management strategies.

Recycled Water Demand Prioritization and Management; Maximizing Beneficial Use

John Wuerth, Eastern Municipal Water District

As recycled water demand increases throughout California, managing the prioritization and seasonality of various customer segments will be critical to meet recycling objectives. Eastern Municipal Water District has made significant progress to identify and understand many of the elements necessary to balance recycled water supplies, storage and demands to maximize its beneficial use.

Competition in the Water Utility Sector and Implications for Water Reuse

Wes Strickland, Brownstein Hyatt Farber Schreck, LLP

This presentation will explore the legal background of water utility competition, barriers to water reuse and desalination from the traditional business model, and potential solutions.

Reuse as a Preferred Water Supply Option– An Environmental Perspective

Laura Belanger, Western Resource Advocates

As utilities face growing water demands, traditional water supply infrastructure projects are increasingly uncertain, expensive, and time consuming. Additionally, such projects often face environmental opposition due to concerns about river and riparian ecosystem impacts. Reuse can play a significant role in a secure, flexible, less impactful and less contentious water supply portfolio.

C3: Environmental Concerns: Pathogens

Room: Mattie Silks

Development of a Risk Management Strategy for Legionella in Recycled Water Systems

Mark LeChevallier, American Water

Legionella has the potential a major issue for reclaimed water systems because it is a pathogen transmitted by aerosols, regrows after treatment in reclaimed water networks. This presentation will provide background information and best management practices for the control of Legionella.

A Novel RNA Virus Detection System for Environmental Waters

Ranjani Ravi, University of Cincinnati

Here we report a novel RNA virus detection system for environmental waters using the inherent specificity of the Duplex-Specific Nuclease (DSN) for cleaving DNA in a DNA-RNA duplex. This technique has the scope to surpass conventionally used methods for virus detection in terms of time, cost and complexity.

The Use of Defined Substrate Technology for the Detection of Total Coliforms, Fecal Coliforms and *E.coli*

Gil Dichter, IDEXX Laboratories

Colilert and Colilert-18 are approved EPA methods for drinking and waste water detecting indicator bacteria, acting as a surrogate for pathogens. Pathogens are difficult to detect requiring skilled technicians to perform the testing. The technology will be reviewed along with state requirements and labs that are using this technology.

Monitoring of the Microbiota in the Cooling Tower System of a Petroleum Refinery Supplied with Water Reuse Treated

Vera Lucia dos Santos, Federal University of Minas Gerais

This presentation will focus on describing the mechanisms involved in biofilm formation, deleterious effects associated with their presence, and importance of monitoring planktonic and sessile microbiota in the cooling tower system of a petroleum refinery supplied with water reuse for evaluate the efficacy of treatment through data obtained from a full-scale.

D3: Creative Concentrate Management

Room: Denver Ballroom 3

Reshape Inland Concentrate Management Cost Curve using Pretreatment and Electrodialysis Reversal

Charlie He, Carollo Engineers

Ozone, biologically activated filter (BAF) with or without ion exchange pretreatment followed by EDR were demonstrated at pilot scale as cost-effective and energy-efficient alternatives to brine concentrators for inland reclaimed water RO concentrate management. Overall recovery was improved from 85% for the primary RO to 94.5 ~ 98.5%. This approach reshaped the widely accepted cost curves for concentrate management, where typically the total project costs increase exponentially with the increase in recovery.

Innovative Concentrate Reduction Treatment Processes for Chino II Desalter

Brandon Yallaly, Carollo Engineers and Jack Safely, Western Municipal Water District

The Chino II Desalter (Chino II) began operation in 2006 to expand the capacity of the groundwater treatment system with a combined ion exchange (IX) and reverse osmosis (RO) treatment capacity of 10 million gallons per day (MGD). Chino II is managed and operated by the Chino Basin Desalter Authority (CDA). The IX and RO treatment trains in Chino II are used to treat brackish groundwater from eight wells that also have elevated nitrate concentrations. A 6.5-MGD expansion of the Chino II RO capacity has been constructed. However, due in part to the high cost of waste brine disposal, the CDA is evaluating means of maximizing the efficiency of the RO treatment system at Chino II to reduce brine disposal costs and increase permeate production.

The strategy for the Chino II Concentrate Reduction Facility (CRF) involves the use of energy recovery devices (ERD) to recover excess energy from the PRO concentrate ahead of the softening process to offset power use onsite. The heart of the design is a high rate pellet softening to remove the limiting scaling precursors from the primary RO (PRO) concentrate. Seeded calcite precipitation occurs in the fluidized pellet reactors, where hard and durable pellets are generated. The pellets naturally dewater and can be easily transported compared to the thick, wet sludge produced by conventional softening processes. The pellets are a value-added product that can be utilized in a variety of industrial applications, thus converting a waste stream of the Chino II process into a usable commodity.

Barriers and Solutions to Concentrate Management for Inland Municipal Desalination

Robert Raucher, Stratus Consulting

Inland brackish water desal is often the only alternative source of new water supply as traditional fresh water sources become depleted. In addition, desalination offers drought protection as a climate-insensitive supply and, in many situations, better water treatment than possible with more conventional water treatment. This presentation will describe the regulatory barriers to–and potential solutions for–concentrate management (CM), which is the most significant impediment to the expanded application of inland municipal desalination in the U.S.

Innovative Brine Management: Modeling and Assessing Impacts to Water Reuse and POTW's

Christopher Stacklin, Orange County Sanitation District

The Orange County Sanitation District has implemented an innovative brine management program. The program uses a watershed mass balance model to assess existing and future loading in its source water and the impacts to its discharge. Model development, challenges, and mitigative measures of the 3 year program will be shared.

A4: Reuse: Cost Effective Operations–Part 2

Room: Denver Ballroom 1–2

Economics of a Nonpotable Water System

Wayne Lorenz, Wright Water Engineers

Economic planning was performed to compare potable water use to water reuse by a dual pipeline, nonpotable system. A water authority located southeast of Denver Colorado will maximize the use of water supplies using a nonpotable water system and result in a net present worth difference of approximately $24 million.

Dual Use of Scotts Valley's Ocean Outfall for Transmission of Recycled Water to Pasatiempo Golf Club in Santa Cruz County, California

Bahman Sheikh, Water Reuse Consultant and Dana Ripley, Ripley Pacific Company

An existing pipeline, used for the past 30 years to carry secondary effluent from Scotts Valley to an outfall into the Pacific Ocean, will be disinfected and flushed in preparation for dual use for seasonal transmission of disinfected tertiary recycled water to Pasatiempo Golf Course in Santa Cruz, California.

Spot-check Bioassay of a Full-Scale Gravity-Flow Open-Channel Vertical UV System

Pedro DaCruz, Ozonia North America

The focus of this presentation is to detail the findings of a "spot-check" bioassay conducted by Stantec Consulting Services in April 2012 on a full-scale, gravity-flow, open-channel, vertical UV system at the Russian River Treatment Plant in Sonoma County, California.

B4: Reuse: Effective Planning Strategies–Part 2

Room: Denver Ballroom 4–6

Context, Understanding, Acceptance and Research Points the Way Forward

Linda Macpherson, CH2M HILL

Many in the water industry have discovered that presenting scientific and technical information–no matter how well rooted in science and engineering–cannot overcome the stigma of water reuse if the public is first introduced to the subject as a linear progression from wastewater to drinking water, without the contextual understanding about the cyclical, closed-loop nature of water use and reuse in the world today. This important research from the WateReuse Research Foundation suggests that one pathway to acceptance is to create understanding, experiences, and images that are based on a holistic view of water use and reuse–a view that helps people make informed decisions based on a clear, accurate understanding of the many benefits of water reuse.

To Implement Indirect Potable Reuse or a Dual Piping System? A Triple Bottom Line Approach to Finding the Best Use for Reclaimed Water

Richard Humpherys, Carollo Engineers

This presentation will describe a decision tool to assist utility planners in determining the highest and best use of the next available increment of reclaimed water, either for a dual piping system application or for indirect potable reuse. The decision tool uses a triple bottom line approach to evaluating up to six different reclaimed water alternatives. This Excel based decision tool has been tested using a variety of reclaimed water case studies.

Indirect Potable Reuse Concept Study: Rancho California Water District Analyzes Several Options to Achieve Multiple Benefits

Scott Goldman, RMC Water and Environment and Andrew Webster, Rancho California Water District

This presentation will discuss the analysis of several options available to RCWD for Indirect Potable Reuse (IPR) to achieve multiple benefits. Options include sources of recycled water, IPR versus non-potable reuse, multiple brine disposal options, brine minimization technologies, and alternative advanced treatment processes. Each option was analyzed separately, and then combined to identify optimal configurations.

C4: Innovations in Disinfection Technologies–Part 1

Room: Mattie Silks

Reclaimed Water UV Disinfection—Emerging Technologies and Emerging Issues

Andrew Salveson, Carollo Engineers

The UV industry is constantly evolving, with higher intensity, smaller footprint, and increased efficiency systems emerging every year. In parallel, the design and regulatory approach for reclaimed water disinfection is also evolving, with the latest NWRI UV Guidelines in use. This presentation will summarize the convergence of these two issues.

Evaluation of Virus Removal Capabilities of MBR System in a Full Scale Water Reclamation Facility in Nevada

Ufuk Erdal, CH2M HILL

A study was conducted at the Southwest Water Reclamation Facility (SWRF) to determine virus removal capabilities of the MBR system and UV disinfection to develop operating recommendations for MBR and UV disinfection to protect public health and optimize energy and chemical uses.

Ferrate Disinfection of Wastewater Effluent for Wetland Reuse and Rehabilitation

Brady Skaggs, Waldemar S. Nelson and Company

Ferrate disinfection has been evaluated in the laboratory for a chlorine-replacement technology, and is undergoing pilot scale validation in New Orleans, LA. Instead of discharging wastewater to the Mississippi river, New Orleans is evaluating a reuse of discharging ferrate-treated effluent to a freshwater wetland for ecosystem restoration.

D4: Planning Innovation in Desalination

Room: Denver Ballroom 3

Consideration for the Co-Siting of Desalination Facilities with Municipal and Industrial Facilities

Val Frenkel, ARCADIS

This presentation will be based on WateReuse Foundation research report WRF 06-010D that documents the economic, environmental, water supply, water quality, public relation issues and/or other advantages/disadvantages in co-siting new desalination facilities with municipal or industrial operations. It will also compare co-siting to stand alone facilities.

The Phoenix, Beltway Politicians, and Privately Financed Infrastructure Projects, is the Carlsbad Seawater Desalination Project an Omen of Things to Come?

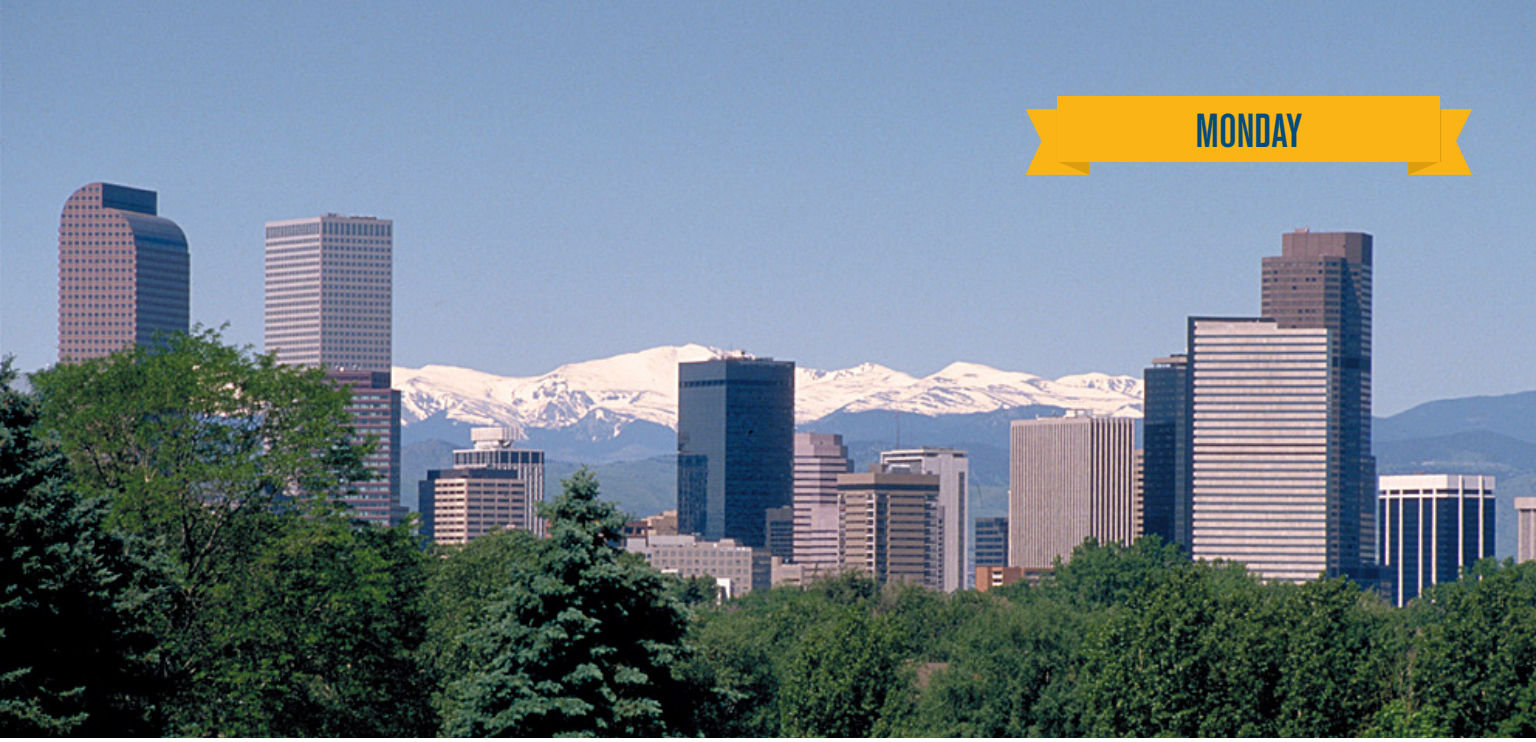
Neil Callahan, SAIC Energy, Environment & Infrastructure

This presentation will describe the current state of the Ps3, project financing industry including pending legislative initiatives to level the playing field for the cost of municipal bonds with private capital. It will provide some insight into business and technical considerations for public agencies considering Ps3. The presentation will also discuss certain aspect of the final project as defined by the executed water purchase agreement, and present the ultimate development and financing of the project. In additional, the presentation will present the technical, business and financial key lessons learned during San Diego County Water Authority's continued commitment to delivering a reliable and drought proof supply of desalinated water for the San Diego region.

Polymer Assisted Forward Osmosis for Desalination and Water Reuse

Xinying Wang, University of Illinois Urbana-Champaign

This presentation will talk about a forward osmosis process that employs a temperature-reversible polymer to recycle the draw solute. This process has potential applications in desalination and water treatment.



A5: Reuse: Cost Effective Operations–Part 3

Room: Denver Ballroom 1–2

High Recovery Reverse Osmosis for Water Reuse at the Kranji NEWater Factory

Richard Stover, Desalitech

An innovative closed circuit reverse osmosis process is being demonstrated at Singapore PUB's Kranji NEWater Water Reclamation Plant. Tertiary treated municipal wastewater is being reclaimed at 90% recovery with a single stage of membrane elements. Additional goals of the demonstration are reduced energy consumption, reduced fouling and cleaning requirements.

Incorporating Advanced Wastewater Treatment for Potable Reuse in Big Spring, Texas

Rob Haas, Trojan Technologies

This presentation will discuss the decision making process leading to the development and construction of the Raw Water Production Facility (RWPF) in Big Spring, Texas as well as details which influenced the decision to pursue potable wastewater reuse to sustain the drinking water supply of the local communities.

A Potable Reuse and Wetlands Improvement Concept for Drought-Challenged El Paso, Texas

Gilbert Trejo, ARCADIS and Carlos Dominguez, El Paso Water Utilities

A decade's long drought challenges El Paso's water supply. This presentation will present a long-term solution that involves potable reuse via multi-barrier advanced treatment technologies. The Rio Bosque potable reuse concept will not only diversify EPWU's water supply portfolio, but also offer additional benefits to the community and the environment.

B5: Reuse: Effective Planning Strategies–Part 3

Room: Denver Ballroom 4–6

Water Reuse in Edmonton, Alberta Canada

Alan Rimer, Black & Veatch

Water reuse in western Canada is a distinct possibility! Modeling of two scenarios (one regional and one localized scenario focused on two large municipal facilities) was the key element of this work. The scale and size of this project (40 industries, consuming about 150 MLD, over an area of 317 square kilometers are believed to be unique among such water reclamation projects.

Solving Water Scarcity Through Public-Private Partnerships

Kelly Lange-Haider, Dow Chemical Company

Using a public private partnership Dow and its partners are twice reusing the community's treated wastewater, in manufacturing and again in cooling towers, thereby using every liter of water three times instead of once. The efforts at this manufacturing site have led to 60,000 tons per year lower carbon dioxide emissions.

Regional Considerations Impact Water Reuse Management Options

Allegra da Silva, CDM Smith

During development of the 2012 EPA Guidelines for Water Reuse, a new chapter was created to highlight the regional considerations in planning and differences in regulatory approach that impact development and demand for reclaimed water. This presentation will examine the regional difference noted in eight geographical regions with evaluation of impacts based on population, land use, precipitation, and existing water use patterns.

C5: Innovations in Disinfection Technologies–Part 2

Room: Mattie Silks

Evaluation of Oxidizing Agents for Disinfecting Oil Refinery Wastewater Aiming Reuse Purposes

Andrea Azevedo Veiga, PETROBRAS

Commercial oxidants effectiveness comparison, alternative to chlorine, aiming oil refinery wastewater disinfection intending reuse; Cost-effective operation evaluation; Commercial disinfectant comparison: performic acid, peracetic acid, H2O2 and ClO2 related to total aerobic heterotrophic bacteria and total coliform in laboratory scale.

D5: Desalination Energy Reduction Technologies

Room: Denver Ballroom 3

Energy Consumption Modeling in Seawater Desalination

Silvana Ghiu, Separation Processes

Large-scale implementation of seawater desalination for augmentation of potable water supplies is receiving increased consideration globally; including specific regions of the U.S. Notably, California, Florida and Texas have projects under development. A significant factor in the implementation of seawater desalination for potable water production is the energy consumption associated with the process, perceived or actual. The presentation of energy consumption values by different entities often suffer from a lack of local real world data and standardization in the calculation methodology, reporting format and transparency with regard to basic process and engineering assumptions. This presentation will summarize the results of a twelve month Tailored Collaboration between Water Research Foundation (WRF) and West Basin Municipal Water District (West Basin). Separation Process (SPI) consulting engineers are the selected contractor and principal investigator for the project which will develop an Excel based energy consumption model together with the guidance and tools to understand and communicate the energy consumption associated with seawater desalination by Reverse Osmosis (RO) process.

Selecting the Best Energy Recovery Device at Reverse Osmosis Treatment Plants

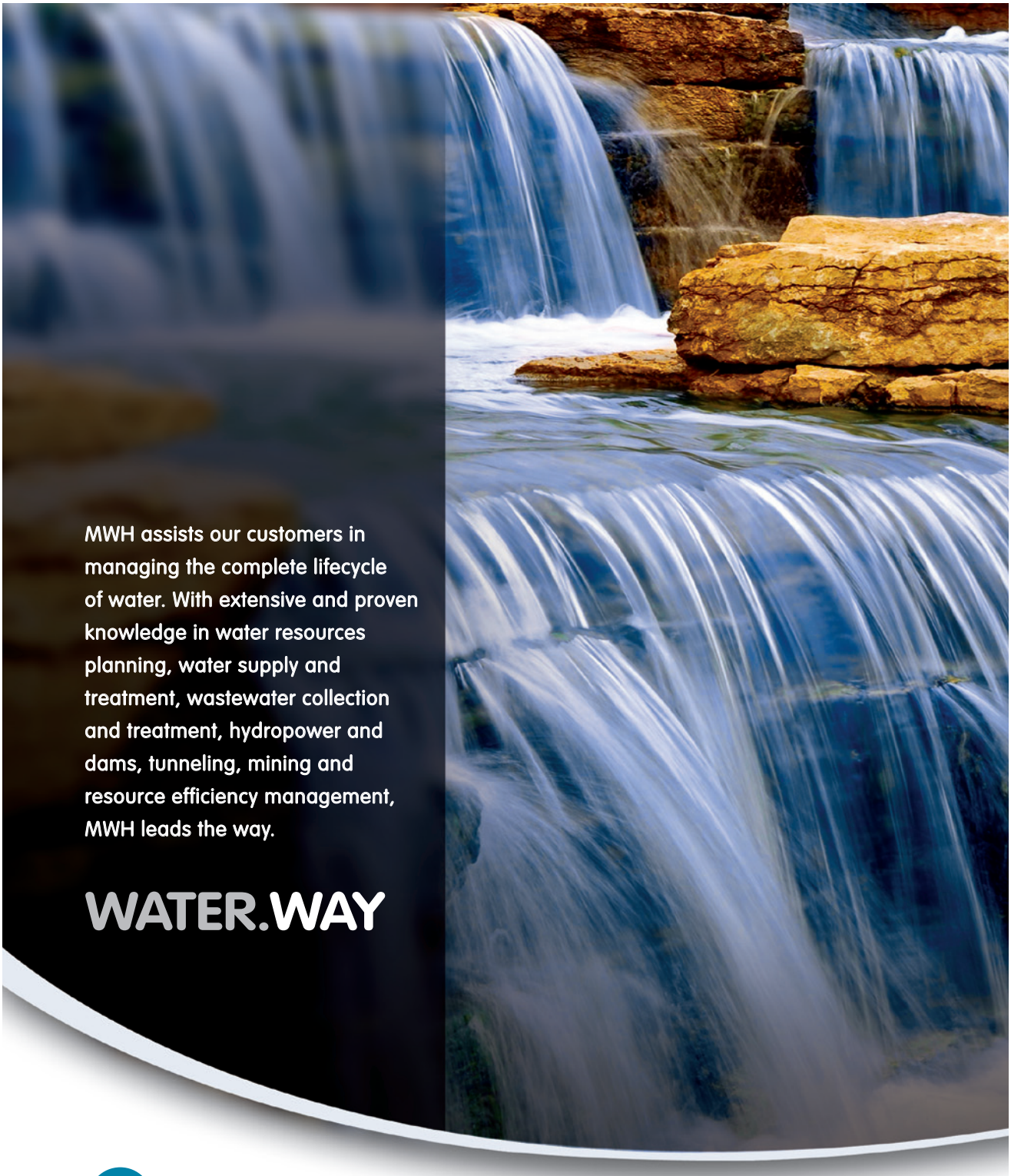
Tyler Nading, CH2M HILL

How do you know if an ERD is cost beneficial for your RO plant? How do you know which ERD to select? This presentation summarizes the different types of ERDs and presents a tool commissioned by WRRF that helps the user select the best ERD for a given RO plant.

Reverse Osmosis: Where We Started and Where We Are Heading To

Val Frenkel, ARCADIS

This presentation will evaluate different components of the energy for desalination, the current status of efficient energy use by each component and what should be the next steps to minimize energy demand for desalination bringing desalination process to the next level.



TUESDAY

TUESDAY, SEPTEMBER 17, 2013

7:00 a.m. – 2:00 p.m.	Registration Open *(Colorado Ballroom Foyer)*			
7:00 a.m. – 3:30 p.m.	Exhibit Hall Open *(Colorado Ballroom A–E)*			
7:00 a.m. – 8:00 a.m.	Continental Breakfast *(Colorado Ballroom A–E)*			
7:00 a.m. – 8:00 a.m.	Graywater Committee Meeting *(Colorado Ballroom H)*			
	A6 Decentralized Reuse–Part 1	**B6** Reuse: Effective Planning Strategies–Part 4	**C6** Coaching the Regulators–Part 1	**D6** Frontiers of Desalination Membrane Technology and Science
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Guy Carpenter, HDR Engineering*	*Mark LeChevallier, American Water*	*Craig Riley, Washington State Department of Health*	*Gary Engstrom, U.S. Water Services*
8:00 a.m. -8:30 a.m.	Assessing the Financial Viability of Decentralized Water Supply Systems: A Sydney Case Study *Shane Tyrrell, GHD*	Oklahoma's Development of the Three R's: A Reuse Regulation Rulebook *Michael Graves, Garver*	Updating Texas Reclaimed Water Regulations by Adopting 2012 EPA Guidelines Best Practices *Don Vandertulip, CDM Smith*	Evaluating Membrane Alternatives for a High Salinity Recycled Water *Greg Wetterau, CDM Smith*
8:30 a.m. – 9:00 a.m.	Decentralized Distribution for Reliable Water Supply *Kalyan Piratla, Clemson University*	Being on the Ground Floor Leading Development of Statewide Reuse Regulations While Implementing City Wide Full Scale Water Reclamation *Kyle Kruger, Garver*	The Delicate Art of Promoting Recycled Water *Lori Anne Dolqueist, Manatt Phelps & Philips, LLP*	Optimizing Recovery of Water and Minerals from Hypersaline Brines using Forward Osmosis and Membrane Distillation *Kerri Hickenbottom, Colorado School of Mines*
9:00 a.m. – 9:30 a.m.	An Overview of Graywater Reuse Regulations and Implementation in Urban Areas *Sybil Sharvelle, Colorado State University*	Recycled Water Takes Flight in California's Central Valley *Dave Richardson, RMC Water and Environment*	Advancing the Use of Reclaimed Water in Oklahoma–Regulatory Successes and Challenges *Ellen McDonald, Alan Plummer Associates*	Towards Sustainability in Seawater Desalination Utilizing the Water Chemical Potential Stored in Wastewater *Andrea Achilli, Humboldt State University*
9:30 a.m. – 10:00 a.m.	San Francisco Public Utilities Commission's Living Machine: 1 Year of Lessons Learned *John Scarpulla, San Francisco Public Utilities Commission*	No Community Is Too Small To Realize Great Benefits from Water Reuse *Charles Jessup and Dan McGraw, City of Meadows Place, TX*	Preparing the First Master Reclamation Permit in the Santa Ana Region *Stephanie Shamblin Gray, HDR Engineering*	Precoat Filtration with Adsorbent Media for Outstanding Fouling Reduction and NOM Removal *Mark Benjamin, University of Washington*
10:00 a.m. – 10:30 a.m.	Networking Break and Raffle *(Colorado Ballroom A–E)*			
10:00 a.m. – 10:30 a.m.	Poster Presentations *(Colorado Ballroom Foyer)*			

TUESDAY

	A7 Decentralized Reuse–Part 2	B7 Panel Discussion: Public-Private Collaboration Creates Resilient Industry	C7 Coaching the Regulators–Part 2	D7 Lowering Your Carbon Footprint
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Guy Carpenter, HDR Engineering*	*Eric Rosenblum, Envirospectives*	*Craig Riley, Washington State Department of Health*	*John Rehring, Carollo Engineers*
10:30 a.m. – 11:00 a.m.	Cost Analysis of Indirect and Direct Reuse with Decentralized Facilities *Gwendolyn Woods, University of Arizona*	*Michael Lesniak, Nalco, an EcoLab Company* *Julie Minton, WateReuse Research Foundation* *Susan Fernandes, U.S. Business Council for Sustainable Development* *Jenny Murray, Denver Water* *Ben Moline, Molson Coors*	Meeting North Carolina's New Microbial Standards for Reclaimed Water *Patricia Drummey Stiegel, Hazen and Sawyer*	Improving MF and RO Membrane Performance with Ozone *Shane Trussell, Trussell Technologies*
11:00 a.m. – 11:30 a.m.	Financial Impact of On-Site Reuse Systems to Municipalities and Private Reuse System Owners *Anni Luck, Hazen and Sawyer*		Auxiliary Water Codes–Taming the Beast *Dan Pedersen, Austin Water*	Getting a Head Start on Reuse: Direct Microfiltration of Primary Effluent *Graham Juby, Carollo Engineers*
11:30 a.m. – 12:00 p.m.	Evaluation of the Energy Footprint of a Decentralized Treatment Facility used for Tailored Urban Water Reuse *Ryan Holloway, Colorado School of Mines*		Environmental Impact Evaluation of Atmospheric Blowoffs from the Durham County, NC Reuse Water System *Joseph Pearce, Durham County*	Purple Makes Green with Title XVI: Water Reuse Comes to Round Rock, Texas *Jason Christensen, HDR Engineering*
12:00 p.m. – 1:30 p.m.	Lunch on Your Own			
12:00 p.m. – 1:30 p.m.	National Legislative Committee Meeting *(Colorado Ballroom G)*			
12:00 p.m. – 1:30 p.m.	Industrial Reuse Committee Meeting *(Colorado Ballroom H)*			
12:00 p.m. – 4:00 p.m.	**Technical Tour:** Aurora Water's Binney Water Treatment Plant *(buses will depart from the 18th and California hotel entrance)*			

	A8 Panel Discussion: Decentralized Reuse	**B8** Linking Reuse and Groundwater–Part 1	**C8** Innovative Reuse Applications	**D8** Direct Potable Reuse
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Bahman Sheikh, Water Reuse Consultant*	*Mark Farrell, Water Resource Associates*	*Bob Reed, Ferrate Treatment Technologies*	*Rick Arber, Hatch Mott MacDonald*
1:30 p.m. – 2:00 p.m.	Policy, Ordinance for Building Scale and District-Scale Applications of Distributed Reuse *Paula Kehoe, San Francisco Public Utilities Commission*	Influences of Ozonation on Soil Aquifer Treatment for Wastewater Reuse *Yugo Takabe, Kyoto University*	Modeling Advanced Treatment Trains for Potable Reuse Applications *Eva Steinle-Darling, Carollo Engineers*	DPR Initiative Update *Dave Smith, WateReuse California*
2:00 p.m. – 2:30 p.m.	Distributed Reuse in California Developments, Subdivisions, and Golf Courses *Dana Ripley, Ripley Pacific Company* Distributed Water Reuse in the Green Building Community *John Bell, Greyter Systems*	Stabling Recycled Water Using NaOH and CaCl2 *Rashanak Aflaki, City of Los Angeles*	Reuse Technology Opportunities for Aquaculture at Decommissioned Wastewater Treatment Facilities Using Reclaimed Water *Rafael Cuevas Uribe, Kentucky State University*	Economic and Environmental Drivers for Direct Potable Reuse *Tom Richardson, RMC Water and Environment*
2:30 p.m. – 3:00 p.m.	Decentralized Water Reuse: Cost and Resilience Benefits *Hwee Hwang, University of Arizona* The Living Machine *John Scarpulla, San Francisco Public Utilities Commission*	Expanding Reuse Availability with Aquifer Storage and Recovery Management *James Dwyer, CH2M HILL and Ed McCarthy, Jackson, Sjoberg, McCarthy & Townsend, LLP*	The Evaluation Of Cloth Media Filtration as Pretreatment to Ultrafiltration In Wastewater Reuse Applications *Dave Holland, Aqua-Aerobic Systems*	Indirect Potable Reuse Alternatives to the California Model–What Else is There? *Bruce Chalmers, CDM Smith*
3:00 p.m. – 3:30 p.m.	Networking Break and Raffle *(Colorado Ballroom A–E)*			
3:00 p.m. – 3:30 p.m.	Poster Presentations *(Colorado Ballroom Foyer)*			

TUESDAY

	A9 Panel Discussion: Reuse in the Food and Beverage Industry	**B9** Linking Reuse and Groundwater–Part 2	**C9** Creative Disposal Options	**D9** Panel Discussion: Public Acceptance of Direct Potable Reuse
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Jon Freedman, GE Water & Process Technologies*	*Mark Farrell, Water Resource Associates*	*Bob Reed, Ferrate Treatment Technologies*	*Mark Millan, Data Instincts, Public Outreach Consultants*
3:30 p.m. – 4:00 p.m.	Advances in Water Use in the Poultry Processing Industry *Gary Engstrom, U.S. Water Services* The Evolution of Potato Processing Water and Solids Reuse in Idaho *Michael Murray, HDR Engineering and Henry Hamanishi, J.R. Simplot Company* Water Reuse in the Brewing Industry *Ben Moline, Molson Coors*	Renewed Interest for an Indirect Reuse Groundwater Replenishment Project *Reymundo Trejo, Upper San Gabriel Municipal Water District and Shane Trussell, Trussell Technologies*	Planning and Development of Alternative and Integrated Water Systems for Highly Urbanized Cities *John Poon, CH2M HILL Australia Pty Ltd*	*Mark Millan, Data Instincts, Public Outreach Consultants* *Eleanor Torres, Orange County Water District* *Linda Macpherson, CH2M HILL* *Marsi Steirer, City of San Diego Public Utilities Department* *Patsy Tennyson, Katz & Associates* *Ron Wildermuth, West Basin Municipal Water District*
4:00 p.m. – 4:30 p.m.		Recharging Groundwater with Reclaimed Water: A Valuable Water Rights Mitigation Strategy *Jeff Hansen, HDR Engineering and Teri O'Neal, City of Lacey*	Reclaimed Water Bulk Filling Stations–Expanding Reclaimed Use to New Areas *Cole Newton, Austin Water Utility*	
4:30 p.m. – 5:00 p.m.		Permitting Potable Reuse in California: A Case Study Based on the Expansion of the Leo J. Vander Lans Water Treatment Facility, Los Angeles County, California *Cathy Chang, Water Replenishment District of Southern California and Greg Wetterau, CDM Smith*	Donald C. Tillman Water Reclamation Plant In-Plant Storage Partnership to Meet Everyone's Needs and Succeed *Al Bazzi, City of Los Angeles*	
5:30 p.m. – 10:00 p.m.	**Dinner and Discovery at the Denver Zoo** (see page 8 for more information)			

A6: Decentralized Reuse–Part 1

Room: Denver Ballroom 1–2

Assessing the Financial Viability of Decentralized Water Supply Systems: A Sydney Case Study

Shane Tyrrell, GHD

How do we account for the legacy of existing water supply systems when assessing the financial viability of decentralized water supply opportunities? This paper will investigate the importance of this question using the City of Sydney Decentralized Water Master Plan (DWMP) as a case study.

Decentralized Distribution for Reliable Water Supply

Kalyan Piratla, Clemson University

This presentation will offer the results from the comparative supply reliability analysis of centralized vs. decentralized systems for a chosen study area in Charleston, SC. Supply reliability models are used to quantify reliability taking into account the infrastructure needs for both centralized and decentralized systems.

An Overview of Graywater Reuse Regulations and Implementation in Urban Areas

Sybil Sharvelle, Colorado State University

Differences in state regulations on graywater reuse and among treatment systems and have left the regulatory community and others confused about what a graywater regulation should include. Graywater reuse is a complex issue and many are unsure of what graywater regulations should include. A Graywater Reuse Database will be demonstrated that links state regulations to commercially available system performance. Also, an overview will be provided on implementation of graywater reuse in the urban environment at varying scales.

San Francisco Public Utilities Commission's Living Machine: 1 Year of Lessons Learned

John Scarpulla, San Francisco Public Utilities Commission

The San Francisco Public Utilities Commission's accelerated the evolution of on-site wastewater reuse by installing an engineered wetland system at its new headquarters. The SFPUC also developed a program allowing and incentivizing the installation of decentralized reuse systems. This presentation will reflect on the first year of operation and management of the system and program.

B6: Reuse: Effective Planning Strategies–Part 4

Room: Denver Ballroom 4–6

Oklahoma's Development of the Three R's: A Reuse Regulation Rulebook

Michael Graves, Garver

This presentation will discuss the process that Oklahoma has recently developed to define and codify a consistent set of non-potable reclaimed water regulations for all utilities to use. It also provides a municipal perspective of the regulatory, technical, and political path forward for development of indirect reuse standards.

Being on the Ground Floor Leading Development of Statewide Reuse Regulations While Implementing City Wide Full Scale Water Reclamation

Kyle Kruger, Garver

The Norman Utilities Authority (NUA) is actively involved in the development of Reuse Regulations for the State of Oklahoma. NUA is also master planning upgrades to their WRF for production of reclaimed water to meet long-term drinking water supply alternatives. This presentation will describe the regulatory and planning process for project implementation.

Recycled Water Takes Flight in California's Central Valley

Dave Richardson, RMC Water and Environment

Two major recycled water projects are being studied in the California Central Valley. To enhance the benefits of these projects, which are aimed at serving agricultural users, providing recycled water to wildlife areas is being evaluated.

No Community Is Too Small To Realize Great Benefits from Water Reuse

Charles Jessup and Dan McGraw, City of Meadows Place, TX

With the City of Meadows Place being contained within only one square mile and having a population of 4,660 people, this reclaimed water lake project demonstrates that no community is too small to utilize reclaimed water and realize tremendous community benefits.

C6: Coaching the Regulators–Part 1

Room: Mattie Silks

Updating Texas Reclaimed Water Regulations by Adopting 2012 EPA Guidelines Best Practices

Don Vandertulip, CDM Smith

One of the most significant current discussions on uses for reclaimed water in many states, including Texas, is the use of reclaimed water for intentional, planned indirect potable reuse and direct potable reuse applications. Texas does not yet have regulations specific to indirect or direct potable reuse but does have several of these projects being permitted through other TCEQ regulations. While new regulations are being considered, lessons learned should be implemented in updated regulations. Suggestions are provided to update Texas regulations.

The Delicate Art of Promoting Recycled Water

Lori Anne Dolqueist, Manatt Phelps & Philips, LLP

Given the fractured nature of water regulation, local, state and federal entities are grappling with how to regulate and encourage the use of recycled water. Involvement in the process of developing policies now can mean the difference between success and failure of recycled water projects in the future.

Advancing the Use of Reclaimed Water in Oklahoma-Regulatory Successes and Challenges

Ellen McDonald, Alan Plummer Associates

The first portion of this presentation will provide an overview of the regulatory framework for water in Oklahoma and the process that occurred to successfully develop the initial nonpotable reuse regulations. Ongoing challenges associated with establishing regulations for indirect potable reuse in the state also will be discussed. The second portion of the presentation will describe efforts of the City of Norman and Central Oklahoma Master Conservancy District (COMCD), who operates and maintains the City's raw surface water supply, to pursue the development of both nonpotable and indirect potable reuse projects that would benefit the City and the Conservancy District. Specific regulatory challenges associated with these efforts will be described.

Preparing the First Master Reclamation Permit in the Santa Ana Region

Stephanie Shamblin Gray, HDR Engineering

The Riverside Public Utilities Department is the first to apply for a Master Reclamation Permit (MRP) in the Santa Ana Region. Without a precedent, diligent coordination between RPU and the California Regional Water Quality Control Board (Regional Board) in determining MRP requirements was critical.

D6: Frontiers of Desalination Membrane Technology and Science

Room: Denver Ballroom 3

Evaluating Membrane Alternatives for a High Salinity Recycled Water

Greg Wetterau, CDM Smith

This presentation will describe the evaluation conducted by Santa Barbara to determine the most appropriate upgrades to address high turbidities and salinity in their recycled water. Analyses concluded that membrane technologies provide the most benefit to reduce turbidity, while an accelerated pipe repair program may be more beneficial for salinity control.

Optimizing Recovery of Water and Minerals from Hypersaline Brines using Forward Osmosis and Membrane Distillation

Kerri Hickenbottom, Colorado School of Mines

Membrane distillation and forward osmosis were evaluated for desalination and concentration of hypersaline brines (~150,000 mg/L-TDS!). Novel operating techniques prevented membrane scaling, eliminated chemical-based membrane cleaning, and subsequently sustained high water fluxes, salt rejection, and membrane integrity. A system model was developed to optimize water production and reduce energy demand.

Towards Sustainability in Seawater Desalination Utilizing the Water Chemical Potential Stored in Wastewater

Andrea Achilli, Humboldt State University

A novel hybrid desalination process called RO-PRO desalination, utilizes seawater RO that in combination with pressure-retarded osmosis (PRO) achieves water desalination at lower energy expenditure. In the system, treated wastewater, or another source of impaired water, is used as an energy source that is manifested during mixing with concentrated brine before ultimate discharge of the mixture back into the ocean.

Precoat Filtration with Adsorbent Media for Outstanding Fouling Reduction and NOM Removal

Mark Benjamin, University of Washington

Precoat filtration using a granular aluminum oxide can continuously achieve 70–80% UV removal while almost eliminating fouling of downstream MF membranes. This presentation will report on the application of the process as a pretreatment for RO.

A7: Decentralized Reuse–Part 2

Room: Denver Ballroom 1–2

Cost Analysis of Indirect and Direct Reuse with Decentralized Facilities

Gwendolyn Woods, University of Arizona

Economic and environmental costs of direct nonpotable, indirect potable, and direct potable reuse were considered for a variety of conditions to determine the effects of slope, service area size, transmission grid size, population density, and distance to reclamation facility on the costs and benefits of distributed wastewater treatment capacity for water reclamation and reuse.

Financial Impact of On-Site Reuse Systems to Municipalities and Private Reuse System Owners

Anni Luck, Hazen and Sawyer

This presentation will review a systematic approach used to evaluate the impact of private on-site reuse systems on a municipality's operating cost and revenue streams due to changes in potable water demand and treatment costs, as well as operational costs at wastewater conveyance and treatment facilities.

Evaluation of the Energy Footprint of a Decentralized Treatment Facility used for Tailored Urban Water Reuse

Ryan Holloway, Colorado School of Mines

An energy analysis and optimization tool developed for a a decentralized sequencing batch membrane bioreactor designed for water reuse will be presented.

B7: Panel Discussion: Public-Private Collaboration Creates Resilient Industry

Room: Denver Ballroom 4–6

Michael Lesniak, Nalco, an EcoLab Company
Julie Minton, WateReuse Research Foundation
Susan Fernandes, U.S. Business Council for Sustainable Development
Jenny Murray, Denver Water
Ben Moline, Molson Coors

This panel of business, technology and utility experts will address the critical topic of sustainable industrial water use. Some of the questions to be considered include:

- What motivates a company to invest in water reuse?
- How have advances in technology helped industry overcome the challenges involved in reusing industrial water or changing from a potable to a nonpotable supply?
- What can utilities do to encourage their industrial customers to use treated effluent in their manufacturing and cooling processes?

The format of this session will offer attendees the opportunity to interact with the panel for a productive discussion about industrial water reuse problems and solutions.

Produced and moderated by the WateReuse Industrial Reuse Committee, this session offers a preview of many of the issues to be covered at the upcoming Industrial Reuse Conference to be held December 9-10, 2013 in Long Beach, CA. For more information, go towww.watereuse.org/conferences/industrial-reuse.

C7: Coaching the Regulators–Part 2

Room: Mattie Silks

Meeting North Carolina's New Microbial Standards for Reclaimed Water

Patricia Drummey Stiegel, Hazen and Sawyer

New reclaimed water rules in North Carolina established a higher class of reclaimed water subject to microbial standards for coliphage and Clostridium perfringens in addition to E. coli. This presentation will review published studies and new data on coliphage and C. perfringens concentrations in reclaimed water and removal in treatment plants.

Auxiliary Water Codes—Taming the Beast
Dan Pedersen, Austin Water

Austin Water is using a consultant to revise numerous and conflicting codes in order to promote reclaimed water (and other auxiliary water) use while maintaining adequate public health protection.

Environmental Impact Evaluation of Atmospheric Blowoffs from the Durham County, NC Reuse Water System
Joseph Pearce, Durham County

Atmospheric reuse water blow-offs concerned North Carolina regulators and resulted in "innovative" permit requirements. These innovative permit requirements included specialized de-chlorination systems and nutrient discharge tracking. This presentation will discuss our findings from the first eighteen months of system operation, and the minimal environmental impacts from these blow-offs.

D7: Lowering Your Carbon Footprint
Room: Denver Ballroom 3

Improving MF and RO Membrane Performance with Ozone
Shane Trussell, Trussell Technologies

Two recent pilot-scale studies have demonstrated the potential benefits of preozonation on the performance of membrane processes that are treating wastewater effluents. This presentation will highlight the results of using ozone pretreatment on MF and RO membrane performance.

Getting a Head Start on Reuse: Direct Microfiltration of Primary Effluent
Graham Juby, Carollo Engineers

Producing high quality reuse water without using activated sludge would reduce costs and save energy. The first step in achieving this is direct microfiltration of primary effluent. This presentation will describe 8-months of direct microfiltration pilot testing using a full-scale microfiltration module at Treatment Plant #2 in Corona, CA.

Purple Makes Green with Title XVI: Water Reuse Comes to Round Rock, Texas
Jason Christensen, HDR Engineering

This presentation will focus on the sustainability aspects of the new City of Round Rock water reuse system from the perspectives of 1) reducing demand on the City's limited potable water supply and 2) energy reduction. The presentation will also discuss cost savings resulting from water reuse and the Federal Title XVI cost-share grant program for construction of reuse projects.

A8: Panel Discussion: Decentralized Reuse
Room: Denver Ballroom 1–2

Policy, Ordinance for Building Scale and District-Scale Applications of Distributed Reuse
Paula Kehoe, San Francisco Public Utilities Commission

Distributed Reuse in California Developments, Subdivisions, and Golf Courses
Dana Ripley, Ripley Pacific Company

Distributed Water Reuse in the Green Building Community
John Bell, Greyter Systems

Decentralized Water Reuse: Cost and Resilience Benefits
Hwee Hwang, University of Arizona

The Living Machine
John Scarpulla, San Francisco Public Utilities Commission

This session will present five different perspectives on decentralized water reuse systems in different settings–ranging from development-wide to district-scale to single-family dwellings; spanning the gamut from graywater to rainwater to recycled water. Geographic diversity will be provided from California, Arizona, and Colorado, with a sprinkling of international insight. The session will provide opportunities for the audience to interact with the presenters in a less formal setting than the usual podium sessions. The moderator will pose specific questions to the speakers to stimulate in-depth exploration of issues surrounding decentralized water reuse.

B8: Linking Reuse and Groundwater–Part 1

Room: Denver Ballroom 4–6

Influences of Ozonation on Soil Aquifer Treatment for Wastewater Reuse

Yugo Takabe, Kyoto University

Influences of ozonation after the biological treatment in WWTP on soil aquifer treatment were evaluated from the view point of disinfection by-products and ozonation by-products in order to establish water reuse system which is based on advanced risk assessment with low energy and low cost.

Stabling Recycled Water Using NaOH and CaCl2

Rashanak Aflaki, City of Los Angeles

The County of Los Angeles using recycled water to prevent seawater intrusion and replenish groundwater imposed a Langelier Saturation Index (LSI) limit on the recycled water to protect its distribution and injection systems. The quarterly average limit of LSI was set to between -0.5 and 0.5. Preliminary data indicated that the Plant was not able to meet the LSI limit by increasing the lime dosage, due to its adverse impact on turbidity. Increasing the lime dosage resulted in an increase in the recycled water turbidity beyond the limit of 0.2 NTU.

After extensive study and lab experiments, a few alternatives were chosen and examined. Capital costs, O&M costs, reliability, and technical feasibility were taken into consideration in choosing the best alternative. After careful comparison, the Plant decided to perform a full scale pilot test using a combination of calcium chloride and sodium hydroxide. This alternative was the most attractive since the Plant frequently had difficulty keeping a stable recycled water turbidity using the lime slurry system. Since both sodium hydroxide and calcium chloride are highly soluble, they do not affect the turbidity as the powder lime does. This alternative can also eliminate operational and maintenance problems. associated with the lime system. In addition, the capital and O&M costs of this system in comparison with other alternatives are more favorable.

Expanding Reuse Availability with Aquifer Storage and Recovery Management

James Dwyer, CH2M HILL and Ed McCarthy, Jackson, Sjoberg, McCarthy & Townsend, LLP

Aquifer storage and recovery (ASR) has been used as an alternative to surface impoundments in Florida since 2008. This presentation will summarize regulatory and technical challenges to implementation of reuse ASR in Texas, along with suggestions for regulatory exceptions to enable great reliance on reuse in Texas.

C8: Innovative Reuse Applications

Room: Mattie Silks

Modeling Advanced Treatment Trains for Potable Reuse Applications

Eva Steinle-Darling, Carollo Engineers

WateReuse Research Foundation Study No. 11-02, Equivalency of Advanced Treatment Trains for Potable Reuse, aims to support the evolution from IPR to DPR by assessing the effectiveness of advanced treatment trains in removing microbial and chemical contaminants that are or may become a concern with respect to drinking water quality.

Reuse Technology Opportunities for Aquaculture at Decommissioned Wastewater Treatment Facilities Using Reclaimed Water

Rafael Cuevas Uribe, Kentucky State University

The goal of this project is to develop a safe and sustainable water supply for aquaculture using reclaimed water. Initial research of raising juvenile paddlefish, hybrid striped bass and catfish as stocker fish have shown promising results using sustainable resources such as decommissioned tanks, reclaimed water and Daphnia from clarifier tanks.

The Evaluation Of Cloth Media Filtration as Pretreatment to Ultrafiltration In Wastewater Reuse Applications

Dave Holland, Aqua-Aerobic Systems

As requirements for wastewater reuse quality are increasingly difficult across the United States, conventional tertiary filtration is often unable to deliver the required performance and reliability necessary to meet new objectives. As a result, tertiary filtration is often supplemented or replaced with microfiltration (MF) or ultrafiltration (UF) membranes in the technology selection process.

D8: Direct Potable Reuse

Room: Denver Ballroom 3

DPR Initiative Update

Dave Smith, WateReuse California

The State of California has established a goal for additional water recycling that can only be met by expanding potable reuse. Groundwater recharge with recycled water is allowed in California and draft regulations for reservoir augmentation are being prepared by regulatory authorities (collectively considered indirect potable reuse). Direct potable reuse (DPR) involves introduction of advanced treated purified recycled water into the raw water upstream of a drinking water treatment plant or the potable water distribution system. WateReuse California sponsored legislation enacted in 2010 to require regulatory authorities to evaluate the feasibility of DPR.

Economic and Environmental Drivers for Direct Potable Reuse

Tom Richardson, RMC Water and Environment

Several agencies in California are establishing long term strategies to maximize recycled water as they develop sustainable pathways. Thanks to the evolution of regulations for indirect potable reuse and the prompt by SB 918, direct potable reuse (DPR) has come to the fore in long-range planning. As the regulatory discussion regarding DPR evolves, the potential economic and environmental benefits of DPR become clearer.

Indirect Potable Reuse Alternatives to the California Model—What Else is There?

Bruce Chalmers, CDM Smith

The California Model using MF/RO/UV-AOP, or full advanced treatment (FAT) has become the standard in the industry for IPR. Highly reliable but less expensive alternatives to FAT continue to be investigated. The feasibility of ozone-BAC, nanofiltration, and EDR will be summarized and compared to FAT.

A9: Panel Discussion: Reuse in the Food and Beverage Industry

Room: Denver Ballroom 1–2

Advances in Water Use in the Poultry Processing Industry

Gary Engstrom, U.S. Water Services

The Evolution of Potato Processing Water and Solids Reuse in Idaho

Michael Murray, HDR Engineering and Henry Hamanishi, J.R. Simplot Company

Water Reuse in the Brewing Industry

Ben Moline, Molson Coors

One of the most water-intensive industrial sectors, the food and beverage industry has made great strides in reducing their overall water demand through onsite treatment and reuse as well as the use of recycled water for appropriate purposes. Presentations in this panel will examine innovations in water use and reuse in the poultry, potato processing and brewing industries.

B9: Linking Reuse and Groundwater–Part 2

Room: Denver Ballroom 4–6

Renewed Interest for an Indirect Reuse Groundwater Replenishment Project

Reymundo Trejo, Upper San Gabriel Municipal Water District and Shane Trussell, Trussell Technologies

This presentation will describe past efforts to supplement water demands in the San Gabriel Valley with recycled water, reasons for the renewed interest in recycled water, the proposed approach to meet regulatory goals, and pilot testing of an advanced treatment system to address public perception and demonstrate regulatory compliance.

Recharging Groundwater with Reclaimed Water: A Valuable Water Rights Mitigation Strategy

Jeff Hansen, HDR Engineering and Teri O'Neal, City of Lacey

The Cities of Lacey and Olympia, Washington are constructing a subsurface infiltration facility at an existing park site that will recharge area groundwater with reclaimed water to provide in-kind mitigation of impacts associated with exercise of future water rights, and provide public education in a multi-use urban setting.

Permitting Potable Reuse in California: A Case Study Based on the Expansion of the Leo J. Vander Lans Water Treatment Facility, Los Angeles County, California

Cathy Chang, Water Replenishment District of Southern California and Greg Wetterau, CDM Smith

Using a case study based on a groundwater recharge project using recycled water in Los Angeles County, California, this presentation will assess the overall effectiveness of the current regulations in California in encouraging the use of recycled water and streamlining the permitting of groundwater recharge projects using recycled water.

C9: Creative Disposal Options

Room: Mattie Silks

Planning and Development of Alternative and Integrated Water Systems for Highly Urbanized Cities

John Poon, CH2M HILL Australia Pty Ltd

New water sources like recycled water embodies the philosophy of integrated water management, offer cities of the Asian Century the opportunity to resolve their water supply shortfalls. Examples of how three cities from Singapore to India are using major water reuse projects and the technical and planning challenges are outlined.

Reclaimed Water Bulk Filling Stations—Expanding Reclaimed Use to New Areas

Cole Newton, Austin Water Utility

Austin Texas continues to grow its reclaimed system and expand its uses for reclaimed water. Austin Water is implementing a plan to install bulk-water filling stations on their reclaimed system. This presentation will outline the thought process to install these facilities and the results experienced by the two stations installed.

Donald C. Tillman Water Reclamation Plant In-Plant Storage Partnership to Meet Everyone's Needs and Succeed

Al Bazzi, City of Los Angeles

DCTWRP In-Plant Storage project constructed two concrete lined storage basins providing additional 15.2 million gallons (mgd) temporary storage for primary effluent, fill and draw control system and no treatment. Historically, City of Los Angeles wastewater projects have mostly employed the design-bid-build project delivery model, which entails two parts which entails two parts - one with Bureau of Engineering or an engineering firm to design the project, and another with a construction company to build it as designed. This presentation will discuss the design, reasons why design-build vehicle was selected, project turnaround schedule and the reasons why this design-build project delivery works so well down to a bit at give-and-take and compromise.

D9: Panel Discussion: Public Acceptance of Direct Potable Reuse

Room: Denver Ballroom 3

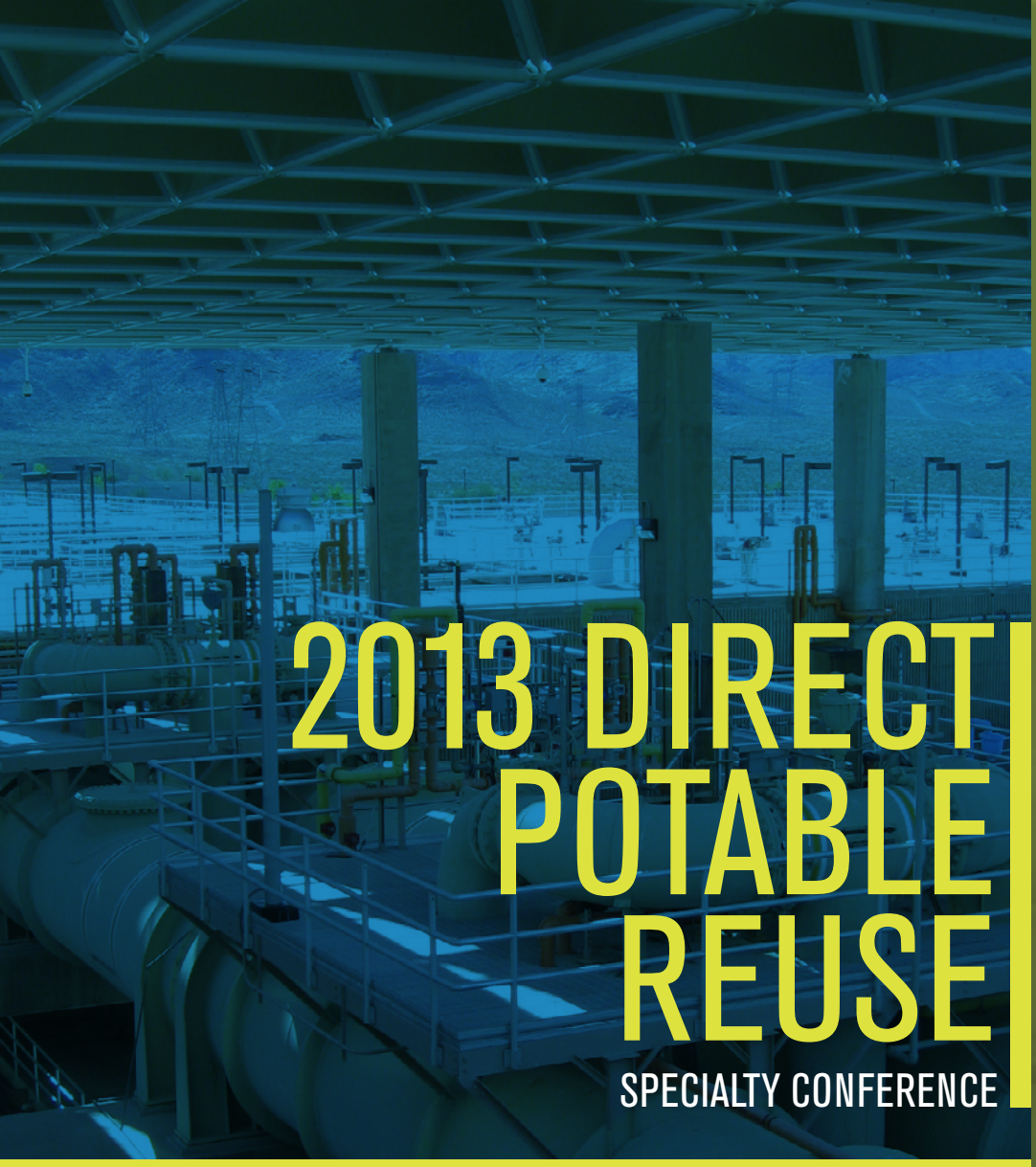
Mark Millan, Data Instincts, Public Outreach Consultants
Eleanor Torres, Orange County Water District
Linda Macpherson, CH2M HILL
Marsi Steirer, City of San Diego Public Utilities Department
Patsy Tennyson, Katz & Associates
Ron Wildermuth, West Basin Municipal Water District

Since recycled water was first introduced, it has faced challenges regarding how to communicate its safe use to the public. In this session you will hear from some of the industry's most experienced communication practitioners who have been, or are currently involved, in studies and projects.

Among the perceived health risks for recycled water projects is the presence of trace concentrations of PPCPs that can be detected in treated wastewater and in drinking water too. The ability for scientists to detect chemicals at very low levels has outpaced the ability to completely remove them or even fully understand their significance when present, and assess actual risk. This has led to an increased public awareness and concern via regional and national news reports of the presence of chemicals in our environment.

Stakeholder's concerns increase as more communities consider indirect and direct potable uses. New treatment train concepts are on the horizon that will likely incorporate "real-time" monitoring systems to help ease public and regulator concerns for health, safety and reduction of environmental impacts.

Effective communication regarding safety and reliability of recycled water quality provided by treatment technologies and monitoring techniques is perhaps the greatest challenge we face in the coming years as we strive to build trust in these systems and the organizations that will operate them.



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WEDNESDAY

WEDNESDAY

WEDNESDAY, SEPTEMBER 18, 2013

7:30 a.m. – 9:00 a.m.	Registration Open *(Colorado Ballroom Foyer)*			
7:30 a.m. – 9:00 a.m.	**Breakfast Panel Discussion:** National Legislative and Water Policy Outlook *(Colorado Ballroom A–E)*			
	A10 Do Microconstituents Matter?	**B10** Reuse: Effective Planning Strategies–Part 5	**C10** Successful Urban Reuse Retrofits	**D10** Improving Sustainability
Room	*Denver Ballroom 1–2*	*Denver Ballroom 4–6*	*Mattie Silks*	*Denver Ballroom 3*
Moderator	*Alan Rimer, Black & Veatch*	*Tim Thomure, HDR Engineering*	*Randy Brown, City of Pompano Beach Utilities*	*Cynthia Lane, American Water Works Association*
9:00 a.m. – 9:30 a.m.	Bioaccumulation of Perfluoroalkyl Acids in Edible Crops via Reclaimed Water *Andrea Blaine, Colorado School of Mines*	CII Water Use Patterns, Reliability Values, and Roles for Reuse *Robert Raucher, Stratus Consulting*	Just this Once?–Is a Slippery Slope *Rick Fell, Jacobs Engineering Group*	The Cost of Over-Treating Reclaimed Water: A Triple Bottom Line Evaluation of Potable and Non-Potable Reuse Treatment Schemes *Larry Schimmoller, CH2M HILL*
9:30 a.m. – 10:00 a.m.	Detection of Unknown Nitroso- Disinfection By-Products in Reclaimed Waters by a Novel Total Organic Nitrosamine Assay *Rebecca Trenholm, Southern Nevada Water Authority*	Examples of Industrial-Water Recycling and Beneficial Uses in Colorado *Gary Beers, Industrial Water Permitting and Recycling Consultants and Charles Johnson, Colorado Department of Public Health and Environment*	But Utilities Can't Do That!–the Start of I Can Water *Maria Loucraft, City of Pompano Beach Utilities*	Repurposing Water-Fast Track Design and Construction for a Sustainable Power Plant Water Supply *Lee Tharps, CH2M HILL*
10:00 a.m. – 10:30 a.m.	Formation of Targeted Nitrosamines during Ozonation of Reclaimed Waters: Implications for Potable Reuse *Eric Dickenson, Southern Nevada Water Authority*	Pairing Recycled Water and Regional Collaboration for a Diverse Water Portfolio *Andria Loutsch, CDM Smith and Kevin Booker, Sonoma County Water Agency*	Privately Financed Sewer Mining for Urban Reuse *Will Kirksey, Living Machine Systems*	A Novel Forward Osmosis MBR Operated for Potable Reuse and Nutrient Recovery *Ryan Holloway, Colorado School of Mines*
10:30 a.m. – 11:00 a.m.	Advisory Groups, Surveys, and Other Adventures in Community Dialogue: Groundwater Recharge and Compounds of Potential Concern *Lisa Dennis-Perez, LOTT Clean Water Alliance, Jeff Hansen, HDR Engineering, and Patsy Tennyson, Katz & Associates*	Best Management Practices to Protect Reclaimed Water Quality Following Storage and Distribution *Patrick Jjemba, American Water*	Beyond Irrigation: Approaches to Identify and Serve Industrial Customers *Kraig Erickson, RMC Water and Environment*	Evaluation of a New Cloth Filter Performance in a Short SRT Activated Sludge Plant *Ufuk Erdall, CH2M HILL*
11:00 a.m. – 12:30 p.m.	**Closing Plenary Session–**Water Reuse: To Infinity and Beyond *(Colorado Ballroom A–E)*			

A10: Do Microconstituents Matter?

Room: Denver Ballroom 1–2

Bioaccumulation of Perfluoroalkyl Acids in Edible Crops via Reclaimed Water

Andrea Blaine, Colorado School of Mines

This study examined the potential for bioaccumulation of perfluoroalkyl acids (PFAAs) into lettuce and strawberries irrigated with reclaimed water. Many PFAAs persist through wastewater treatment processes and are environmentally persistent, bioaccumulative, and toxic. Consequently, concerns have arisen about the potential bioaccumulation of PFAAs into food crops irrigated with reclaimed water.

Detection of Unknown Nitroso- Disinfection By-Products in Reclaimed Waters by a Novel Total Organic Nitrosamine Assay

Rebecca Trenholm, Southern Nevada Water Authority

Nitrosamines have been shown to be formed during oxidative treatment processes. Additional unknown nitroso-containing disinfection by-products (DBPs) may also be formed. Various treated wastewater samples were analyzed for targeted nitrosamine and non-targeted total organic nitrosamine (TONO) analysis in order to identify the formation of unknown nitroso- containing DBPs.

Formation of Targeted Nitrosamines during Ozonation of Reclaimed Waters: Implications for Potable Reuse

Eric Dickenson, Southern Nevada Water Authority

This presentation will discuss whether the formation of nitrosamines in water reuse applications using ozonation could be a serious concern and highlight useful mitigation strategies.

Advisory Groups, Surveys, and Other Adventures in Community Dialogue: Groundwater Recharge and Compounds of Potential Concern

Lisa Dennis-Perez, LOTT Clean Water Alliance, Jeff Hansen, HDR Engineering, and Patsy Tennyson, Katz & Associates

The LOTT Clean Water Alliance is using a Community Advisory Group, telephone surveys, and interviews of key stakeholders to engage the local community in a dialogue regarding reclaimed water and compounds of potential concern as the first step in a scientific study of groundwater recharge with reclaimed water.

B10: Reuse: Effective Planning Strategies–Part 5

Room: Denver Ballroom 4–6

CII Water Use Patterns, Reliability Values, and Roles for Reuse

Robert Raucher, Stratus Consulting

This presentation will describe a nearly completed WateReuse Research Foundation project (WRF-09-04) that describes and estimates the levels and patterns of CII water use, and examines the value of water supply reliability to key components of the CII sector. It will also explore reuse opportunities in the CII sectors.

Examples of Industrial-Water Recycling and Beneficial Uses in Colorado

Gary Beers, Industrial Water Permitting and Recycling Consultants and Charles Johnson, Colorado Department of Public Health and Environment

Under Colorado's regulations for Solid Waste Sites and Facilities, industrial waters can be identified as recyclable materials for a recycling facility and for beneficial uses. The criteria for approval can include use as a substitute for a commercial product or raw material. Innovative beneficial uses are profiled and discussed.

Pairing Recycled Water and Regional Collaboration for a Diverse Water Portfolio

Andria Loutsch, CDM Smith and Kevin Booker, Sonoma County Water Agency

The North Bay Water Reuse Program addresses the challenges of a regional water reuse strategy to alleviate critical water supply issues and reduce demands on potable water while providing a sustainable long-term supply of water for urban, agricultural, and environmental uses.

Best Management Practices to Protect Reclaimed Water Quality Following Storage and Distribution

Patrick Jjemba, American Water

Employing advanced treatment technologies helps produce high quality reclaimed water; however, storage or conveyance can lead to quality deterioration. To ensure customers have a positive experience with reclaimed water usage, utilities should adopt Best Management Practices (BMPs). Methods used to prioritize 14 key areas for BMP development will be discussed.

C10: Successful Urban Reuse Retrofits

Room: Mattie Silks

Just this Once?—Is a Slippery Slope

Rick Fell, Jacobs Engineering Group

Denver Water has completed a strategic, urban expansion of their recycled water program—adding considerable annual demand in the vicinity of Denver's Montbello neighborhood. The expansion benefitted from an established collection of design and construction standards, which guided it to a successful completion.

But Utilities Can't Do That!—the Start of I Can Water

Maria Loucraft, City of Pompano Beach Utilities

The City of Pompano Beach struggled for years in convincing single family residential customers to connect to the reuse system. It was not until the Utilities Department developed a connection program doing "things it could not do" that the program took off. With 448 connections in under 18 months, the program is a proven model for built-out urban residential connections.

Privately Financed Sewer Mining for Urban Reuse

Will Kirksey, Living Machine Systems

Capital and technology provided by the private sector can tap the water in municipal sewers for reuse, offering triple bottom line sustainability. Case studies of innovative partnerships using decentralized, ecological treatment demonstrate how a shared savings business model creates viable options for municipalities and their customers to regenerate infrastructure.

Beyond Irrigation: Approaches to Identify and Serve Industrial Customers

Kraig Erickson, RMC Water and Environment

This presentation will describe potential methods to identify potential industrial customers and issues to address to successfully sign up the customer. The discussion includes technologies used in various industrial applications, water quality considerations, case studies of existing industries using recycled water, potential concerns and steps to implement conversion at industrial facilities.

D10: Improving Sustainability

Room: Denver Ballroom 3

The Cost of Over-Treating Reclaimed Water: A Triple Bottom Line Evaluation of Potable and Non-Potable Reuse Treatment Schemes

Larry Schimmoller, CH2M HILL

This presentation will use an extensive TBL framework to compare the sustainability of water reuse treatment train alternatives. A potable reuse scenario compares an MF-RO-UVAOP treatment process to an ozone-BAC-GAC-UV process. A non-potable reuse scenario compares a tertiary filtration approach to an RO-based approach. TBL benefits and costs are presented.

Repurposing Water- Fast Track Design and Construction for a Sustainable Power Plant Water Supply

Lee Tharps, CH2M HILL

Power plants require significant quantities of water to operate. However this stresses available supplies. This presentation will discuss a case study of a 650 MW gas-fired power plant in New Jersey and its use of secondary treated wastewater for process and cooling water needs.

A Novel Forward Osmosis MBR Operated for Potable Reuse and Nutrient Recovery

Ryan Holloway, Colorado School of Mines

A novel hybrid osmotic MBR was pilot tested for over 6000 hours with domestic wastewater feed. Potable and non potable water are produced simultaneously. For more than 5 moths of continuous operation the system has shown constant water flux without membrane cleaning and very high product water quality.

Evaluation of a New Cloth Filter Performance in a Short SRT Activated Sludge Plant

Ufuk Erdal, CH2M HILL

In this study, performance of a new cloth filter was pilot tested for filtering secondary effluent from a short solids retention time activated sludge plant. Without chemical addition, the cloth filter fully satisfied Title 22 recycled water criteria for turbidity (i.e., <2 NTU) at filtration rates between 3.5 and 7.0 gpm/sf.

INDUSTRY NOVELTY POSTER SESSIONS

Sunday 3:00 p.m. – 3:30 p.m.

Monday 9:45 a.m. – 10:15 a.m.
3:00 p.m. – 3:30 p.m.

Tuesday 10:00 a.m. – 10:30 a.m.
3:00 p.m. – 3:30 p.m.

- A Novel Biocatalytic Nitrogen Removal Technology
  Fatemeh Shirazi, Microvi Biotech
- Aluminum Silicate Formation in Membrane Separation Processes: Facts vs. Mythis
  Mo Malki, American Water Chemicals
- Applying Molecular Tools for Microbial Source Tracking in the Duck Creek Watershed
  Vikram Kapoor, University of Cincinnati
- Chile's Experience Developing a Recycled Water Program
  Mary Grace Pawson, GHD
- Cost Effective Feasibility Investigation of Natural Subsurface Reuse Treatment Systems
  Dave Colvin, Leonard Rice Engineers
- Environmental Discourses in Borana Oromo: A Focus on Narratives
  Teshome Tafesse, Addis Ababa University
- Greywater Management in the Czech Republic
  Adam Bartonik, ASIO, spol. s r.o.
- Greywater Reuse in Saudi Arabia: Current Situation and Future Potential
  A.O. Al-Jasser, College of Engineering. King Saud University
- Investigation of Pathogen Disinfection and Regrowth in a Graywater Reuse Treatment System for Toilet Flushing
  Kristen Wiles, Colorado State University
- Monitoring Microbial Water Quality via Online Sensors
  Samendra Sherchan, University of Arizona
- Monitoring the Microbiota Present in Reactor Supplied with Reuse Water Treated with Ultrasound
  Vera Lucia dos santos, Federal University of Minas Gerais
- New RO Membane Technology to Decrease Operating Expenses
  Katariina Majamaa, Dow Water & Process Solutions
- P-VES Process
  Frank Passarelli, Water Desalination International
- Thermochemical Conversion Processes to Recover Energy from Biosolids in Decentralized Water Reclamation Facilities
  Dotti Ramey, Colorado School of Mines
- Water Indirect Reuse
  Simon Takawira Muserere, Harare Municipality

Industry Novelty Poster Sessions

A Novel Biocatalytic Nitrogen Removal Technology
Fatemeh Shirazi, Microvi Biotech

A novel biocatalytic technology for domestic wastewater treatment and reuse applications can remove ammonia and nitrate with an HRT of less than 3 hours. A treatment system incorporating this technology would be less than 1/4th the size of a conventional process train achieving equivalent treatment, leading to substantial cost reductions.

Aluminum Silicate Formation in Membrane Separation Processes: Facts vs. Mythis
Mo Malki, American Water Chemicals

This poster will investigate the types of silica fouling that would occur in the presence of aluminum carryover from coagulant dosing, and evaluates multiple types of antiscalants to determine if such fouling can be prevented.

Applying Molecular Tools for Microbial Source Tracking in the Duck Creek Watershed
Vikram Kapoor, University of Cincinnati

The primary goal of this research is to identify universal, human, bovine, and canine associated Bacteroides in Duck Creek and to understand spatial and temporal patterns of these fecal indicator organisms. This input map, along with tests for human pathogens like E. Coli O157:H7, have been used to assess the risk of CSO inputs into the Duck Creek watershed.

Chile's Experience Developing a Recycled Water Program
Mary Grace Pawson, GHD

Chile is a country that offers unique challenges for water resource planners and engineers. While the concept of recycled water projects providing benefits to both water supply and wastewater disposal needs is not new in the US the concept is still emerging in Chile. This approach is being applied to one of Chile's largest city's, Antofagasta where a feasibility study is being conducted to develop a new recycled water program in Antofagasta.

Cost Effective Feasibility Investigation of Natural Subsurface Reuse Treatment Systems
Dave Colvin, Leonard Rice Engineers

Riverbank filtration and soil aquifer treatment are natural pre-treatment systems with many benefits. However, feasibility testing is necessary to ensure that these reuse solutions sustainably meet project needs for water quantity and water quality. This poster presents cost-effective tools for efficiently evaluating riverbank filtration and soil aquifer treatment feasibility.

Environmental Discourses in Borana Oromo: A Focus on Narratives
Teshome Tafesse, Addis Ababa University

This study explored discourses of environmental narratives in Borana Oromo of the southern Ethiopia. Accordingly, the findings revealed discourses of environmental necessity and survival, scarcity and security, hopelessness, inclusion and exclusion, seniority, responsibility, and obedience and disobedience.

Greywater Management in the Czech Republic
Adam Bartonik, ASIO, spol. s r.o.

The concept of wastewater reuse has been recently coming more important. Such measures are gradually being introduced in the EU. However, the Czech Republic still misses experience and a design background in this area.

Greywater Reuse in Saudi Arabia: Current Situation and Future Potential
A.O. Al-Jasser, College of Engineering. King Saud University

The Poster will present and discusses the results of a study aimed to assess the degree of public acceptance of greywater reuse. Data from 721 household owners were collected and analyzed, and evaluated in the context of additional available information. The results are presented and suitable recommendations are discussed.

Investigation of Pathogen Disinfection and Regrowth in a Graywater Reuse Treatment System for Toilet Flushing
Kristen Wiles, Colorado State University

Graywater reuse for toilet flushing can reduce household potable water demand by 25%, but treatment systems must be low-cost, simple to operate and assure public health. Pathogen disinfection and regrowth studies conducted for a treatment system comprised of only filtration and disinfection indicate that this system represents a promising approach.

Monitoring Microbial Water Quality via Online Sensors

Samendra Sherchan, University of Arizona

The poster presentation will cover the following:

1. Major issues related to online sensors in water distribution system.
2. Potential for real-time monitoring of microorganisms using commercially available water quality sensors including: HACH Guardian Blue Monitoring Platform; GE TOC Analyzer; JMAR BioSentry; Instant BioScan unit and the SCAN spectrolyser technology.

Monitoring the Microbiota Present in Reactor Supplied with Reuse Water Treated with Ultrasound

Vera Lucia dos santos, Federal University of Minas Gerais

The poster will focus on describing the ultrasonic technology as an innovative technology for the treatment of waste water by promoting the organic compounds and algae, microorganisms removal through data obtained from studies in pilot scale, and the advantages, disadvantages and action mode of the technique.

New RO Membane Technology to Decrease Operating Expenses

Katariina Majamaa, Dow Water & Process Solutions

This poster will demonstrate the recent innovations in reverse osmosis polyamide membrane technology intended for wastewater reuse. These new membranes allow operation at 30–50% lower energy consumption than currently available membranes in the industry. Two pilot trials will be discussed in detail together with example savings in large wru installations.

P-VES Process

Frank Passarelli, Water Desalination International

Fresh water for drinking, agriculture and industrial use is an essential for mankind and is amongst one of the most important for man's survival.

Thermochemical Conversion Processes to Recover Energy from Biosolids in Decentralized Water Reclamation Facilities

Dotti Ramey, Colorado School of Mines

Thermochemical Conversion processes might provide sustainable energy recovery from biosolids in decentralized water reclamation plants. Potential benefits include energy-positive production of reuse water, reasonable odor management, and reduced carbon footprint. The challenges of applying TCCs to biosolids must be understood and described to assist decision makers in evaluating TCC processes.

Water Indirect Reuse

Simon Takawira Muserere, Harare Municipality

The chemical requirements have increased in number and levels of dosage since mid-90s and currently the City of Harare uses eight water treatment chemicals compared to 2 to 3 generally used by other urban centres in Zimbabwe. Recent reports from the City of Harare have indicated that two to three million United States Dollars are now required.

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CDM Smith is a global engineering firm specializing in cutting edge treatment technologies. A long-recognized leader in water reuse, CDM Smith has established a prominent role in water reuse and membrane treatment process for indirect potable use applications. CDM Smith professionals have led in development and updating the EPA Guidelines for Water Reuse with issue of the 2012 Guidelines in October 2012.

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Kennedy/Jenks Consultants is a national leader and innovator in water reuse and desalination. For over 90 years, we have offered clients a full-range of applied research, planning, program development, design, customer outreach, system retrofit, construction management and funding assistance services. Currently, we are very active in planning many IPR and desalination projects and are helping clients communicate sensitive water quality issues with the public.

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Stratus Consulting (www.stratusconsulting.com) provides economic analysis (including Triple Bottom Line assessments), strategic and integrated resource planning, regulatory policy analysis, valuation, communications, and costing services to address the high-profile management issues facing today's water community. We promote sound management of water resources deploying technical skills in economics, risk management, communication, workshop facilitation, climate change planning, statistics, and ecological sciences.

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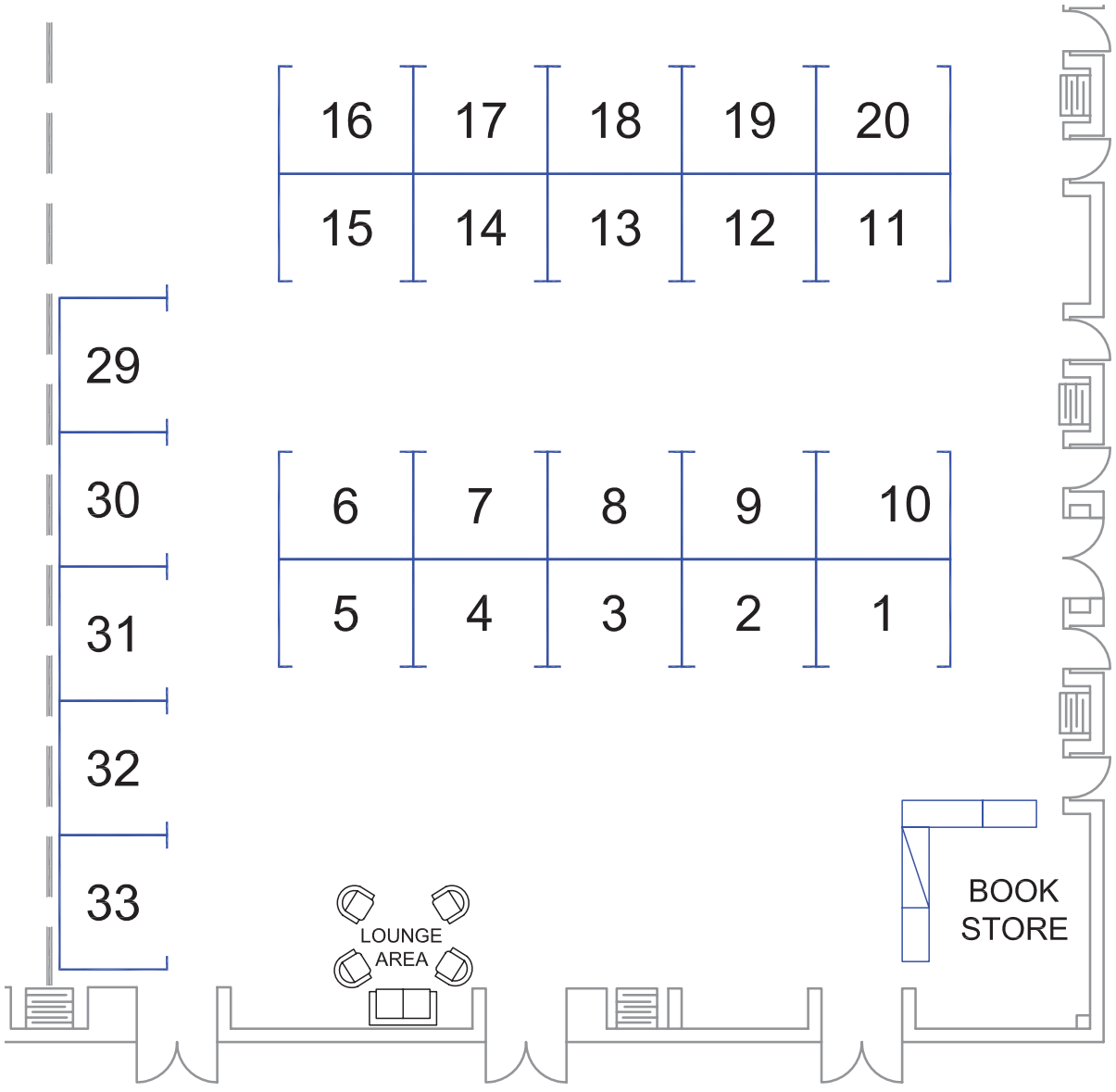

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Closing Plenary Session

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