

# currents

FIGHTING WATER WITH WATER:

*How Harvey Will Help  
Strengthen Municipal Water  
and Wastewater Systems*

*plus*

Water  
Regulation  
Update

Out Front  
on Direct  
Potable Reuse

Circle Takes  
The Square:  
Plate Settler  
Innovation

Bryant Bench  
Scholarship |  
Blue Plan-It® Award  
| Expansion of  
Carollo to DC





By Paul M. Flick  
Corporate Communications Manager

The Stalwart *Currents* Editorial Staff is clearly sending me a message with the amount of space they’ve allocated for me in this issue. That message seems to be, “Get on with it.” So I will. We have storms, we have regulatory updates, we have direct potable reuse news from Colorado, and we have plate settlers, which I’ve been assured are a real thing. We hope you enjoy the issue, and maybe next month I can talk a bit more about—

CONTENTS

Water Regulation Update 2

Fighting Water With Water:  
How Harvey Will Help Strengthen  
Municipal Water and Wastewater Systems 4

Getting Ahead of DPR: Collaborative Approach  
to Direct Potable Reuse Implementation in Colorado 6

Circle Takes The Square:  
How Trinity River Authority of Texas Is Adapting  
Plate Settlers For Circular Clarifiers 7

Bryant Bench Scholarship |  
Blue Plan-It® Award | Expansion of Carollo to DC 8



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# WATER REGULATION UPDATE

By Sarah Burns (sburns@carollo.com) and  
Caroline Russell, Ph.D., P.E.

The current regulatory horizon poses a unique dilemma for water utilities. On one hand, public scrutiny and ongoing regulatory actions on lead, perfluorinated compounds, and cyanotoxins are leading to new/more stringent regulations for the protection of public health. The U.S. Environmental Protection Agency (USEPA) has issued health advisory levels for the first two contaminant classes and is expected to issue a proposed Long-Term Lead and Copper Rule in 2018. On the other hand, the current administration is focused on de-regulation, and Executive Orders (EOs) have been issued to limit the ability of federal organizations, such as the USEPA, to develop new regulations. This article focuses on a few of the major regulatory activities that are anticipated to affect utilities over the next 5 years.

### Executive Order 13771

The EO titled “Reducing Regulation and Controlling Regulatory Costs,” issued on January 30, 2017, states that for every new regulation, two existing regulations must be identified for repeal. The EO is directed at reducing costs by stating that the costs associated with new regulations within a fiscal year should be zero.

The implications this EO will have within the context of drinking water regulations remains unclear; though it is likely that the promulgation of new regulations will be minimized while the EO is in place. In the interim, water utilities are advised to continue their efforts to

protect public health by minimizing exposure to contaminants with known health effects and to consider potential future regulations as part of any long-range facility planning.

### Long-Term Lead and Copper Rule Revisions

The Lead and Copper Rule (LCR), established in 1991, is primarily focused on preventing public exposure to lead in the distribution system by reducing corrosivity through corrosion control treatment (CCT). The LCR set Action Levels (ALs) for lead and copper of 0.015 and 1.3 mg/L, respectively. If the lead or copper ALs are exceeded based on compliance sampling at customer taps, a water utility must revisit its optimal CCT (OCCT). Though LCR revisions have been planned and discussed for almost two decades, the events in Flint Michigan highlighted some of the shortcomings of the existing rule:

- ▶ The LCR is reactive instead of proactive in terms of lead service line replacement. Additionally, lead service line replacement is challenging, since the portion of the line on residential property is not typically owned by the water system and therefore requires coordination with the customer.
- ▶ The lead AL is not health based and is instead based on treatment abilities and costs. It has been established that there is no safe level of lead.

A recent Carollo-led Opflow article (Russell et al., 2017) provides an overview of the LCR and potential planned revisions. Water systems can prepare for potential revisions by identifying lead service lines, optimizing corrosion control treatment, and developing/improving public outreach programs.

### Fourth Unregulated Contaminant Monitoring Rule

Every 5 years, the USEPA evaluates unregulated contaminants to determine if there is an opportunity to protect public health through the regulation of a specific contaminant. The Unregulated Contaminant Monitoring Rule (UCMR) is part of this process. Under the UCMR, public utilities are required to complete monitoring activities for contaminants selected by the USEPA. The resulting occurrence data help the USEPA identify contaminants for which regulations may protect public health. Six perfluorocompounds were included under the previous UCMR3; occurrence data from that sampling effort are available online.

UCMR4, which includes the contaminants listed in Table 1, was published in late 2016. Public water supply systems are required to monitor these contaminants between 2018 and 2020. All large (>10,000 served) facilities will be required to monitor the 20 additional contaminants. Large surface water (SW) utilities and groundwater (GW) utilities influenced by SW will

also be required to monitor cyanotoxins. 1,600 small utilities will be selected: 800 will be SW facilities required to monitor cyanotoxins; the remaining 800 utilities (SW or GW) will be required to monitor the 20 additional contaminants.

Though regulatory action is not expected within the next few years, water systems should utilize collected monitoring data to identify which contaminants might be of concern for their individual system. Once potential concerns are known, existing treatments can be assessed for removal efficiencies and new treatment technologies can be identified and evaluated, as needed.

### Moving Forward

While the current regulatory horizon is unclear, water utilities can begin planning for any potential future regulations by: (1) reviewing their water quality to understand which unregulated contaminants could be of concern for their system; (2) initiating changes to address contaminants that pose a public health concern, accounting for unintended consequences; and (3) accounting for potential future regulations as part of their long-range facility planning.

### Reference

Russell, Caroline, Philip Brandhuber, and Darren Lytle. “Lead in Drinking Water: Past, Present, and Future.” Opflow 43, no. 12: 10-15. December 2017. <https://dx.doi.org/10.5991/OPF.2017.43.0079>

TABLE 1. UCMR4 CONTAMINANT LIST

10 Cyanotoxins (Nine Cyanotoxins and One Cyanotoxin Group)	
• Total Microcystins	• Nodularin
• Microcystin-LR	• Microcystin-LF
• Microcystin-LA	• Microcystin-YR
• Microcystin-LY	• Cylindrospermopsin
• Microcystin-RR	• Anatoxin-a
20 Additional Contaminants	
• Germanium	• Oxtflufen
• Manganese	• HAA5
• Alpha-hexachlorocyclohexane	• HAA6BR
• Profenofos	• HAA9
• Chlorpyrifos	• 1-butanol
• Tebuconazole	• 2-propen-1-ol
• Dimethipin	• 2-methoxyethanol
• Total permethrin (cis- & trans-)	• Butylated hydroxyanisole
• Ethoprop	• O-toluidine
• Tribufos	• Quinoline

Table adapted from USEPA



## FIGHTING WATER WITH WATER:

*How Harvey Will Help Strengthen Municipal Water and Wastewater Systems*

By | Paul Walker, P.E. (pwalker@carollo.com) and Paul M. Flick

**The Imperfect Storm**

On August 24, 2017, Tropical Storm Harvey was building strength in the Bay of Campeche—a bight in the southern Gulf of Mexico. Originally identified as a tropical wave on August 13, Harvey's power had waxed and waned as it crossed the Caribbean Sea to the Gulf of Mexico. Yet, just 24 hours after leaving the Bay of Campeche, Harvey would make landfall in Rockport, Texas, as a Category 4 hurricane with sustained 130 MPH winds. It then stalled over greater Houston and proceeded to drop more rain than any previous storm in U.S. history, and in the process, become the costliest storm ever.

While news stories covered the tragic deaths of nearly 100 people, the destruction and damage of hundreds of thousands of homes, and the displacement of tens of thousands of people, relatively scant coverage was given to the damage done to public utility facilities. Yet, more than 10 days after Harvey had finished ravaging Texas, the Texas Commission on Environmental Quality (TCEQ) reported that 52 of the state's drinking water supply systems were shut down (with a further 161 issuing boil water notices) and 40 wastewater treatment plants were inoperable, heavily damaged, or destroyed.

**Amidst the Chaos, a Small Slice of Order**

A bright spot in this story can be found in the City of Houston—one of the most heavily hit areas of the state. The City's 80-mgd Northeast Water Purification Plant (NEWPP) provides drinking water to customers throughout the greater Houston area. Over a 4-day period that saw nearly 40 inches of rainfall, plant operators watched anxiously as floodwaters rose and began to inundate the plant. "I was in prayer mode, I was in survivor mode," said **Andrew Molly**, *Senior Assistant Director of Drinking Water Operations*, when asked about how he and his staff felt when they were trapped at the plant during the storm.

Using a complex, hastily installed system of water barriers and pumps, plant operators were able to keep the plant operational, though at a reduced capacity. Still, preventing plant failure was a win for a city that had already seen so much damage and chaos. For a public that often takes its water supply for granted, Harvey served as a wakeup call for not just Texas water customers, but public agencies across the state.

**Learning From the Tragedy**

Now, as Houston launches its 320-mgd expansion of the NEWPP, the City's utility leaders and its Owner's Advisor, Carollo, are looking at the lessons learned from Harvey and identifying strategies to "harden" public works facilities from severe storm events.

"Harvey helped us see some major vulnerabilities in how treatment plants are laid out," says **Paul Walker**, *Carollo Senior Advisor*. "For example, we learned that 100-year and 500-year flood elevations established by the Federal Emergency Management Agency (FEMA) are not sufficient when considering storms of Harvey's magnitude. We need to be smarter about our facility designs in the wake of increased storm activity and intensity."

By 2024, the NEWPP will treat 400 mgd of surface water from nearby Lake Houston, a fivefold increase from its current capacity, providing drinking water to 2.2 million people. "The area is growing at a rapid pace," declares Houston Mayor Sylvester Turner. "More businesses are coming into the region, and water is one of those essential ingredients that all residents and the business community heavily rely on." As Carollo continues to collaborate with City leaders, design firms, and contractors, they do so with a new focus—not just to make sure the NEWPP is a reliable "good neighbor" when the sun is shining, but that it can sustain the lives of the communities it serves, no matter what darkness hides behind the next set of clouds from the Gulf.

“For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled.”

**Richard P. Feynman**,  
*American Physicist*



## Getting Ahead of DPR: Collaborative Approach to **DIRECT POTABLE REUSE** Implementation in Colorado

By John Rehring, P.E. ([jrehring@carollo.com](mailto:jrehring@carollo.com)) and Austa Parker, Ph.D.



Despite what we see in Coors commercials and movies, Colorado is not actually blanketed with snow year round. Indeed, according to Drought.gov, the state has suffered through abnormally dry to severe drought conditions for the past 5 years. And it is projected to get worse. Colorado's 2015 Water Plan predicts substantial water supply shortages, driven primarily by climate change and a near-doubling of the state's population by 2050.

As many public agencies across the country are discovering, the most cost-effective supply of water is the one you already have, which is why non-potable reuse is so common. However, direct potable reuse (DPR) is still in the early stages of regulatory acceptance across the U.S., and Colorado currently has no DPR regulatory systems in place. If the state has its way, that's about to change.

Carollo is leading a collaborative group of utilities, regulators, agencies, and nonprofit organizations to make sure that Colorado is well positioned to implement DPR when the time comes. Organized through WaterReuse Colorado and supported by funding from the Colorado Water Conservation Board and others, the group is working towards providing tools to support the safe and effective adoption of DPR in Colorado, as utilities begin to seriously consider implementing this water supply option.

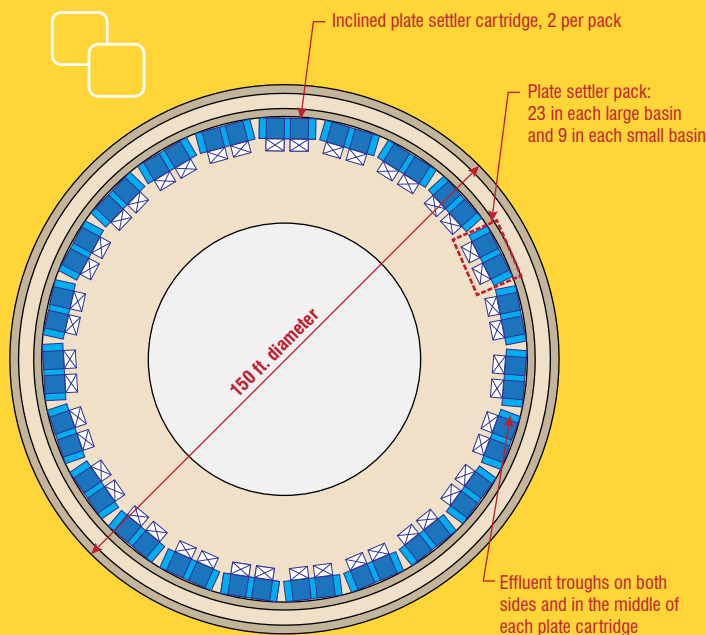
Working closely with the Colorado Department of Public Health and Environment, the group has developed a framework for DPR regulations that spans 11 critical areas for protection of public health and administration of a DPR program. On a different front, national outreach experts Katz & Associates have helped the group develop a communications and outreach plan to shift perspectives on DPR and create public education opportunities.

While DPR will always be a local choice, Colorado will soon have regulatory and outreach tools in place for use when the time is right. And based on the State Water Plan predictions, it will take a broad suite of solutions – including DPR – to meet Colorado's future water needs.



## CIRCLE TAKES THE SQUARE: How Trinity River Authority of Texas is Adapting Plate Settlers for Circular Clarifiers

By Letty Arvide-Gomar ([lgomar@carollo.com](mailto:lgomar@carollo.com)) and  
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**Circular basins at the Tarrant County Water Supply Project WTP required a unique arrangement of plate settlers.**

### PROJECT QUICK FACTS

Plant capacity	87 mgd
Capacity of 80-foot diameter basins (4)	3 mgd
Capacity of 150-foot diameter basins (5)	15 mgd
Total number of stainless steel plates	9,390
Total area of stainless steel plates	402,300 SF

One of the secrets to better water treatment is being able to increase the rate at which floc settles in a clarifier. Plastic tube settlers increase a clarifier's surface area and improve settling rates, which in turn increases the plant's treatment capacity. However, as the Trinity River Authority of Texas (TRA) recently discovered, plastic settlers can deteriorate over time when exposed to sunlight.

Carollo evaluated various options to provide settling equipment in the nine sedimentation basins at TRA's 87-mgd Tarrant County Water Supply Project Water Treatment Plant (WTP). Plate settlers provide the advantage of a longer life with a more durable material, ease of maintenance and cleaning, and improved settling efficiency; therefore, the team is planning to replace the plastic tube settlers with stainless steel plate settlers.

During the design process, the project team visited three installations of plate settlers in Texas and interviewed the operators. Based on this feedback, the project team developed a full-scale testing protocol to meet state regulatory standards, as plate settlers are still considered a "new" technology in Texas. An additional challenge the team faced was the fact that TRA's basins are circular, and there are no installations of this size and configuration in the country.

Beyond regulatory considerations, the design team also had to factor in physical and hydraulic constraints. The existing structures had to be able to handle the additional weight of the heavier plate settlers, and the headloss had to be within the hydraulics of the plant to maintain the same operating conditions. Carollo conducted computational fluid dynamics (CFD) modeling of the design, which demonstrated that flow distribution within each basin would be adequate with the plate settlers.

TRA and Carollo continue to collaborate closely with the Contractor and plate settler manufacturer during construction to smoothly transition from full-scale testing to final acceptance into the plant treatment process. The plates settlers are anticipated to be fully integrated into the plant by early 2020.

## Carollo's Blue Plan-it® Team Wins 2017 Software and Technology Innovation Award

Carollo would like to congratulate our Blue Plan-it® Team, especially Chao-an Chiu and Charlie He, for winning the 2017 Software & Technology Innovation Award, given by Corporate Vision Magazine. This is an exceptional achievement for a non-software company.

Corporate Vision's internal research team judges the award based solely on the merit of an individual or firm, assessing potential winners against a number of relevant criteria and available information. Carollo was selected from a shortlist of 200 firms by these judges and then passed along to a corporate jury (made up of Corporate Vision's directors, investors, and partners) for a final vote to determine those most deserving of the title.

This award demonstrates Carollo's passion and dedication to providing innovative solutions to the world's water challenges, and serves as proof of the success and commitment of Carollo R&D and the entire Blue Plan-it® Team.

**Congratulations!**



## Carollo Opens a New Office in Our Nation's Capital!

Carollo's water expertise comes to Washington D.C. with the opening of their newest office. Managed by Jenna Manuszak, this new office is staffed with individuals who understand local water issues, share Carollo's values, and have a commitment to clients. This group brings expertise in master planning, water resources, and infrastructure to the Carollo brand. Carollo's presence in the D.C. area provides the local municipalities and communities a new partner in finding solutions to aging and outdated water infrastructure.

## Carollo Awards Second Bryant L. Bench Scholarship to Berkeley Student



Carollo awarded the second Bryant L. Bench Scholarship to Lisbeth DaBramo, a student at the University of California - Berkeley, at the AWWA ACE17 Conference in Philadelphia, PA, in June 2017.

The scholarship was established in honor of Carollo Engineers' Water Practice Director Bryant Bench, who passionately combined elegant engineering with innovative concepts, like Managed Filtration, to improve drinking water quality for millions across the country. Bryant was also a mentor and teacher, setting "Benchmarks" to care for, trust, and learn from those with whom and for whom he worked.

Applicants for this scholarship must be pursuing a Master's degree in a water engineering-related field and have shown a passion and dedication to providing innovative solutions to the world's water challenges. The scholarship consists of a one-time \$10,000 award that students can use to complete or further their education in their chosen field. Congratulations to Lisbeth!

