Message

From: Chris Hornback [CHornback@nacwa.org]
Sent: 9/6/2017 8:27:07 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]
CC: Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: Meeting with NACWA

Looks like Crystal has made it work for September 28 at 11am. We'll send a list of the few items we hope to cover in advance. Looking forward to the discussion.

-Chris

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Wednesday, September 6, 2017 1:20 PM
To: Chris Hornback <CHornback@nacwa.org>; Shapiro, Mike <Shapiro.Mike@epa.gov>
Cc: Campbell, Ann <Campbell.Ann@epa.gov>; Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: Meeting with NACWA

Chris,

Let's see if Crystal can work some of her magic and find a time that works for a NACWA meeting.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Chris Hornback [mailto:CHornback@nacwa.org]
Sent: Wednesday, September 6, 2017 11:48 AM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Shapiro, Mike <Shapiro.Mike@epa.gov>
Cc: Campbell, Ann <Campbell.Ann@epa.gov>; Penman, Crystal <Penman.Crystal@epa.gov>
Subject: Meeting with NACWA

Lee, Mike -

Adam Krantz, NACWA's CEO, would like to set up a meeting with you both to introduce NACWA's senior staff to Lee and to discuss a few of our top priority issues.

Below are some possible dates and times. We'd like to get this set up by the end of the month if possible.

9/19 – 9-12
9/20 – All day
9/21 – 9-12
9/22 – 9-1
9/26 – 9-12 and 2-4
9/27 – 9-1
9/28 – All day

Thanks. I will be the point of contact for scheduling.

-Chris

Chris Hornback | Chief Technical Officer | National Association of Clean Water Agencies (NACWA)
(O) Ex. 6 | (M) Ex. 6 chornback@nacwa.org

Message

From: Shapiro, Mike [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=2C70AF880BA747B5A8B6BAA45A040125-MSHAPIRO]
Sent: 9/6/2017 8:10:54 PM
To: Chris Hornback [CHornback@nacwa.org]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: Meeting with NACWA

Chris,

That would be great. Crystal will work to set up a time that works.

Mike

Michael Shapiro
Acting Assistant Administrator, Office of Water
US EPA, 4101M
1200 Pennsylvania Ave., NW
Washington, DC 20460
202-564-5700

From: Chris Hornback [mailto:CHornback@nacwa.org]
Sent: Wednesday, September 06, 2017 11:48 AM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Shapiro, Mike <Shapiro.Mike@epa.gov>
Cc: Campbell, Ann <Campbell.Ann@epa.gov>; Penman, Crystal <Penman.Crystal@epa.gov>
Subject: Meeting with NACWA

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Thanks. I will be the point of contact for scheduling.

-Chris

Chris Hornback | Chief Technical Officer | National Association of Clean Water Agencies (NACWA)
(O) Ex. 6 (M) Ex. 6 | chornback@nacwa.org

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 8/29/2017 10:11:24 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Philly's New Water Pricing Model for Low-Income Residents Is a US-First
Attachments: Philly's New Water Pricing Model for Low-Income Residents Is a US First.pdf

From Water Finance & Management.

FYI.

GTM

Philly's New Water Pricing Model for Low-Income Residents Is a U.S.-first

By Erin Bonney Casey

ERIN BONNEY CASEY

The City of Philadelphia has thrust itself into the broader national discussion on the affordability of water with its newly launched and unique water pricing model.

In an era of rising water rates and constrained municipal budgets, Philadelphia is adapting to shifting market conditions. The goal of Philadelphia's innovative pricing structure, the first of its kind in the United States, has been designed to insulate the poor from rising water rates, while mitigating the rise of late and unpaid water bills.

Nationally, residential water and wastewater bills have steadily increased by an average 5.7 percent annually over the past five years, outpacing average annual income growth (5 percent) and inflation (1.9 percent), according to Bluefield Research. Rate increases in Philadelphia are necessary for the publicly-owned water utility to cover annual operating expenses and capital expenses totaling an estimated $1.04 billion from 2016 and 2025. Rate increases like these are placing pressure on low-income customers and magnifying the financial challenges facing municipal water utilities.

In Philadelphia, water and sewer bills make up approximately 14 percent, or $64 per month, of average household utility bills including gas, power, mobile phone service, and cable-internet. As a result, delinquency has become a major issue for the Philadelphia Water Department (PWD). In total, unpaid water bills exceed $260 million, coupled with 40 percent of customers falling behind on bill payments at any given time. This has undermined water and sewer services and forced new pricing strategies.

The issue of water affordability is especially pronounced in Philadelphia, which ranks 22 out of the top 50 large metropolitan areas for water bills. Philadelphia households' water and sewer bills have already increased 29 percent since 2012, and another 5 percent increase is planned for 2018. Further, over 20 percent of households faced a water shutoff at least once since 2012. With the city's poverty rate at 26.4 percent, well above the 13.5 percent national average, placing additional burdens on the lowest income residents is unsustainable.

Attempting to address these issues, the City of Philadelphia has launched a tiered assistance program (TAP), an income-based water rate structure, making the city the first in the nation to establish water rates based on income. The change stems from Philadelphia City Council's establishment of an Income-Based Water Revenue Assistance Program (IWRAP) in 2015. What makes the program unique is that it applies to all households making less than 150 percent of the poverty line, without requiring residents to fall behind on bills or undergo a lengthy applications process before qualify for rate assistance.

The program requires households making 0 to 50 percent of the poverty line to pay 2 percent of monthly income for water, households at 51 to 100 percent of the poverty line will pay 2.5 percent of income for water, and a household between 101 and 150 percent of the poverty line will pay 3 percent for water. The department estimates that close to 60,000 customers will be eligible for the TAP program, up from the approximately 7,500 currently enrolled in the Water Revenue Assistance Program (WRAP). Philadelphia's new income-based pricing structure follows the example of the energy sector, which implemented income-based rates in Pennsylvania when the industry was deregulated in the 1990s.

In Philadelphia, water and sewer bills make up approximately 14 percent, or $64 per month, of average household utility bills including gas, power, mobile phone service and cable-internet.

Broadly speaking, tiered water pricing structures have traditionally been the most common mechanism employed by utilities and municipalities to limit the cost of critical water supplies, while charging premiums for higher water usage (e.g. swimming pools, lawn irrigation). Nevertheless, Bluefield's analysis shows that rate increases since 2012 have had a greater impact on low water users in 26 of the top 50 largest water utilities in the United States.

Nationally, water utilities are seeking innovative strategies to recoup water utility costs. In some cases, utilities are shifting to higher fixed rates to protect utility revenues from consumption fluctuations. Austin Water, for example, is moving towards a structure that relies on higher fixed rates to smooth out utility revenues. Utilizing a different innovative pricing mechanism, the City of Atlanta has levied a 1 percent sales tax that goes towards water, sewer, and stormwater projects instead of raising rates by 25 percent over the next three years. Meanwhile, the State of California is in the process of designing a statewide program to provide aid to residents who need help paying their water bills.

The effectiveness of Philadelphia's new pricing model remains to be seen, but it is clear that rising costs and public pushback are forcing utilities to move beyond traditional pricing practices to keep pace.

Erin Bonney Casey is a research director for Bluefield Research and leads Bluefield's U.S. municipal water practice. She can be reached at *ebonney@bluefieldresearch.com*. Bluefield Research provides data and analysis on U.S. water markets through insight services, reports and consulting. Learn more at *bluefieldresearch.com*.

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 8/9/2018 3:19:54 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: FW: Nothing regulated under the Safe Drinking Water Act since 1996?
Attachments: Safe Drinking Water Regulations since 1996.docx

Dear Colleagues,

You may recall that I addressed this question back in May and welcomed in put on our research addressing what AWWA staff perceived as a an urban legend of sorts. We thank all of you who took the time to communicate your ideas, criticisms, feedback, etc. We have now come up with a second, expanded draft document which continues the discussion, a copy of which is attached for your review and comment.

Among the interesting factoids are these:

*Since 1996 the we calculate the total regulatory burden for post-1996 SDWA regulations is $2.8 billion each year.

"No other federal environmental statute managed by the U.S. Environmental Protection Agency has promulgated as many standards targeting the same regulated entities over this period." Again, we welcome your feedback to help us groundtruth this claim.

*EPA has also published 15 drinking water health advisories, some of which, functionally, have regulatory impact.

*There have been five rulemakings to collect data.

*See the argument that most delay or lack of regulatory activity is due to insufficient resources as documented by the Association of State Drinking Water Administrators (last page of attachment).

Again, your comments, criticisms, data and overall input is most welcome as we try to improve upon this analysis. Let us hear from you. Thank you.

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 direct)

Attachment

From: Tracy Mehan
Sent: Thursday, May 17, 2018 12:54 PM
To: Tracy Mehan <tmehan@awwa.org>
Subject: Nothing regulated under the Safe Drinking Water Act since 1996?

Dear Colleagues,

I have heard it said, often, around town that EPA has not done any regulation of drinking water since the 1996 reauthorization of the Safe Drinking Water Act other than arsenic. I have asked my staff to look into this claim. While we are still researching the question, and want to add some regulatory cost figures to the inventory, a preliminary, i.e, tentative, list of regulations issued under the SDWA, since 1996, looks like this:

*Arsenic Rule
*Radionuclides Rule
*Backwash Recycle Rule
*Stage 1 Disinfectants and Disinfection Byproducts Rule
*Stage 2 Disinfectants and Disinfection Byproducts Rule
*Interim Enhanced Surface Water Treatment Rule
*Long-Term 1 Enhanced Surface Water Treatment Rule
*Long-Term 2 Enhanced Surface Water Treatment Rule
*Groundwater Rule
*Revised Total Coliform Rule

These are now part of a list of 97 (by my count) parameters or contaminants regulated under Safe Drinking Water Act. In addition, we have seen several (many?) Health Advisories issues that often have the impact of de facto regulations, e.g, PFAS.

I will be reporting further on our research. But it seems that the idea that nothing has been regulated under the SDWA, since '96, is a bit of an overstatement. In the meantime, if I am missing something, or have made an error, please let me hear from you (I will be out of the office on vacation until May 29th).

Thanks.

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (direct)

Regulating Drinking Water Quality in the United States

The 1996 Safe Drinking Water Act Amendments established regulatory framework that more than any of the other current federal environmental statutes in the United States transparently considers the available science, public health benefit, and the cost of rule implementation. In keeping with the Pareto Principle, the Amendments did a few things, very well. First it set the stage for the rapid development of a list of regulations for which there was an ample body of evidence to begin the rulemaking process and secondly, it established very clear criteria and expectations for rulemakings.

In the wake of the 1996 Amendments EPA has promulgated eleven regulations for the express purpose of improving the quality of water systems provide consumers. Those rules include:

1. Arsenic Rule
2. Radionuclides Rule
3. Filter Backwash Recycle Rule
4. Stage 1 Disinfectants and Disinfection Byproducts Rule
5. Stage 2 Disinfectants and Disinfection Byproducts Rule
6. Interim Enhanced Surface Water Treatment Rule
7. Long-Term 1 Enhanced Surface Water Treatment Rule
8. Long-Term 2 Enhanced Surface Water Treatment Rule
9. Ground Water Rule
10. Lead and Copper Rule Short-Term Revisions
11. Revised Total Coliform Rule

Based on EPA estimates, these rules represent a total regulatory implementation burden of $2.8 billion each year. While the arsenic rule was specific to arsenic and the "enhanced" SWTRs were nominally to regulate *Cryptosporidium*, the SWTRs, FBRR, DBP rules, GWR, and Revised TCR establish more stringent performance criteria through treatment techniques that reduce risks from hundreds of pathogens and disinfection byproducts.

Rule	Year	Named Contaminants	Annual Burden ($million, 2017)[+]
Stage 1 Disinfectants and Disinfection Byproducts Rule	1998	TTHM, HAA5, Bromate, Chlorate	$728
Interim Enhanced Surface Water Treatment Rule	1998	*Cryptosporidium*	$299
Lead and Copper Rule Minor Revisions*	1999	Lead, Copper	--
Radionuclides Rule	2000	radium-226, radium-228, gross alpha, beta particle and photon activity, uranium	$220
Arsenic Rule	2001	Arsenic	$129
Filter Backwash Recycle Rule	2001	*Cryptosporidium*	$7.2
Long-Term 1 Enhanced Surface Water Treatment Rule	2002	*Cryptosporidium*	$44.8
Lead and Copper Rule Minor Clarifications	2004	Lead, Copper	--

Stage 2 Disinfectants and Disinfection Byproducts Rule	2006	TTHM, HAA5	$254
Long-Term 2 Enhanced Surface Water Treatment Rule	2006	*Cryptosporidium*	$150.5
Ground Water Rule	2006	Fecal contamination (i.e., bacteria, viruses, and *Cryptosporidium*)	$62.3
Lead and Copper Rule Short-Term Revisions	2007	Lead, Copper	$6.3
Revised Total Coliform Rule	2012	E. coli	$23.8

Note:* Burden, $926 million annually, reflects 1991 rule as implemented post-1999 revision.
Note: + EPA annual burden estimate adjusting to 2017 dollars based on ENR CCI.

No other federal environmental statute managed by the U.S. Environmental Protection Agency has promulgated as many standards targeting the same regulated entities over this period. And this list is limited to the list of regulations that target delivered water quality. By comparison, under the Clean Air Act the list of new hazardous air pollutants has decreased by four contaminants since 1996, and only one new contaminant is being considered for listing.[1] Under the Resource Conservation and Recovery Act, there were no new regulations to manage additional hazardous substances rather the focus has been on the applicability and application of the existing risk management targets.[2,3]

In 1996 – early 2018 timeframe EPA published 15 drinking water health advisories. A number of these advisories complement primary standards, but not all. While not strictly regulatory requirements, health advisories have implications. Most recently in 2015 and 2016, health advisories for microcystins, cylindrospermopsin, perfluorooctanoic acid, and perfluorooctanesulfonate, which are all identified as having semi-acute health effects for children at very low concentrations in water, have led to numerous water systems taking water supplies off-line, modifying treatment, expanding monitoring, and taking other steps. In 1998 the advisory for Methyl tertiary butyl ether and again in 2008 the advisory for perchlorate had similar impacts on the drinking water sector.

Over this same period, EPA has promulgated five rulemakings to collect data to support regulatory decision-making. Occurrence data is already compiled for more than 80 contaminants and data is being gathered now for an additional 30 contaminants.

Rule	**Year**	**Number of Named Analytes**	**Estimated Burden** (million $)
Information Collection Rule	1996	27	$129
Unregulated Contaminant Monitoring Rule 1	1999	26	NA
Unregulated Contaminant Monitoring Rule 2	2007	25	$44.4
Unregulated Contaminant Monitoring Rule 3	2012	30	$69.8
Unregulated Contaminant Monitoring Rule 4	2016	30	$97.2

[1] USEPA, Initial List of Hazardous Air Pollutants with Modifications, https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications#mods

[2] USEPA, Resource Conservation and Recovery Act Timeline, https://www.epa.gov/rcra/resource-conservation-and-recovery-act-timeline

[3] ATSDR has developed or updated 164 minimal risk levels for use by RCRA and CERCLA program between 1996 and May 2018. https://www.atsdr.cdc.gov/mrls/pdfs/atsdr_mrls.pdf one or more of which may be monitored and managed at individual clean-up sites.

Note: The ICR required sampling for 27 contaminants, as well as an extensive list of supporting analytes, ancillary data, and treatment studies from 500 large water systems.
Note: NA, available historical information are not sufficient to prepare a complete estimate.

With the data available from UCMR and the peer reviewed literature EPA has prepared three regulatory determination rulemakings. And, through those rulemakings identified 24 contaminants that were initially believed to be present at a level that might warrant regulations, none but perchlorate has warranted further warrant further action.[4] EPA did issue guidance for *Acanthamoeba* particularly for contact lens wearers.

While perchlorate is the only contaminant for which EPA made a positive regulatory determination, the process established in the 1996 Amendments has not only focused the sector's attention on contaminants for which there is a scientific basis to consider regulation, not just with respect to the 80 contaminants investigated in the UCMR process, but also the more than 100 contaminants that are identified every five years through the contaminant candidate list process. The CCL process, which utilizes a protocol developed with the assistance of the National Academy of Sciences and the National Drinking Water Advisory Council evaluates the available information on occurrence and health effects for thousands of chemicals and hundreds of microbes. The current CCL4 includes 97 chemicals or chemical groups and 12 microbial contaminants.

Contaminant Candidate List 4

Chemicals	Equilin	o-Toluidine
1,1-Dichloroethane	Erythromycin	Oxirane, methyl
1,1,1,2-Tetrachloroethane	Estradiol (17-beta estradiol)	Oxydemeton-methyl
1,2,3-Trichloropropane	Estriol	Oxyfluorfen
1,3-Butadiene	Estrone	Perfluorooctanesulfonic acid (PFOS)
1,4-Dioxane	Ethinyl estradiol (17-alpha ethynyl estradiol)	Perfluorooctanoic acid (PFOA)
17alpha-estradiol	Ethoprop	Permethrin
1-Butanol	Ethylene glycol	Profenofos
2-Methoxyethanol	Ethylene oxide	Quinoline
2-Propen-1-ol	Ethylene thiourea	RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine)
3-Hydroxycarbofuran	Formaldehyde	sec-Butylbenzene
4,4'-Methylenedianiline	Germanium	Tebuconazole
Acephate	HCFC-22	Tebufenozide
Acetaldehyde	Halon 1011 (bromochloromethane)	Tellurium

[4] Regulatory Determinations 3 (dimethoate, 1,3-dinitrobenzene, terbufos, and terbufos sulfone); Regulatory Determinations 2 (Boron, Dacthal mono-acid (MTP) degradate, Dacthal di-acid (TPA) degradate, 1,1-Dichloro-2,2-bis(p-chlorophenyl) ethylene (DDE), 1,3-Dichloropropene (Telone), 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, s-Ethyl propylthiocarbamate (EPTC), Fonofos, Terbacil, 1,1,2,2-Tetrachloroethane); Regulatory Determinations 1 (*Acanthamoeba*, Aldrin, Dieldrin, Hexachlorobutadiene, Manganese, Metribuzin, Naphthalene, Sodium, Sulfate)

Acetamide	Hexane	Thiodicarb
Acetochlor	Hydrazine	Thiophanate-methyl
Acetochlor ethanesulfonic acid (ESA)	Manganese	Toluene diisocyanate
Acetochlor oxanilic acid (OA)	Mestranol	Tribufos
Acrolein	Methamidophos	Triethylamine
Alachlor ethanesulfonic acid (ESA)	Methanol	Triphenyltin hydroxide (TPTH)
Alachlor oxanilic acid (OA)	Methyl bromide (bromomethane)	Urethane
alpha-Hexachlorocyclohexane	Methyl tert-butyl ether (MTBE)	Vanadium
Aniline	Metolachlor	Vinclozolin
Bensulide	Metolachlor ethanesulfonic acid (ESA)	Ziram
Benzyl chloride	Metolachlor oxanilic acid (OA)	**Microbes**
Butylated hydroxyanisole	Molybdenum	Adenovirus
Captan	Nitrobenzene	Caliciviruses
Chlorate	Nitroglycerin	*Campylobacter jejuni*
Chloromethane (Methyl chloride)	N-Methyl-2-pyrrolidone	Enterovirus
Clethodim	N-nitrosodiethylamine (NDEA)	*Escherichia coli* (0157)
Cobalt	N-nitrosodimethylamine (NDMA)	*Helicobacter pylori*
Cumene hydroperoxide	N-nitroso-di-n-propylamine (NDPA)	Hepatitis A virus
Cyanotoxins	N-Nitrosodiphenylamine	*Legionella pneumophila*
Dicrotophos	N-nitrosopyrrolidine (NPYR)	*Mycobacterium avium*
Dimethipin	Nonylphenol2	*Naegleria fowleri*
Diuron	Norethindrone (19-Norethisterone)	*Salmonella enterica*
Equilenin	n-Propylbenzene	*Shigella sonnei*

Today more than ever, the concept of science-based regulatory policy is a topic of discussion. In crafting the 1996 SDWA, Congress described the fundamental decision criteria for sound rulemaking in a way that focuses public resources on the best risk reduction opportunities and does so based on the best available science. When evaluating whether to regulate, EPA must ask and answer three key questions: (1) is the contaminant likely to occur in drinking water, (2) is the contaminant likely to pose a risk to public health, and (3) is there a meaningful opportunity for risk reduction. And, EPA must not only answer these questions but substantiate the basis for the rulemaking (1) using best available science and (2) enumerating both quantifiable and nonquantifiable costs and benefits. When setting a regulatory standard benefit-cost and feasibility must be taken into account when considering regulatory alternatives.

Beyond the water quality regulations, there have been federal regulations that establish standards for public notification, requirements for routine consumer confidence reports, and structure variances and

exemptions. In addition to federal requirements, state requirements also continue – back flow prevention, operator certification, water loss control, water supply plans, and other initiatives.

While we most often focus on water systems when we think about SDWA implementation. *Insufficient Resources for State Drinking Water Programs Threaten Public Health*, a report prepared by the Association of State Drinking Water administrators illustrates that appropriately targeting regulatory activity is important, because available resources are limited and need to be focused where they provide the most public health protection. The last edition of this report in 2014 documented a yearly shortfall of at least $230 million between program needs and available resources available in state primacy agencies.

There are opportunities for additional risk reduction in the drinking water sector. First and foremost is addressing pressing needs for infrastructure investment. With an estimated trillion dollar 20-year capital investment need to assure that the current water supply is reliable, it is danger that inadequate investment will ultimately lead to public health risk. We know that when funding is not adequate to support utility operations, shortcomings in ongoing maintenance can occur. Adequate ongoing attention to reservoirs, water treatment plants, and distribution system facilities are an essential aspect of managing infrastructure renewal costs, they contribute to maintaining the quality and reliability of water service. We saw in Flint, MI that a failure to invest in facilities and personnel ultimately led to a crisis in water quality, a loss of public confidence, and potentially illness and death in the community.

Message

From: Brent Fewell [brent.fewell@earthandwatergroup.com]
Sent: 8/28/2017 1:33:19 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Byron R. Brown Esq. (Byron_Brown@EPW.senate.gov) [Byron_Brown@EPW.senate.gov]
CC: Michael Deane (michael@nawc.com) [michael@nawc.com]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: Meeting Request
Attachments: EPA 1987 OW Memo re Privatization and CWA.pdf

Lee/Byron,

Would you two be willing to meet with me and Michael Deane of NAWC to discuss an important policy issue involving wastewater infrastructure, i.e., specifically the need to authorize private ownership of POTWs under the CWA. This has been a perennial issue that many have tried to ignore (or workaround), but it reared its ugly head recently when American Water acquired the Scranton wastewater system. http://www.philly.com/philly/business/energy/PUC-approves-195M-takeover-of-Scranton-sewer-system.html Attached is a 1987 office of water memo that describes the issue. Essentially, the CWA uses the term "publicly owned wastewater systems." As you can appreciate, this puts private owners of domestic wastewater treatment plants in a very difficult situation. And the regulators aren't always clear or consistent on how they handle. From a public policy standpoint, it makes no sense that on a Wednesday a system can be a POTW and then Thursday, just because the assets are transferred to a private entity, it ceases to be a POTW for regulatory purposes. In any event, knowing the history and politics of this issue it will also likely require the help of OGC and the Administrator's office, but wanted to see if we could schedule a meeting and you two can decide who would be appropriate.

The best dates for Michael and me are Sep. 14 (any time between 10 a.m. – 4 p.m.) and any time on Sep. 15. Look forward to hearing from you.

Brent

Brent Fewell, Esq. | Earth & Water Group
1455 Pennsylvania Ave., NW, Suite 400, Washington, DC 20004
Ex. 6 (o) | Ex. 6 (c) | www.earthandwatergroup.com

Earth & Water Law LLC
SOLUTIONS FOR BUSINESS AND THE PLANET

APR 16 1987

MEMORANDUM

SUBJECT: Permit Implications of Privatization

FROM: Martha G. Prothro, Director
Permits Division (EN-336)

TO: Water Management Division Directors, Regions I X

On June 27, 1985, we sent you a draft document of questions and answers dealing with the NPDES permit and pretreatment implications of transactions that create private interests in municipal wastewater treatment works (i.e., "privatization"). In the draft memorandum we set out our conclusions on the applicable requirements for privatized facilities and discharges into such facilities and requested your comments.

Based on the comments we received, it is clear that there is a good deal of misunderstanding in this area, particularly with respect to the relevant Clean Water Act and NPDES requirements and legal constraints. For example, several commenters did not agree that ownership of the treatment works should be the determining factor in the appropriate limitations and whether pretreatment applied. These commenters suggested that any treatment plant treating primarily domestic waste should be regulated as a POTW (i.e., subject to limits based on secondary treatment, with contributors subject to pretreatment) regardless of whether it is publicly or privately owned. The Clean Water Act, however, does not allow for such an approach. Under the Act, whether a facility is subject to secondary treatment (and its users to pretreatment) requirements or whether other technology-based limits (BAT, BCT) apply depends solely upon whether the plant is publicly or privately owned, and not on the nature of the wastes being treated.

Another area of misunderstanding involves contracts with private parties for operation of POTWs. A couple of commenters questioned whether the private contract operator should be an NPDES permittee, suggesting instead that the POTW be the sole permittee. However, the NPDES regulations are explicit on this point, stating that when the owner and operator of a discharger are different persons, the operator of a facility is required to obtain an NPDES permit. See 40 CFR 122.21(b). We do agree

with several commenters that, although the operator must be a permittee, where the municipality continues to own the treatment works or sewer system, it should be a co-permittee. This policy is reflected in our revisions to the document.

Several commenters also raised questions about our statements that federally owned treatment plants (e.g., those serving military bases) are not POTWs, suggesting instead that we regulate these facilities as POTWs. The legislative history of the CWA indicates that Congress did not intend this to be the case. (See Appendix A of the attachment.) Moreover, EPA's regulatory definition of "POTW" in the general pretreatment regulations includes only plants owned by States and municipalities. See 40 CFR 403.3(o). Thus, these facilities will continue to be regulated as privately owned treatment works.

Attached is the final guidance that incorporates comments received on the earlier draft. Also, since the earlier draft was distributed for comment, the Office of Municipal Pollution Control has prepared a separate memorandum dealing with the construction grants implications of various privatization scenarios (attached). Accordingly, we have dropped the grants-related discussions from our document. If you have any questions, please call me (FTS 475-9545) or have your staff call George Young (FTS 475-9539).

Attachments

cc: James Elder
Susan Lepow
Michael Quigley

QUESTIONS AND ANSWERS ON PERMIT AND PRETREATMENT IMPLICATIONS OF PRIVATIZATION

I. Introduction

"Privatization" of municipal wastewater treatment systems can occur in a variety of ways. The construction of new treatment plants or the upgrading of existing ones may be privately financed. Existing POTWs, or portions thereof, may be sold or leased to private parties. Municipalities may enter into contracts whereby private parties are to operate an existing POTW. Privatization may also result where an existing privately owned facility that was formerly used solely as an industrial discharger's treatment facility is now used to treat a municipality's wastewater. (This is the situation in Golden, Colorado, where a treatment plant owned by the Coors Company, and formerly used to treat the company's brewery waste, is now being used to treat wastewater received from the town of Golden.)

A treatment plant that treats wastes from any source other than the operator of the treatment plant is either a "publicly owned treatment works" (POTW) or a "privately owned treatment works" under EPA regulations. The grouping in which a facility is placed depends solely on the ownership and not on the nature of its influent. POTW is a treatment system that is owned by a State or municipality (for purposes of the NPDES program this includes counties or State sewer districts). "Privately owned treatment works" is defined in 40 CFR 122.2 as "any device or system which is (a) used to treat wastes from any facility whose operator is not the operator of the treatment works and (b) not a 'POTW'." In other words, a treatment plant that is not a POTW is by definition a privately owned treatment works, even if it is not in fact "privately owned." For example, a federally owned treatment plant serving a military base is not a POTW since it is not owned by a State or municipality, even though the majority of its waste may be domestic sewage from residential base housing. See 40 CFR 403.3(o). */ Conversely, any treatment works that is publicly owned (by a State or municipality) is a POTW, even if it receives most or all of its flow from industrial users.

Whether a treatment plant is a POTW or a privately owned treatment works is important in determining the limits to be contained in the plant's NPDES permit and the requirements (i.e., pretreatment or otherwise) to which contributors to the treatment plant are subject. If a treatment plant is a POTW, its NPDES permit must contain, at a minimum, technology-based limits requiring secondary treatment. See §301(b)(1)(B) of the Clean Water Act (CWA). In addition, contributors to the plant are subject to applicable pretreatment requirements. Privately

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*/ The legislative history of the Clean Water Act indicates that Congress intended to exclude federally owned treatment works from being classified as POTWs. See Appendix A.

owned treatment works, on the other hand, are subject to technology-based limits that require BPT, BAT, BCT and/or NSPS. See CWA, §§301(b)(2), 306. These limits are established based upon applicable effluent limitation guidelines, and, for wastestreams not covered by a guideline, the permit writer's "best professional judgment" (BPJ). */ Contributors to privately owned treatment works are not subject to pretreatment requirements, but instead must comply with any requirements imposed pursuant to 40 CFR 122.44(m). That provision authorizes the permitting authority to include in the privately owned treatment works' NPDES permit "any conditions expressly applicable to any user, as a limited co-permittee, that may be necessary in the permit issued to the treatment works to ensure compliance with applicable requirements under this part." Alternatively, the permitting authority may issue separate permits to the treatment works and its users, or require a separate permit application from any user. As noted in the preamble to the consolidated permit regulations (45 FR 33342, May 19, 1980), the discretionary authority provided by §122.44(m) gives the permitting authority "sufficient flexibility to ensure compliance with applicable standards and limitations and to minimize any administrative burdens."

The questions and answers that follow address some of the basic issues that privatization presents in the pretreatment and NPDES contexts, and represent an attempt to resolve these issues within the constraints of the existing statutory and regulatory schemes. Not all of the possible privatization scenarios are discussed, but the general principles set forth should be applicable to most situations that are likely to occur. The first two sets of questions and answers deal with the preliminary issues of how "POTW" is defined for pretreatment purposes and the pretreatment implications where a privately owned treatment works is treating wastewater received through a publicly owned collection system. The remaining questions and answers examine the NPDES and pretreatment implications of specific privatization transactions.

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*/ Of course, for both POTWs and privately owned treatment works, where technology-based limitations are deemed not to be protective of water quality, more stringent water quality-based limitations may need to be established on a case-by-case basis. See CWA, §301(b)(1)(C). In addition, privately owned treatment works (and POTWs not covered by the "domestic sewage exemption" (40 CFR 261.4(a)(1)) or "permit-by-rule" (40 CFR 270.60(c))) that treat, store dispose of hazardous waste, are also subject to applicable requirements under the Resource Conservation and Recovery Act (RCRA).

II. Questions and Answers

Question #1: What is a "POTW" for purposes of triggering pretreatment program requirements?

Answer: Section 307(b) of the Clean Water Act ("the Act") directs EPA to promulgate pretreatment standards for pollutants introduced into "treatment works (as defined in section 212 of this Act) which are publicly owned." Section 212 of the Act defines "treatment works" to include "any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. . . including . . . sewage collection systems" and "any other method or system for preventing, abating, reducing, storing, treating, separating, or disposing of municipal waste . . . or industrial waste . . . ." This definition includes treatment facilities that treat exclusively municipal or industrial wastes as well as those treating a combination of the two. Assuming a facility is a treatment works, the controlling factor in determining whether the facility is a POTW under §307(b) is public ownership. The nature of the pollutants being contributed to the treatment works is irrelevant.

The General Pretreatment Regulations (40 CFR Part 403) further clarify the statute by defining "POTW" as "a treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act)." 40 CFR 403.3(o). This definition also includes

"sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant." "POTW Treatment Plant" is defined as "that portion of the POTW which is designed to provide treatment . . . of municipal sewage and industrial waste." As with the statutory definition, the regulatory definition of "POTW" turns on ownership of the facility and not characterization of its flow as municipal or industrial in nature.

Under the General Pretreatment Regulations, a facility must be owned by a State or municipality in order to be a POTW. Contributors to facilities meeting this criterion are subject to any and all applicable statutory and regulatory pretreatment requirements.

Federally owned treatment plants (such as those serving some military bases or Forest Service operations) are not POTWs (since they are not owned by a State or municipality), and are therefore regulated as privately owned treatment works. Thus, they are subject to permit limits based on BPT, BAT, BCT and/or NSPS (see Introduction, p. 2). Because these plants are classified as privately owned treatment works, contributors to them are subject to any requirements imposed under 40 CFR 122.44(m) (see Introduction, p. 2).

Contributors to sewerage systems that do not lead to a POTW treatment works similarly are treated as contributors to a privately owned treatment works. These discharges are not covered by pretreatment standards (although they would be if a treatment works were later constructed), but instead are subjec to direct discharger standards applied under 40 CFR 122.44(m).

Question #2: What are the pretreatment implications where a treatment plant is privately owned but the collection system is publicly owned?

Answer: Where a treatment plant is privately owned but the collection system leading to it is publicly owned, the collection system does not meet the regulatory definition of "POTW" since it does not convey wastewater to a publicly owned treatment plant. See 40 CFR 403.3(o). Therefore, contributors to the system are not subject to Federal pretreatment requirements. */ As contributors to a "privately owned treatment works," however, they (and the public entity whose collection system discharges into the treatment plant) may be subject to requirements imposed under 40 CFR 122.44(m), which allows the Director to regulate such contributors, either as co-permittees with the owner/operator of the treatment plant or under separate permits (see Introduction, p. 2).

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*/ There may, however, be local sewer use ordinance limitations, similar to the prohibited discharge limitations in 40 CFR 403.5(a) and (b), that apply to contributors as a result of previous construction grant funding requirements (if Federal construction grants were used to construct the collection system). These limitations would generally be contained in a municipal ordinance covering discharges to the public sewer system.

Question #3: What are the pretreatment implications where a POTW is sold to a private party?

Answer: Where the entire treatment plant is sold, pretreatment requirements no longer apply since there is no longer any introduction of pollutants into a POTW (i.e., the treatment plant is now privately owned). This is true whether or not the collection system remains in public ownership. In the case of a partial sale of a POTW, the pretreatment implications depend upon which portion is sold. For example, if all system components located between an industrial user's outfall and the POTW's headworks (i.e., the sewer lines connecting the industrial user's facility to the public treatment plant) are sold to the industrial user, pretreatment requirements continue to apply since the industrial user is still introducing pollutants into a POTW (i.e., the treatment plant is still publicly owned). The only change is the point at which these requirements apply. Instead of applying where the industrial user's effluent enters the sewer, they now apply where the effluent enters the treatment plant (i.e., the headworks), since this is the point of introduction to the POTW. */

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*/ If other industrial users discharge to the now privately owned sewer upstream of the treatment plant, and any of the wastewater in the sewer is subject to a categorical pretreatment standard, the applicable limits where the effluent enters the treatment plant will be derived using the same flow-proportioning calculation required for individual industrial users who combine wastestreams after treatment. See 51 FR 21461-21462 (June 12, 198

Where part of the treatment plant is sold but the collection system remains in public ownership, whether industrial contributors to the collection system are subject to pretreatment requirements depends upon whether the treatment plant can still be characterized as "publicly owned." This in turn depends upon the nature and extent of private ownership. If the public and private entities are co-owners of the entire facility, it is still a POTW and pretreatment would apply. If, however, the different entities own distinct portions of the facility a case specific analysis tracing the waste would be required. If an industrial user's waste flows through any treatment process that is publicly owned, then the plant is considered a POTW and the contributor is subject to pretreatment. For instance, where the industrial user's waste flows sequentially through treatment processes that are owned by the public and private entities pretreatment would apply. This result derives from the fact that the waste is treated, even though only partially, by a publicly owned treatment works. If, however, complete treatment trains are distinct, though possibly identical and adjacent, the result would be different. The waste treated at the publicly owned portion would, of course, be subject to pretreatment requirements. The waste treated solely by the privately owned facility would not, but would instead be subject to requirements under 40 CFR 122.44(m).

Question #4: What are the NPDES permit implications where a POTW is sold to a private party?

Answer: Under the NPDES regulations, it is the "operator" of a facility who must apply for and comply with a permit. See 40 CFR 122.21(b). Thus, where a POTW is sold to a private party who also operates the plant, that party must apply for, and comply with, an NPDES permit. The permit limitations for the facility are no longer based on secondary treatment, but on BPT, BAT, BCT and/or NSPS (see Introduction, p. 2). If only a portion of the plant is sold, and the plant can still be characterized as a POTW (see Answer to Question #3, above), the permit limits would then be based on secondary treatment. In these cases, as in any case where the facility is still considered a POTW, the public entity also should be a co-permittee with the operator of the facility.

Where the treatment plant is sold but the collection system remains in public ownership, pretreatment requirements no longer apply. All contributors to the system are now subject to any requirements imposed under 40 CFR 122.44(m), which applies to privately owned treatment works. Under that provision, the Director may issue one permit under which some or all contributors are co-permittees or may issue separate permits. The publicly owned collection system is now a contributor to a privately owned treatment works and, as such, may also be made a co-permittee.*/ This will help to ensure that the collection

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*/ For example, the permit might contain a condition requiring the municipality to notify the privately owned treatment works operator of any significant change in the nature or volume of pollutants being discharged into the collection system.

system will continue to be operated as an integral part of the treatment system, thereby maximizing efficiency and avoiding conflicting interests between public and private parties.

Question #5: What are the pretreatment and NPDES implications where a POTW is leased to a private party?

Answer: Since a lease does not transfer ownership, it does not affect a facility's status as a POTW and therefore should not affect the application of pretreatment requirements. Contributors to the POTW must comply with pretreatment standards under §307(b) of the CWA. As in the case of mixed public-private ownership (see Answer to Question #4 above), the public entity should be a co-permittee even though the lessee is now the operator of the treatment works. With respect to permit limits, secondary treatment (or more stringent requirements under §301(b)(1)(C)) of the CWA) applies since the facility is still a POTW.

Question #6: What are the pretreatment and NPDES permit implications of a municipality contracting with a private party to operate a POTW?

Answer: Since an operating contract does not transfer ownership, it does not change the facility's status as a POTW. Therefore, the facility's NPDES permit limits will continue to be based on secondary treatment (at a minimum) and any industrial contributors will still be subject to applicable pretreatment requirements.

The NPDES regulations impose the duty to apply for a permit on the "operator" of a facility. 40 CFR 122.21(b). Historically, though, municipal NPDES permits have been issued to the municipality even where a private party operates the plant under a service contract. EPA's intent in adopting this requirement was to ensure that the permit would be issued to the person(s) with operational control over the facility. To be consistent with this intent, all private parties operating POTWs under contracts with municipalities should be NPDES permittees. As where there is mixed public-private ownership or the POTW is leased to a private party, since the facility is still a POTW the municipality also should be a co-permittee.

Question #7: What are the pretreatment and NPDES implications where a private party finances improvements to an existing POTW?

Answer: Pretreatment requirements will continue to apply if the upgraded facility can still be characterized as a "POTW." This will depend upon the nature of the privately financed improvements (see Answer to Question #3, above). If the private party also operates the plant, it must apply for an NPDES permit. If the plant remains a POTW, the municipality must also be made a co-permittee (see Answer to Question #7, above). In addition, secondary treatment (at a minimum), and pretreatment standards for industrial users, continue to apply.

Where the plant can no longer be characterized as "publicly owned," it will be regulated as a "privately owned treatment works" and thus will be subject to permit limits based on BPT, BAT and/or BCT (see Introduction, p. 2). This would occur where the private party owns the new treatment works or separate treatment train. Industrial contributors to the plant will be subject to any requirments imposed upon them under 40 CFR 122.44(m) (see Introduction, p. 2).

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 9/7/2017 2:21:55 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]
Subject: FW: Could you all contact Rep Meng?
Attachments: Interior approps amendments.docx

From: Tommy Holmes
Sent: Thursday, September 07, 2017 10:17 AM
To: PAUL RUSH <PRush@dep.nyc.gov>
Cc: Tracy Mehan <tmehan@awwa.org>; Steve Via <SVia@awwa.org>; Doersch, Patricia <patricia.doersch@squirepb.com>
Subject: Could you all contact Rep Meng?

Good morning, Paul!

The House Rules Committee, which determines what amendments can be taken up on the House floor when a bill is up for debate, has considered in order an amendment to take $1 million from WIFIA and send it to the National Parks Service. It is by Rep. Grace Meng, who represents Queens. Could you have your DC office put in a call to her and see what's up, and ask her to leave WIFIA alone? They could point out that the nation's need to reinvest in its water infrastructure has strong support on both sides of the aisle and in the minds of the public, so this is not the time to take away money from an infrastructure tool that has more applicants than it has money for already. I have attached a description of the amendment and inserted text below. Maybe she could withdraw her amendment.

Thanks,
Tommy

Tommy Holmes
Legislative Director
American Water Works Association
1300 Eye St. NW
Suite 701W
Washington, DC 20005 USA
Office 202.628.8303 | **Direct** Ex. 6
Mobile Ex. 6
tholmes@awwa.org | www.awwa.org

Interior-Environment Amendments in Order on Spending Bill

CQ Staff

The House Rules Committee on Wednesday made the following Interior-Environment amendments in order for debate on the fiscal 2018 omnibus spending bill (HR 3354):

- Reps. Martha McSally, R-Ariz., and Paul Gosar, R-Ariz., that would increase funding for BLM Forest Management by $316,000, offset by an equal reduction to BLM Management.

- Rep. Raul M. Grijalva, D-Ariz., that would increase funding for Superfund by $12 million, offset by an equal reduction to BLM Management.
- Rep. Darren Soto, D-Fla., that would reduce by $500,000, then increase by the same amount, funding for National Wildlife Refuge System. The amendment is intended to direct funding to the management of invasive species.
- Rep. Vern Buchanan, R-Fla., that would U.S. Fish and Wildlife Resource Management by $3 million, offset by and equal reduction to **EPA**» Departmental Operations.
- Reps. Don Bacon, R-Neb., and Gosar, that would increase funding for US Fish and Wildlife Resource Management by 4 million, offset by an equal reduction to the agency's land acquisition account.
- Rep. Brian Mast, R-Fla., that would increase funding for USGS Survey by $1 million, offset by an equal reduction to U.S. Fish and Wildlife Management.
- Rep. Joe Courtney, D-Conn., and four other Democrats, that would reduce funding by $300,000, then increase by the same amount, funding for the National Park Service. The amendment is intended to direct funding for operation of the National Park System for the New England Scenic Trail.
- McSally and Gosar, that would increase funding for the National Park Service by $10 million, offset by an equal reduction to «**EPA**» Management.
- Rep. David Cicilline, D-R.I., that would increase funding for the National Park System by $2 million, offset by an equal reduction to the agency's Operation account.
- Reps. James E. Clyburn, D-S.C., and Alma Adams, D-N.C., that would increase funding for Historically Black Colleges and Universities by $2 million, offset by an equal reduction to the Secretary's office.
- Rep. Denny Heck, D-Wash., and five other Democrats, that would prohibit funds from supporting "sanctuary cities" that prevent law enforcement officials from executing immigration laws.
- **Rep. Grace Meng, D-N.Y., that would increase funding for the National Park Service by $1 million, offset by an equal reduction to the Water Infrastructure Finance and Innovation Program.**
- Rep. Morgan Griffith, R-Va., that would increase the number of Appalachian states eligible for grants for the reclamation of abandoned mine lands to be used for economic and community development from 3 to 6.
- Griffith, R-Va., that would increase funding for «**EPA**» Environmental Programs and Management by $80 million, and reduce funding for Abandoned Mine Reclamation Fund for $75 million.
- Rep. Glenn Thompson, R-Pa., that would increase funding for the Abandoned Mine Land Reclamation program by $32 million, offset by an equal reduction to «**EPA**» Management.
- Rep. Tom O'Halleran, D-Ariz., that would increase funding for BIA construction by $10 million, offset by an equal reduction to Interior Department operations.
- Dels. Stacey Plaskett, D-V.I., and Madeleine Z. Bordallo, D-Guam, that would increase funding for Insular Affairs Assistance to Territories by $1 million, offset by an equal reduction to Interior Department operations. ……

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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 6/28/2018 8:59:33 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: New AWWA Guide to USDA Conservation Programs for protection of Source Water

AWWA releases guide to assist water systems in exploring USDA programs to protect source water

June 28, 2018

(DENVER) – The American Water Works Association today released a guide that highlights opportunities for water systems to utilize U.S. Department of Agriculture conservation programs to protect drinking water sources.

Over the past several years, AWWA, the largest association of water professionals in the world, has emphasized the importance of collaboration between the water community and agricultural producers to reduce nutrient runoff and better protect source waters. The online guide, titled USDA Tools to Support Source Water Protection, explains how utilities can leverage USDA programs – particularly through the Natural Resources Conservation Service (NRCS) – to expand the effectiveness of community partnerships.

USDA has funding and programs in place to assist farmers and ranchers in implementing conservation practices, including source water protection. The guide encourages water utilities to work with the agricultural community and local partners to access these programs for the benefit of all parties.

"The USDA conservation programs have tremendous potential to forge partnerships that benefit both agricultural producers and water consumers," said Tracy Mehan, AWWA executive director of government affairs. "This guide provides an inventory of available programs, guidance on how to access those programs and real-life case studies that demonstrate the power of utility-farmer collaborations."

The guide emphasizes that water utilities can:

1. Help shape how conservation dollars are spent, focusing them on the greatest benefits to source water protection.
2. Foster mutual trust and understanding between water systems and farmers, encouraging constructive problem-solving.
3. Make progress on specific source water concerns by focusing on practices that will best address them.
4. Save on treatment costs or delay or avoid installing additional treatment.
5. Reduce risks to their water supplies.
6. Increase public confidence in both water and agricultural sectors.
7. Leverage every dollar they contribute through NRCS and other partners.

AWWA is also bringing attention to the benefits of USDA conservation programs in the reauthorization of the U.S. Farm Bill. The Association created a whiteboard animation video to more clearly illustrate how these programs are key to protecting drinking water sources. It is available on AWWA's YouTube channel.

The U.S. House of Representatives recently passed its Farm Bill, the Agriculture and Nutrition Act of 2018, which includes several key measures advanced by AWWA over the past two years, focusing on source water protection. And the U.S. Senate is currently working on a bipartisan Farm Bill, the Agriculture Improvement Act of 2018, which also features source water protection advancements.

###

Established in 1881, the American Water Works Association is the largest nonprofit, scientific and educational association dedicated to managing and treating water, the world's most important resource. With approximately 51,000 members, AWWA provides solutions to improve public health, protect the environment, strengthen the economy and enhance our quality of life.

Printable version

American Water Works Association
Dedicated to the World's Most Important Resource ®

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 8/4/2017 2:36:49 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Fwd: AWWA Connections

Get Outlook for Android

From: AWWA <connections@awwa.org>
Sent: Friday, August 4, 2017 9:03:32 AM
To: Tracy Mehan
Subject: AWWA Connections

Having trouble viewing the email below? Please click here.
Note: To ensure delivery to your inbox please add connections@awwa.org to your address book.

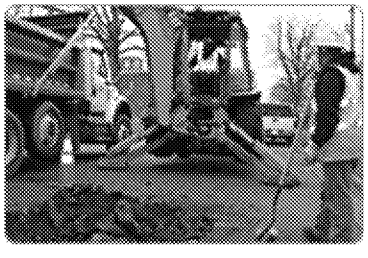
American Water Works Association

AWWA CONNECTIONS®

Replacement guidance

A new standard for getting the lead out

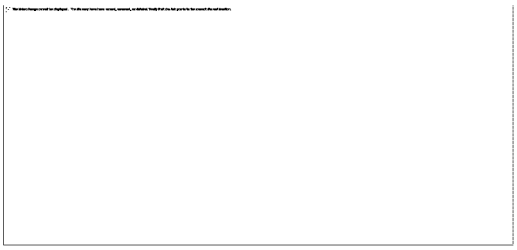
By Ann Espinola



Engineers are putting the final touches on AWWA's newest standard, the first ever to cover the complexities of lead service line replacement.

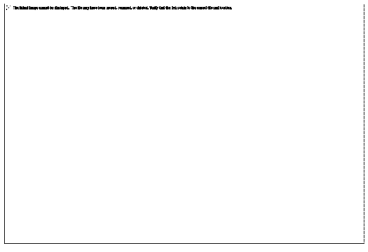
"It gives utilities good guidance, information for the work, communicating with their customers, flushing, and then follow up testing and verification," said Paul Olson, AWWA's senior manager of standards.

This will be AWWA's 179th standard. Read More...



Meeting narcolepsy? RX for bosses and employees

By Stuart Karasik, PhD



Whenever I run into former colleagues who still work full-time, the one question that always comes up is: "What do you miss least about working?"

My response is immediate: "I don't have to go to endless, boring, meetings."

Don't get me wrong -- I loved my job. But I did work for a municipality and, as we all know, the one thing government does best is meetings. There were meetings about everything you could think of that were scheduled more often than needed. To be inclusive, invites usually went out to more than the necessary number of attendees, and the employee level frequently ranged from entry level to deputy directors.

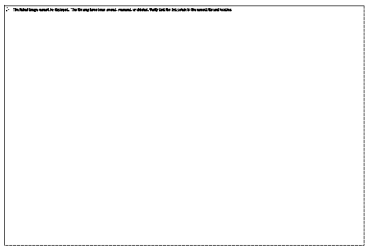
This made meetings difficult to manage and attend. Participants often become disengaged to the point of tuning out, falling asleep, or just not showing up. This is unfortunate because the reasons for the meeting were usually valid and decisions needed to be made.

Recently, Dilbert creator Scott Adams ran a cartoon on falling asleep at meetings. His solution was to have employees see their doctors to get a prescription so they could stay awake, or make "meeting narcolepsy" a valid excuse that would not be subject to discipline.

That made me think, what can employees and supervisors do to make meetings more effective? Read

More...

'These scholarships are more important than ever before'



When you're one of four siblings -- and two of them are in college -- your parents might not be able to help with tuition, room, board, and all the other expenses of college life.

That was the case for Jennifer Liggett, an environmental studies major who carried a demanding course load, worked full time, and held two jobs during summer breaks.

"I was so worried about paying for tuition and books, and this was after taking out loans AND living at home with my parents," said Liggett, now 32.

Then she won a scholarship administered through AWWA and funded by an AWWA member organization. AWWA administers 18 scholarships for future water professionals, including three funded through AWWA's philanthropic outreach program known as The Water Equation.

The scholarship money dramatically impacted Liggett's graduate school experience. Read More...

Member Spotlight

Engineer guides 2017 Disinfection Survey

Scott M. Alpert, PhD, PE

Job and Employer: Associate at Hazen and Sawyer, Charlotte, N.C.

Educational background: Bachelor of mechanical engineering and master of science in environmental engineering, both from Georgia Tech; and PhD from North Carolina State University

Age: 47

What is the biggest challenge you've faced in your career? One of the challenges all engineers face is wanting to have all the data and ensure perfection in our work. However, sometimes you don't have all of the data and have to make the best decisions based on the data you do have. So, finding that balance between perfection and high quality can be challenging.

Tell us about your work on the Disinfection Committee. Because of my interest in disinfection and UV technologies, I served on the committee for a few years before having the opportunity to serve as the current committee chair. Half-way through my term, I can say that I've enjoyed helping to lead initiatives and

working with some incredible colleagues. I look forward to seeing the results of the 2017 Disinfection Survey and the trends and challenges facing the disinfection community today. And, if I can do a quick public service message to the utility leaders reading this – Please help us by completing the survey, because the more responses we receive, the better our data and conclusions will be!!!
Read More...

Upcoming Events

Infrastructure Finance Series: Innovative Public and Private Financing Options for Utilities / Aug. 16

How to Implement Utility Climate Action Plans Webinar / Aug. 22

Effective Utility Management Seminar / Aug. 23 - 24, Pacific Grove, Calif.

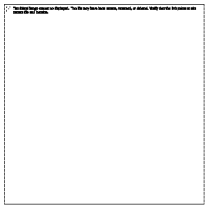
Best Practice Water Audits and Loss Control Programs Seminar / Aug. 29 - 30, Saskatoon, SK Canada

Water Treatment Operator Level 2 / Sept. 11 - Oct. 13 / Online

Guidance on Cross Connection Control Program Selection and Responsibilities Webinar / Sept. 13

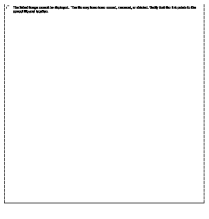
Pass your operator exam the first time

AWWA's Water System Operations (WSO) series is easy to use for both students and trainers. The guides are illustrated with full color graphics, and also contain more than 100 study questions, as well as access to additional online video resources. It is the only book series that meets the ABC-Need-to-Know Criteria. Learn More...



Get access to AWWA's new Buried No Longer tool

Buried No Longer® is an online economic forecasting tool for pipe repair and replacement. Utilities enter data and the tool provides cost estimates under a base model as well as with financial deferrals built in. The output data can be broken out by pipe size or pipe material categories. Learn More...



AWWA Connections is published every other Friday for members. It features water community news and colleague profiles, opportunities to engage and network, career development tips and more. If you have a comment or story idea for *Connections*, please contact us at connections@awwa.org.

.

American Water Works Association
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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 8/7/2017 1:25:58 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: WIFIA
Attachments: MehanOpEdWIFIA.pdf

Lee,

Thanks, again, for taking the time to visit with me. Let me know if you ever require any kind of briefing from our team here at AWWA.

I was very pleased to discuss WIFIA with you (among other pressing issues) and thought you might find the attached op-ed of interest.

All the best.

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (cell)

Attachment

Cleaning Water and Cutting Budgets: A Case for the Water Infrastructure Finance and Innovation Act

By G. Tracy Mehan, III and Ian D. Gansler

We expect that when we make our morning coffee or mix a baby's formula, we're using water that is safe to drink. In reality, our nation is facing an investment crisis, with $1 trillion needed over the next 25 years if we are to maintain current levels of service for a growing population. The longer this investment is delayed, the more expensive it will become.

This is truly a bipartisan issue, with Democrats and Republicans alike admitting it is time to find a solution. On the campaign trail President Donald Trump called attention to the issue, promising to, "refocus the EPA on its core mission of ensuring clean air and clean, safe drinking water for all Americans" at a speech in Pittsburgh. In his first address to Congress, President Trump reiterated his call for a $1 trillion infrastructure investment package.

At the same time, the Federal Government faces immense budgetary constraints. According to the Congressional Budget Office's report, "The Budget and Economic Outlook: 2017-2027," federal debt is projected to rise from 77% of GDP today to an all-time high of 145% of GDP by 2047, exceeding record post-WWII levels of 106% of GDP. Entitlement spending programs like Social Security, Medicare, and Medicaid also loom in the future as crippling budgetary outlays, dwarfing the current levels of federal debt. Lawmakers face twin pressures to solve problems and save money.

The Water Infrastructure Finance and Innovation Act (WIFIA) is one solution that could strike that balance. WIFIA is a financing program, meaning its assistance comes in the form of loans. Any money paid out for projects comes back to the government as the loan is repaid. Towns and cities undergoing infrastructure projects often do not have the cash on hand to pay for the work, so they look to loans and bonds to raise funds, paying it back over the years. Rather than taking out a high-interest loan, WIFIA allows borrowers to take out a loan from the US Treasury, which offers the lowest interest loans on the market.

The current appropriation for WIFIA is $20 million. While this is a drop in the bucket when it comes to the federal budget, that drop will go a long way. The $20 million is only the "subsidy cost" of WIFIA, meaning it covers infrastructure projects that will default and never pay back the loan. The Fitch Rating Agency estimates that only about 0.04% of water infrastructure projects end in default, an extremely reliable rate. That means every dollar appropriated to WIFIA can leverage $67 in investment. If Congress

appropriates WIFIA the full $45 million that it authorized for FY2018, the program could leverage in excess of $2 billion in credit assistance.

WIFIA is set up to complement the State Revolving Funds (SRF), a long-standing federal grant program that gives funding to the states to distribute for water infrastructure projects. President Trump, on his campaign website under the "Infrastructure" heading, promised to "Triple funding for state revolving loan fund programs." Only 49% of a project can be funded through WIFIA; the other 51% must come from other sources, allowing space for the SRF and private equity investments.

SRF's have a right of first refusal over WIFIA applications, allowing them to elect to fund a WIFIA project themselves if they prefer to do so at the same interest rate as WIFIA. SRF's can also apply for WIFIA loans themselves, bolstering their funds to finance one or a group of projects. Many state SRF's just don't have the capacity to fund some larger infrastructure projects. The minimum project cost for a WIFIA loan is $20 million (or $5 million for a small community), which allows SRF to focus on a greater number of smaller projects.

In a budget climate that puts every penny of taxpayer money under a magnifying glass, WIFIA makes a big impact at a small price, creating more than $2 billion in capital with only a $45 million expenditure. In a November New York Times interview, then President-elect Trump said, "Crystal-clean water is vitally important." Too often we take this for granted. When we turn on the tap, the water that comes out safe to drink. President Trump believes in the importance of clean water. WIFIA would be a powerful tool to make it a reality for every American. It is a program he can build upon to achieve his goal of infrastructure renewal.

G. Tracy Mehan, III, is former Assistant Administrator for Water at US EPA in the administration of President George W. Bush. He is now executive director for government affairs at the American Water Works Association, the world's oldest and largest water association with 50,000 members. Ian Gansler is the Legislative Affairs Intern for the American Water Works Association.

Message

From: Smith, Wil [wsmith@epri.com]
Sent: 6/27/2018 3:01:29 PM
CC: Hunter, David [DHUNTER@epri.com]; Washington Seminars [WashingtonSeminars@epri.com]
Subject: EPRI-IEA Washington Seminar/ July 19/ Fuels of the Future
Attachments: IEA-EPRI Cross Border Workshop - DRAFT AGENDA.pdf; EPRI Washington Seminar - Fuels of the Future.pdf

Dear Colleague,

Please join EPRI and the International Energy Agency on Thursday, July 19, for the next EPRI Washington Seminar: Fuels of the Future. The seminar will take place in EPRI's Washington DC office, 1325 G ST NW Suite 1080, from 11:30 am to 2:00 pm. Lunch will be provided. **Space is limited and registration is required.**

Numerous changes within the energy sector could significantly impact both the type of fuel and the manner in which it is used in the future. For example, EPRI's US National Electrification Assessment (April 2018) shows that electricity as a share of end use technologies could increase from 21% today to as much as 47% by 2050. While this increased adoption of electric technologies occurs in a variety of sectors including buildings and industrial processes, the growth is primarily driven by transportation. In combination with efficiency improvements, this electrification could reduce petroleum use in the US transportation sector by nearly 60% between 2015 and 2050.

Energy sector changes impacting future fuel use are not limited to the US. In fact, changes in transportation and electrification in China and India have the potential to significantly reshape the global energy landscape.

This EPRI Washington Seminar, co-hosted by the International Energy Agency, will take an in-depth look at the potential fuel use and make-up of the future, with a specific focus on electrification in the US and Asia and implications for the petroleum sector. We invite policymakers, energy stakeholders, and customers to join our expert presenters in sharing insight into the fuels of the future.

Agenda

THURSDAY, JULY 19, 2018		
TIME	**TOPIC**	**PRESENTER**
11:30 a.m.	*Networking Lunch*	
12:00 p.m.	Welcome and Introductions	*David Hunter, Senior Government and External Representative, EPRI*
12:10 p.m.	US Electrification and its Implications for Long-term Fuel Consumption	*John Bistline, Principal Technical Leader, Energy and Environmental Analysis, EPRI*
12:35 p.m.	Global Energy Futures: Implications for Emerging Economies	*Matt Wittenstein, Sr. Energy Analyst, International Energy Agency*

1:00 p.m.	Energy Future Outlook for Oil and Gas	*Kevin Book, Managing Director, Clearview Energy Partners, LLC*
1:25 p.m.	Discussion and Q&A	
2:00 p.m.	End	

Thursday, July 19, 2018
Seminar: 11:30 am – 2:00 pm
Lunch will be provided
EPRI Washington DC Office,
1325 G Street NW, Suite 1080
Registration is required

http://www.cvent.com/d/tgqdc0

We hope you can join us.

Upcoming EPRI events:

August 20: EPRI/ IEA Workshop on Cross-Border Energy and Capacity Trading (Agenda Attached)
Long Beach, CA

EPRI is pleased to join the IEA in hosting this day-long workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing relevant IEA member countries and other stakeholders to learn from the CAISO-Mexico example and bring their own experiences to bear. This workshop will be co-located with Electrification 2018. The agenda is attached. **To register please click here.**

August 20-23: Electrification 2018
International Conference and Exposition
Long Beach Convention Center, Long Beach, CA

EPRI's biggest event of the year, Electrification 2018, will be a 3 day international conference and exposition taking place in Long Beach, CA, Aug 20-23. Electrification will explore the critical issues, benefits, and opportunities of electrification with an unparalleled collection of industry experts:

- Learn about the capabilities and potential of today's electric technologies
- Understand the disruptive benefits and impacts of emerging electric technologies
- Discuss key policy, regulatory, and environmental issues
- Participate in expert training sessions and other professional development opportunities
- Experience a diverse array of technologies in our exposition hall
- Network with industry, government, and academic leaders to form collaborations and help build the future of electrification

Be sure to register by June 30 to get discounted rates!

Save the Date: November 6-8: EPRI-IEA Challenges in Electricity Decarbonization Expert Workshops
Paris, France

The 5th Annual EPRI-IEA Challenges in Electricity Decarbonization Expert Workshop will again focus on electrification and its implications for the electricity sector. The workshop will be held jointly with the 18th EPRI-IEA-IETA GHG Emissions

Trading Workshop. Details TBA. Space is limited. Please email WashingtonSeminars@epri.com with expressions of interest.

Hope to see you there!

Best,
Wil

Wil Smith
Government & External Relations Associate
Electric Power Research Institute
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Washington, DC 20005
Tel: Ex. 6
Email: wsmith@epri.com

David E. Hunter, Ph.D.
Sr. Government and External Representative
Electric Power Research Institute
1325 G ST NW Suite 1080
Washington, DC 20005
Tel: Ex. 6 (m)
Fax: 202-293-6187
Email: dhunter@epri.com

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

International Energy Agency

EPRI Washington Seminar Series: Fuels of the Future

Thursday, July 19, 2018

1325 G St. NW, Suite 1080 Washington, DC 20005

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Thursday, July 19, 2018

11:30 am – 2:00 pm

Lunch will be provided

1325 G St. NW, Suite 1080 Washington DC

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EPRI Washington Seminar Series: Fuels of the Future

Agenda

THURSDAY, JULY 19, 2018		
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1:25 p.m.	Discussion and Q&A	
2:00 p.m.	End	

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1325 G Street NW Suite 1080, Washington, DC 20005 USA • 202.293.7518 • Customer Service 800.313.3774 • www.epri.com

Cross-border Energy and Capacity Trading

Intra- and international experiences in the Western Interconnection

August 20th 2018
Hyatt Regency Long Beach
200 South Pine Avenue
Long Beach, California, USA
(Held on the side of the Electrification 2018 international conference)

Power system integration can be a tool for improving electricity security, reducing system costs, and enabling the integration of variable renewable resources. For example, rising penetrations of variable renewable generation in the Western Interconnection is driving increased regional collaboration, for example through the development of the Western Energy Imbalance Market (WEIM). One question that has arisen is the extent to which the potential benefits of regional collaboration would extend to greater integration of Mexico's Baja California power system with the California Independent System Operator (CAISO) system in the United States.

In this context, the International Energy Agency (IEA) and Electric Power Research Institute (EPRI) are jointly organizing a workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing other relevant IEA member countries to learn from the CAISO-Mexico example, and bring their own experiences to bear.

Background

The first stage of the IEA's work on "Electricity Security Across Borders" has focused on a "stock-taking" exercise in the form of a series of case studies. Two common elements have emerged from these case studies. First, successfully integrating large shares of variable renewables requires increased real-time cross-border collaboration. Second, there is a growing interest in establishing the trade of *capacity* across borders. Capacity trading is of particular relevance to the question of electricity security, as without trade in capacity jurisdictions are less likely to rely on their neighbours to meet system needs in times of stress. This can lead to overdevelopment of domestic or local capacity, which can in turn impact the cross-border trade of energy.

Through the organisation of this workshop, the IEA and EPRI seek to highlight lessons learned through various case studies to an audience interested in better understanding the potential impact of cross-border capacity trading. The IEA and EPRI will encourage input from Mexico, the United States, and a relevant group of expert stakeholders, allowing these lessons learned to not only inform the question of cross-border energy trading along the U.S. Mexico border and elsewhere.

The meeting will be informal in nature and held under Chatham House Rule. Attendance is by invitation only.

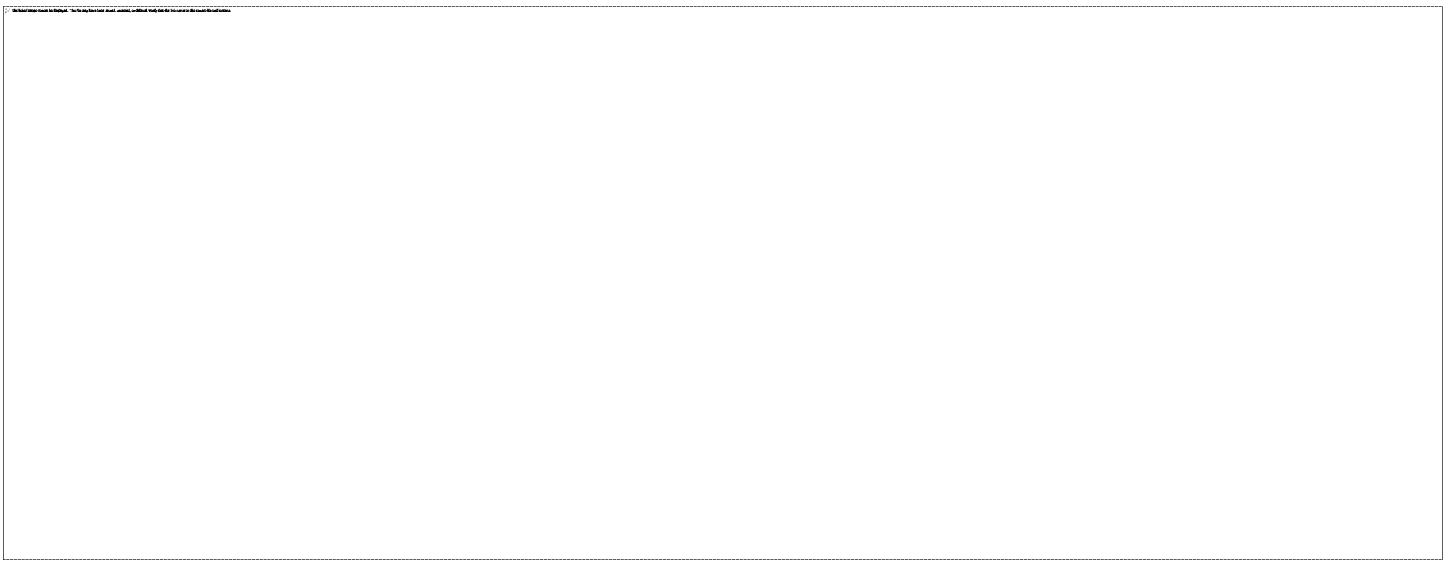
Draft Agenda

07:30 – 08:30	**BREAKFAST AND REGISTRATION**
08:30 – 09:00	Opening remarks • **Peter FRASER**, Head of Gas, Coal and Power Markets Division, IEA • **Anda RAY**, Senior Vice President, External Relations, EPRI
SESSION 1	**BENEFITS AND CHALLENGES OF COORDINATED PLANNING**
09:00 – 10:30	Power system planners around the world have long recognised the benefits of regional power system integration. At the same time, cross-border integration requires coordinated planning and operations. This session will look at examples from North America and Europe in order to highlight the benefits and challenges of regional integration. *Moderator:* **David HUNTER**, Senior Government and External Representative, EPRI *Panelists:* • Why integrate power systems? Lessons from Electricity Security Across Borders **Matthew WITTENSTEIN**, Senior Electricity Analyst, IEA • Regional power system planning: Examples from North America **John TABER**, Technical Leader, EPRI • The North American Renewable Integration Study **Greg BRINKMAN**, Researcher, Grid Systems Analysis Group, NREL
10:30 – 11:00	**COFFEE BREAK**
SESSION 2	**CROSS-BORDER ENERGY TRADING: CURRENT PRACTICES IN THE US**
11:00 – 12:30	This session will focus on the current experiences energy trading among US market participants. Participants will discuss the development of the Western Energy Imbalance Market's technical underpinnings and governance frameworks, and how the WEIM fits into the Western Interconnection more broadly. It will also invite participants from other parts of the United States to share relevant experiences. *Moderator:* **Peter FRASER**, Senior Government and External Representative, EPRI *Panelists:* • Development of the WEIM: Drivers of integration and technical challenges **Roberto BAYETTI**, Director of QA, Architecture and Model Management, CAISO • Regulatory and policy drivers of cross-border integration **Scott MILLER**, Executive Director, Western Power Trading Forum • Power trade between RTOs/ISOs in the Eastern Interconnection **TBD**
12:30 – 13:30	**LUNCH**

SESSION 3	CROSS-BORDER ENERGY TRADING: INTERNATIONAL PERSPECTIVES
13:30 – 15:00	This session will focus on the current experiences and the future potential for international power trading. Specifically, it will discuss the evolution of the current market arrangements, with views from all three relevant countries (Canada, the US, and Mexico) represented. *Moderator:* **Matthew WITTENSTEIN**, Senior Electricity Analyst, IEA *Panelists:* • Perspectives on joining the WEIM: the view from Mexico **Marcos VALENZUELA**, Centro Nacional de Control de Energía (CENACE) • Canada and the WEIM **Mike MACDOUGALL**, Director, Trade Policy, Powerex • Trading power with Mexico **Eduardo ARRIOLA**, Subdirector for Generation, CFE
15:00 – 15:30	COFFEE BREAK
SESSION 4	ESTABLISHING CROSS-BORDER CAPACITY TRADING
15:30 – 17:00	The final session of this workshop will be a deep-dive into what would be required to establish cross-border capacity trading between Mexico and CAISO. Relevant examples will be brought in from other US markets and international experiences (in particular, Europe). *Moderator:* **TBD,** EPRI *Panelists:* • Technical and legal changes required to trade capacity with Mexico **TBD**, CAISO • Capacity trading between ISOs/RTOs – technical requirements and existing procedures **Craig GLAZER**, Vice President – Federal Government Policy, PJM • Technical and legal changes required to import capacity to Mexico **Ivan CAJEME VILLARREAL**, Secretaría de Energía de Mexico (SENER)
17:00	Closing remarks
	FOLLOWED BY RECEPTION

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 7/3/2018 2:14:15 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: from Bloomberg
Attachments: ATT00001.txt



Water from an emergency reserve, for use during drought conditions.
Photographer: David McNew/Getty Images
News

Senate Water Bill Would Blow Hole in Deficit, Budget Agency Says

Posted June 29, 2018, 6:37 PM
By David Schultz

- Analysis finds Senate water bill to boost deficit more than $3 billion
- Republicans say provisions will be fixed before bill lands on floor

A landmark water resources bill in the Senate would blow a hole in the federal deficit, Congress' nonpartisan economic analysts said June 29.

However, the bill is still primed for an easy passage through the chamber because its budget-busting sections will be rewritten before the legislation reaches the Senate floor, Republican staffers told Bloomberg Environment.

The water resources legislation, S. 2800, won approval from the Senate Environment and Public Works committee last month on a unanimous 21-0 vote. If the committee-approved legislation is enacted, it would boost the deficit by more than $3 billion over the next decade, according to an analysis by the nonpartisan Congressional Budget Office.

The lion's share of this $3 billion would come from a section of the bill that would dramatically expand a new program at the Environmental Protection Agency that provides low-cost loans for water infrastructure projects.

The CBO found that expanding this program would lead cities and towns to issue many more tax-exempt bonds than they otherwise would have, which would deprive federal coffers of more than $2.6 billion in revenues over the next decade.

About $378 million of the deficit spending would come from mandatory reimbursements that the Army Corps of Engineers would have to pay to states, municipalities, and other third parties who work on federal water infrastructure projects.

Rewrites Coming

Environment and Public Works aides told Bloomberg Environment this water loan section of the bill would be rewritten before the bill is taken up on the Senate floor to make the legislation deficit-neutral. The staffers also said the bill is still on track to retain the bipartisan support it enjoyed in the committee and that it will likely make it to the floor before Labor Day.

Congress typically passes a water resources bill every other year. These bills contain lists of which mega-projects the Army Corps of Engineers can proceed on, and also often include significant changes to water policies.

Before 2014, Congress passed only one water resources bill in 14 years. Lawmakers on the committees that handle infrastructure in both the House and the Senate have frequently expressed a desire to get the water resources process back on track.

The House cleared its own version of the water resources bill earlier this month on a 408-2 vote. The CBO's estimate of that bill, H.R. 8, found that it would generate only $5 million in deficit spending over the next decade.

The White House has said it would sign the House bill into law, but has not commented on the Senate's version.

To contact the reporter on this story: David Schultz in Washington at dschultz@bloombergenvironment.com

To contact the editor responsible for this story: Rachael Daigle at rdaigle@bloombergenvironment.com

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 7/13/2017 3:20:14 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: DataPoint: Budget Committee Eyes Cuts to Mandatory Spending

http://www.politico.com/pro/blog/budget-committee-cuts-datapoint

FYI.

GTM

Message

From: Patricia Chism [pchism@awwa.org]
Sent: 7/5/2017 4:38:31 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Tracy Mehan [tmehan@awwa.org]
Subject: RE: Meeting with AWWA

Great!

It's on Tracy's calendar for Monday, July 31st at 11am.

Thank you,

Patricia Chism
Office Coordinator
American Water Works Association
Direct Ex. 6
pchism@awwa.org | www.awwa.org

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Wednesday, July 05, 2017 12:33 PM
To: Penman, Crystal <Penman.Crystal@epa.gov>; Patricia Chism <pchism@awwa.org>
Subject: RE: Meeting with AWWA

Great! It looks like we have a time to meet.

From: Penman, Crystal
Sent: Wednesday, July 5, 2017 12:28 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Patricia Chism <pchism@awwa.org>
Subject: RE: Meeting with AWWA

11am will work.

Crystal Penman
Program Specialist
Office of Water
Immediate Office
U.S. Environmental Protection Agency
Work: 202-564-3318
Penman.Crystal@epa.gov

From: Forsgren, Lee
Sent: Wednesday, July 5, 2017 12:24 PM
To: Patricia Chism <pchism@awwa.org>
Cc: Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: Meeting with AWWA

Crystal,

Does that time work with my schedule?

Lee

-----Original Appointment-----
From: Patricia Chism [mailto:pchism@awwa.org]
Sent: Wednesday, July 5, 2017 12:21 PM
To: Forsgren, Lee
Subject: New Time Proposed: Meeting with AWWA
When: Monday, July 31, 2017 10:00 AM-10:45 AM (UTC-05:00) Eastern Time (US & Canada).
Where: EPA 1201 Constitution Ave NW, Washington DC 20640 WJCE 3219B Please call 202-564-5700 for escort

Tracy has a staff meeting from 9:30am to 10:30am. Would 11am work?

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 7/11/2017 2:50:18 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Southerland, Elizabeth [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=de08b1c1374b4f6cb5096fa5db6ef03b-ESouther]; Fontaine, Tim [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9381490efbf945f390051b5e18ace776-Fontain, Timothy]
Subject: Congress Summer of Fiscal Woe

https://www.realclearpolitics.com/articles/2017/07/11/congress_summer_of_fiscal_woe_134430.html

FYI

GTM

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 7/5/2017 1:40:10 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Politics as Lagging Indicator or Why Washington Is the Way It Is
Attachments: Politics as a Lagging Indicator Mehan June 2017.pdf

Dear Colleagues,

Attached is a short article of mine based on remarks I made to AWWA's Board of Directors at ACE '17 in Philadelphia. I thought you might find it of interest.

All the best.

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (cell)

Attachment

American Water Works Association

Dedicated to the World's Most Important Resource®

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POLITICS AS A LAGGING INDICATOR

Why Washington is the way it is.

By

G. Tracy Mehan, III

Executive Director, Government Affairs

American Water Works Association

June 2017

This column is derived from remarks delivered to the AWWA Board of Directors at ACE '17 in Philadelphia, PA this summer.

Washington, D.C. is sometimes referred to as 68 square miles surrounded by reality. An old joke for sure, but things are unusually unsettled in the Federal City these days for a variety of reasons, many of which having to do with the last election. But there are other trends, longstanding and persistent, welling up from the very nature of contemporary American society that are driving current political behavior with often unsettling outcomes. There are also disturbing elements of the federal government's fiscal situation making everything more contentious as liberals and conservatives, Republicans and Democrats face an endless stream of lose-lose choices when it comes to funding their preferred yet competing priorities.

This needs to be kept in mind as the water sector pursues new initiatives, say, for water infrastructure financing, in the days ahead. Every federal dollar spent for every purpose faces scrutiny and even good ideas rarely make it out of the political scrum. The fact that the Water Infrastructure Finance and Innovation Act, AWWA's signature legislative achievement, was funded for the first time this year is something to celebrate. Further, with budget cuts looming large, State Revolving Loan Funds have remained largely untouched and have even grown. This is good news, and perhaps a rare glint of common sense in today's troubled political waters.

The Blue State-Red State divide is not a purely political phenomenon. It is, at root, cultural, religious, social, racial and economic. The fact that now President Donald Trump pulled together a coalition, a plurality not a majority, sufficient to win the Electoral College was a stunning electoral event universally

testified to by all. My home state of Missouri normally is a bellwether state. Between 1904 and 2004 it always goes with the winner except for Adlai Stevenson and Barack Obama.

Trump won all but four Missouri counties. He lost Jackson (Kansas City), Boone (Columbia, the university town), St. Louis County and St. Louis City (a county-level jurisdiction). In the other 111 counties, he won all but 4 by margins of 60 percent or better, many in the 70-80 percent range. Urban, middle-class, racially diverse and more secular communities, were overwhelmed by white, rural, small-town counties, many suffering from the loss of light manufacturing due to globalization. The President won the state with 56.4 percent of the vote versus Secretary Clinton's 37.9 percent. Mitt Romney won by 9.4 percent in 2012.

Recall too that, nationally, President Trump won over 80 percent of Evangelicals.

So it should not come as a surprise that only 20 percent of Americans today "say they can trust the government in Washington to do what is right 'just about always' (4%) or 'most of the time' (16%)," according to the Pew Trust's National Election Study. Pew has been doing these surveys since 1958. Then, "about three-quarters of Americans trusted the federal government to do the right thing almost always or most of the time."

What makes these data even more challenging is that so many citizens distrust the government for different reasons. What agitates a Bernie Sanders voter is very different from what a Ted Cruz supporter finds disturbing. Thus, consensus is illusive. Again, this is all compounded by regional, cultural and economic differences and a general sense of disconnection from Washington. With one exception. Most Americans receive, or expect to receive, substantial transfer payments from the federal government. It is not an accident that President Trump, Secretary Hillary Clinton and Senator Bernie Sanders pledged not to touch or cut entitlements during their respective political campaigns.

Polarization and gridlock are not just functions of a nation divided by culture, economics, religion, race and the like. There is a sharp divide on budget and fiscal matters due to the straight jacket created by resistance to more taxation and a disinclination to restrain the cascade of entitlement spending-Medicare, Medicaid and Social Security, mandatory not discretionary spending, along with payment on the national debt with low interest rates soon to rise if the Federal Reserve is to be believed.

According to the Congressional Budget Office's (CBO) report, *The Budget and Economic Outlook: 2017-2027* (January 2017), things are not looking so good for the federal fisc: "The Congressional Budget Office projects that over the next decade, if current laws remained generally unchanged, budget deficits would eventually follow an upward trajectory-the result of strong growth in spending for retirement and health care programs targeted to older people and rising interest payments on the government debt, accompanied by only modest growth in revenue collections," states the CBO. "Those accumulating deficits would drive debt held by the public from its already high level up to its highest percentage of gross domestic product (GDP) since shortly after World War II ."

While we are talking big numbers here, a $559 billion budget deficit for FY 2017 and a national debt of over $19 trillion (with a "t"), this is just the bond debt held by the public. It is entitlement spending, as noted above, which is the very real Death Star looming over the nation and the economy.

Niall Ferguson, a Harvard economic historian and host of the PBS television documentary, "The Ascent of Money," argues in his book, *The Great Degeneration: How Institutions Decay and Economies Die* (2012), that "the statistics commonly cited as government debt are themselves misleading, for they encompass only the sums owed by the government in the form of bonds."

"But the official debts in the form of bonds do not include the often far larger unfunded liabilities of welfare schemes [*sic*] like…Medicare, Medicaid and Social Security," writes Ferguson. "The best available estimate for the difference between the net present value of federal government liabilities and the net present value of future federal revenues is *$200 trillion, nearly thirteen times the debt as stated by the U.S. Treasury."* (Emphasis added).

Everyone in Washington wants more of something but, again, usually very different things: more benefits, more tax cuts, more defense spending, more infrastructure, more subsidies. But the inherent limits of the budget process, along with current law, rigorous budget scoring congressional rules (PAYGO or "Pay-As-You-Go"), are forcing tough trade-offs. Any new spending requires a reduction in spending elsewhere or new revenue. There is no rising tide to lift all the boats to flip Jack Kennedy's famous quote on its head. The budget process is barely functioning anymore and is another fraught political interaction between the Democratic and Republican caucuses looking for very different things for their respective Blue and Red constituencies.

These are not harmonious times in Washington, D.C. and the nation at large. Politicians are as much a result of the current national distemper as a cause. Politics in the nation's capital is a lagging indicator. AWWA's voice, advocating for smart water policy and promoting public health and the environment, has never been more critical.

Message

From: Patricia Chism [pchism@awwa.org]
Sent: 6/30/2017 9:47:15 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Automatic reply: Congratulations

Thank you for your email.

I am out of the office with no access to email. I will return on Wednesday, July 5th, 2017.

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 6/30/2017 7:00:48 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Congratulations

Dear Lee,

Congratulations on your new appointment in the Office of Water, my favorite office at the agency. I think you will enjoy working with all the fine folks there.

After you get settled in, I would be happy to drop by to provide you with any information you might find helpful relative to AWWA, SDWA, infrastructure finance and the like.

Good luck with the new job and have a great 4th of July.

Tracy

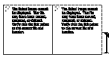
G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
1300 Eye Street, N.W., Suite 701W
Washington, D.C. 20005
Ex. 6 (cell)
tmehan@awwa.org

Message

From: Adam Krantz [AKrantz@nacwa.org]
Sent: 5/3/2018 2:16:10 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Nathan Gardner-Andrews [NGardner-Andrews@nacwa.org]
Subject: Re: Water Associations Engagement Meeting Call in Ex. 6 passcode Ex. 6

Lee: Thanks for the invitation - unfortunately NACWA has a conference in Providence at the same time that I need to attend. Nathan Gardner-Andrews on our staff will attend and has already RSVPed with Crystal. Please add him to the email list if possible. Thanks and apologies for having to miss this important discussion. Hope you are doing well, Adam.

Adam Krantz | CEO | NACWA: Ex. 6

 No matter your interest, NACWA's got you covered! Join us for the *National Pretreatment & Pollution Prevention Workshop & Training* from May 15-18, 2018 or *Strategic Communications: H2O* from June 6-7, 2018.

On May 3, 2018, at 9:24 AM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Dear Stakeholders,
>
> As you know, EPA is committed to rebuilding the country's aging water infrastructure. We are also committed to working collaboratively with our stakeholders. Addressing infrastructure is complex, and we need your input to develop the most effective solutions.
>
> You are invited to a discussion session with the leadership of EPA's Office of Water, as part of the 6th annual National Infrastructure Week. Topics of discussion will include affordability, governance, the Water Infrastructure Finance Innovation Act (WIFIA) and State Revolving Funds (SRFs). Targeted questions for each topic area will be shared in advance of the meeting.
>
> The meeting will be on May 15th, 9:00 – 10:30 am, at EPA's Headquarters, 1200 Constitution Avenue NW, Washington, D.C.
>
> Please RSVP at your earliest convenience to Crystal Penman (penman.crystal@epa.gov<mailto:penman.crystal@epa.gov>).
>
> Sincerely,
> Lee Forsgren
>
> <Real ID Information.pdf>
>
> <meeting.ics>

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 5/30/2018 3:27:44 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Fracking, directional drilling, economics, environment and foreign policy
Attachments: Windfall Review.pdf

Dear Colleague,

Attached please find my review of Meghan O'Sullivan's new book, Windfall: How the New Energy Abundance Upends Global Politics and Strengthens America's Power. This review will appear in an upcoming issue of The Environmental Forum (Environmental Law Institute).

I hope you find it of interest. All the best.

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (direct)
(cell)

Attachment

Fracking Files

Mixing Energy, Economics, and Geopolitics

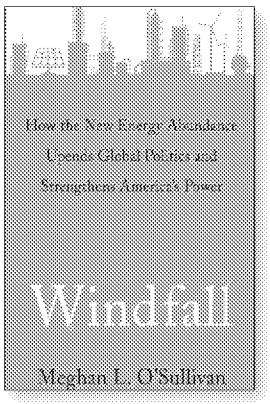
By G. Tracy Mehan III

Meghan L. O'Sullivan tells the story of how, on one hazy Sunday in late February 2016, the 935-foot, 100,000-ton *Asia Vision* was maneuvered into position by four red, white and green tugboats so as to perfectly align this behemoth with the four loading arms of the jetty at Sabine Pass terminal, "part of a one-thousand-acre facility straddling the Texas-Louisiana border."

"With a wrench the size of a human arm, workers secured the ship to the jetty," writes O'Sullivan. "Natural gas, which had been cooled to –260 degrees Fahrenheit and liquefied over the course of traveling through more than a mile of steel pipe and refrigerating systems, flowed into the tanker." A few days later, the ship sailed on to Brazil with its three billion cubic feet of gas.

This historic event was the culmination of more than a decade of work by an American company, Cheniere Energy, at a cost of $20 billion, to develop this extensive LNG operation — without ever turning a profit. Indeed, "the *Asia Vision* was the first vessel carrying LNG that shipped from the lower forty-eight states since the 1960s. After decades of fretting about its burgeoning dependency on imported energy, the United States had become an exporter of natural gas," observes O'Sullivan in her new Simon & Schuster book *Windfall. How the New Energy Abundance Upends Global Politics and Strengthens America's Power.*

The epiphany of the voyage of the *Asia Vision* illuminates the amazing developments in America's energy sector, developments not without controversy, showcasing entrepreneurial drive, technological innovation, and a boom in the nation's production of tight oil and shale gas through new techniques such as hydraulic fracturing and directional drilling. The impacts of this revolution in energy production encompassed everything from local land use battles to gross domestic product, international oil and gas markets, the climate change debate, geopolitics, and the rise and decline of nations across the globe.



Windfall: How the New Energy Abundance Upends Global Politics and Strengthens America's Power. By Meghan L. O'Sullivan. Simon & Schuster; 479 pages; $29.00.

Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States. Environmental Protection Agency.

Water and Hydraulic Fracturing: A White Paper From the American Water Works Association.

The drastic reversal of the American energy situation, certainly since the 1973 OPEC embargo, is demonstrated by the fact that Cheniere "had gambled big in 2003 to build facilities on the U.S Gulf Coast to import expected waves of LNG," which O'Sullivan calls "a second multibillion dollar wager." She says, "Banking that this reversal of energy fortunes would turn the United States into an exporter of natural gas, they convinced investors to support their efforts to convert these facilities from importing LNG to exporting it."

The "unconventional boom" in the production of shale gas and tight oil, the "windfall," was led by the estimable George Mitchell, the struggling petroleum engineer who pioneered hydraulic fracturing, or fracking, along with dozens of small and midsized American companies, transforming the world of energy. In 2006 the United States produced enough shale gas to heat 15 million homes a year. By 2014, it could, hypothetically heat 200 million homes. By 2015 more than half of all natural gas produced in the country came from shale, compared to just 6 percent a decade earlier.

What worked for shale gas worked for tight oil, starting in the first decade of the 2000s. Production from places like Eagle Ford in Texas and the Bakken fields in North Dakota resulted in American tight oil production surpassing Iraq's overall production by 2014.

"In the same year, burgeoning U.S. tight oil production pushed overall American crude output to be 10 percent of the world's supply," writes O'Sullivan, a professor at Harvard's Kennedy School of Government and formerly deputy national security advisor for Iraq and Afghanistan for President George W. Bush. "Accounting for nearly half of overall U.S. crude oil production, tight oil was the driving force behind America's oil resurgence."

If the diligent reader were to scour O'Sullivan's 146 pages of notes, he or she would be rewarded with the following nuggets: the number of wells in the Barnett Shale (Texas) rose from 2,070 to 17,980, an increase of 750 percent. And this: nat-

ural gas production in the Barnett grew from 834 million cubic feet a day in 2003 to 5,752 million cubic feet in 2012.

From O'Sullivan's perspective this explosive growth in domestic energy production resulted in nothing less than an "American Renaissance" of energy. "According to one study by the consultancy IHS, unconventional oil and gas production added almost 1 percent to GDP each year from 2008 to 2013, making it responsible for approximately 40 percent of all GDP growth during that period," spanning the Great Recession.

"A 2015 Harvard Business School/Boston Consulting Group report used a more inclusive methodology and calculated that oil and gas produced by fracking contributed $430 billion — or just about 2.5 percent of GDP — to the U.S. economy in 2014 alone," O'Sullivan relates. "This amount translates into roughly $1,400 for each American in a single calendar year and is equal to more than half the entire stimulus package passed in 2009 to fuel investments in infrastructure, education, renewable energy, and health over the course of the following decade."

Fracking spurred GDP growth while expanding American influence in foreign affairs

According to *Windfall,* "Moody's Analytics . . . calculated that more than a quarter of a million jobs were directly created by oil- and gas-related industries between 2006 and early 2015, with most stemming from the shale gas and tight oil sectors." But the ultimate job growth was much larger than that, O'Sullivan notes. "Each of these directly created jobs was estimated to have spurred another 3.4 related jobs, making a total of over one million new jobs attributable to the boom. These new jobs were roughly equivalent to half the number of American manufacturing jobs lost from December 2007 to June 2009, the official length of the recession, according to the National Bureau of Economic Research."

Readers should understand that the focus of *Windfall* is on the geopolitical consequences of the United States' unconventional energy boom, including the decline of Russian leverage over Europe and Ukraine, making China comfortable with energy markets rather than supporting rogue regimes to acquire energy, and the taming (somewhat) of OPEC.

Now that both shale gas and tight oil are part of a global energy market, the United States will still need to encourage more countries, especially China, to exploit their unconventional resources to keep prices in line and the supply flowing, while reducing carbon emissions in the case of gas. Europe's geology and environmental politics make it unlikely on the Continent. Yet, even as prices drop, OPEC, which can bring oil production on or off quickly, can impact prices in a global market. But the salient point of the book is the enhancement of the strategic position and leverage of the United States going forward.

O'Sullivan also seeks to justify fracking to environmentalists who see it as (a) producing just another fossil fuel, and (b) a mortal threat to renewables given its low costs and cheap price. Aside from some questionable claims that unconventional energy led to the 2015 climate pact between the United States and China as well as the Paris Agreement, she hits the mark when she notes that "the advent of shale gas enabled the United States to bring down its emissions to their lowest absolute level in twenty years. Between 2005 and 2015, U.S. CO_2 emissions related to the energy sector declined by 12 percent." She cites David Victor, a professor at the University of California, San Diego, regarding the switch from coal to natural gas in the power industry. The impact on U.S. emissions was "about twice the total effect of the Kyoto Protocol on carbon emissions in the rest of the world, including the European Union." She also argues that "there is not strong evidence to support fears that low fossil fuel prices will come at the expense of continued investment in renewables and other alternative energies."

Windfall does not delve into any water quality issues related to fracking and unconventional energy. So readers may want to consult publications by the Environmental Protection Agency and the American Water Works Association on the subject.

EPA's report "Hydraulic Fracturing for Oil and Gas," accessible at epa.gov/hfstudy, offers a review and synthesis of available scientific information concerning the relationship between hydraulic fracturing activities and drinking water resources in the United States. While recognizing that data gaps and uncertainties limit its ability to fully assess potential impacts locally and nationally, the report does outline conditions under which impacts from fracking can be frequent or severe — spills during the handling of hydraulic fracturing chemicals and discharge of inadequately treated wastewater to surface water.

AWWA's white paper "Water and Hydraulic Fracturing" is a concise, well-illustrated document providing an overview of the topic. It also provides information on the life cycle of oil and natural gas development that may present concerns to drinking water utilities and ways to mitigate risks. It is accessible at awwa.org.

G. Tracy Mehan III is an adjunct professor at the Antonin Scalia Law School, George Mason University, and executive director for government affairs at the American Water Works Association. He may be reached at tmehan@awwa.org.

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 5/30/2018 2:44:00 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: from Inside EPA

Rural water utilities urge EPA to resist PFAS MCL

May 29, 2018

Rural drinking water suppliers are pushing back against urgent calls by lawmakers, local communities and states for EPA to develop a federal drinking water standard to address perfluorinated chemicals frequently showing up in drinking water systems across the country.

The National Rural Water Association's (NRWA) regulatory committee May 25 unanimously adopted a policy recommendation for NRWA to urge Congress and EPA against adopting an enforceable federal Safe Drinking Water Act maximum contaminant limit (MCL) for per- and polyfluoroalkyl substances (PFAS), fearing local governments will be burdened by fines for non-compliance.

Instead, the regulatory committee's recommendation calls for "alternative federal initiatives" that would assist communities with PFAS contamination, the group says in a May 29 press release. It cites funding that local communities need for treating and monitoring their drinking water supplies.

NRWA represents more than 30,000 water and sewer utilities. NRWA's executive committee on June 30 plans to consider the regulatory committee's recommendation. If the executive committee adopts the advice, it will become the association's policy, and the group will likely send formal comment to EPA and Congress, a spokesman for the group says.

NRWA's emerging position comes as EPA Administrator Scott Pruitt announced May 22 at a much-anticipated national summit on PFAS that the agency will "take the next step" to evaluate the need for an MCL for the two most common PFAS -- perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) -- although agency officials have said that any MCL is likely years away.

The pushback from rural water utilities also comes amid a split among states over whether EPA should quickly develop an MCL for PFOA and PFOS. While some states have urged quick issuance, others are concerned that such regulations "could divert resources from other drinking water issues and impose unwarranted costs on water systems," the Environmental Council of States said in a May 21 letter to EPA on the eve of the summit.

But lawmakers, community groups, and some environmental groups and states have for months pressured the agency to quickly develop an MCL for PFOA and PFOS. Without a national standard, states have adopted a patchwork of drinking water and cleanup levels for PFAS.

NRWA in its release urges another path, in part fearing enforcement repercussions on local governments.

It notes in findings on the issue that MCLs are regulatory enforceable levels that may result in fines on local governments, the release says.

Instead, it says, affected communities need "funding for treatment, monitoring assistance, on-site technical assistance for emergency operations, credible public health information, emergency access to safe drinking water and locally supported solutions."

Levying fines on local consumers for MCL violations "is not a helpful solution for small and rural communities" harmed by PFAS contamination, the findings say.

NRWA says EPA should identify what level of PFAS in drinking water is unsafe or acknowledge if such a finding is not possible, it says.

Further, the group notes that local governments lack responsibility for PFAS contamination, but rather "responsible parties should be held accountable for remediation, treatment and providing alternative sources of safe drinking water."

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communication in error, please immediately notify the sender by reply email and destroy all copies of the communication and any attachments.

American Water Works Association
Dedicated to the World's Most Important Resource ®

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 3/29/2018 3:06:07 PM
To: Diane VanDe Hei (vandehei@amwa.net) [vandehei@amwa.net]; arceneaux@amwa.NET; Dan Hartnett [hartnett@amwa.net]; Erica Brown [brown@amwa.net]; Colleen Newman [colleen@nawc.com]; Ex. 6; 'Eileen O'Neill' [eoneill@wef.org]; Tim Williams [twilliams@wef.org]; Claudio Ternieden [cternieden@wef.org]; Steve Dye [sdye@wef.org]; Steve Dye [sdye@nexusgr.com]; Sean Garcia [sgarcia@APWA.NET]; Adam Krantz [AKrantz@nacwa.org]; Nathan Gardner-Andrews [NGardner-Andrews@nacwa.org]; cfinley@nacwa.org; Kristina Surfus [KSurfus@nacwa.org]; Sheehan, John A (53808) [jasheehan@michaelbest.com]; Radhika Fox [rfox@thevalueofwater.org]; Tom Neltner [tneltner@edf.org]; Lynn Thorp [lthorp@cleanwater.org]; Eide, Elizabeth [EEide@nas.edu]; sjohnson@nas.edu; Gerald E Galloway [gegallo@umd.edu]; paul.reig@wri.org; Nancy Stoner [nstoner@piscesfoundation.org]; Joel Brammeier [jbrammeier@greatlakes.org]; Joel.Beauvais@lw.com; Doersch, Patricia [patricia.doersch@squirepb.com]; Mederos, Carolina [carolina.mederos@squirepb.com]; David White [dwhite@9bgroup.com]; Pelham Straughn [pstraughn@9bgroup.com]; Couri, Jerry [JerryCouri@mail.house.gov]; Pawlow, Jon [Jon.Pawlow@mail.house.gov]; Donaldson, Teri (EPW) [Teri_Donaldson@epw.senate.gov]; Stevens, Mae (Cardin) [Mae_Stevens@cardin.senate.gov]; Brown, Joe (Boozman) [Joe_Brown@boozman.senate.gov]; Herrgott, Alex H. EOP/CEQ [Ex. 6]; Patella, Michael A. EOP/CEQ [Ex. 6]; Jackson, Ryan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=38bc8e18791a47d88a279db2fec8bd60-Jackson, Ry]; Dravis, Samantha [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ece53f0610054e669d9dffe0b3a842df-Dravis, Sam]; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Burneson, Eric [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2cacb9a8d49f49af80531e9e2ccb9018-eburneso]; Gebhardt, Jim [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d25752bcb8c741fd831dbc3429088987-Gebhardt, J]; Abhold, Kristyn [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bfe730f27efa48beb8a6252c5ed0e71e-Abhold, Kri]; Brubaker, Sonia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6055e643e5154f25b83a5515161e1705-sbruba02]; Stein, Raffael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=280af9f00275496d96dc7587ab473480-Rstein]; Jernberg, Jorianne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=Jernberg, Jorianne]; Nagle, Deborah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33888a2bbe8f48aeb4ad9cc54259fb4e-dnagle]; Lape, Jeff [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8d208a4970394d869eb5419e1ac8d589-Jlape03]; Goodin, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eac342f280a4b9db4079c81f66d1913-JGoodin]; Hall, Lynda [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bc410640384b4ba0a158573d17f88fb9-LHall02]; Rose, Bob [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f346adaaeaa640cf96014ec0f1eab610-BROSE]; Corr, Elizabeth [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=691e1abf082a4a5b8723cc9ac8d9bdf0-ecorr]; Simon, Roy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6cd6ce5f749a46f9a1768857ea08d860-rsimon]; McGartland, Al [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5fe25fc1df634f9798675527e0070429-AMcGartl]; Wall, Tom

[/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=128011ac603c4d1a82301ada1bdfd733-Twall]; Shanaghan, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=63bb2a6ab300454dbd58e2d3b9084cca-pshanagh]; Anderer, Kirsten [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=065ed70f5f8e4c49803b16363d4d0e00-Anderer, Kirsten]; Chamberlain, Nick [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b499d62de3c84c1eb010a14a477e7ade-Chamberlain, Nick]; Fort, Felecia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6859774b6a2447b2b9ea5e262c5e1365-Felecia Fort]; Horne, James [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d18a5ec215d54ff0a42cceabded0faf4-jhorne]; Bastian, Robert [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a647429ac5a24671b34e22cba92369b2-rbastian]; andy@ccmua.org; eolson@nrdc.org; jdevine@nrdc.org; Ex. 6 lbroaddus@broadviewcollaborative.com; Ex. 6 Charles Murray [cmurray@fairfaxwater.org]; Andrew DeGraca [adegraca@sfwater.org]; Beate Wright [bwright@waterrf.org]; Harry Zhang [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user968cbb01]; apramanik@werf.org; Melissa Meeker [mmeeker@werf.org]; Pat Sinicropi [psinicropi@watereuse.org]; Amber Kim [akim@watereuse.org]; Rob Renner [rrenner@waterrf.org]; Peter Stangel [peter@usendowment.org]; Sylvia Malm [Ex. 6]; Geoffrey Grubbs [Ex. 6]; hank@suntowater.com; Vanessa Leiby [Vanessa@WWEMA.org]; Mary Mehan [Ex. 6]; Margaret M. White [Ex. 6]; Matthew Mehan [Ex. 6]; Clare McNiff [Ex. 6]; Mary O'Beirne [Ex. 6]; [Ex. 6]; Joe Mehan [Ex. 6]

Subject: FW: It is a special day...

Importance: High

From: Keli Jackson **On Behalf Of** David LaFrance
Sent: Thursday, March 29, 2018 10:58 AM
Subject: It is a special day...
Importance: High

Dear AWWA Board of Directors:

Today is AWWA's birthday. We turn 137 years old.

Today, by being a member you are linked to all the AWWA water professionals of the past and importantly you are the beginning of AWWA's future.

Today is a great day to remind yourself about our beginnings by watching some of the AWWA history video and to also visualize the future we are creating.

As a reflection of the past, here is what AWWA and the rest of the world were doing a century ago:

AWWA:

- AWWA President (1917-1918) was Major Theodore A. Leisen, Michigan Section.
- ACE was held in St. Louis, MO.
- Robert Morse and Abel Wolman authored "The Practicability of Adapting Standards of Quality for Water Supplies."
- William Mullholland delivered the Owens River to Los Angeles via 238 miles of aqueduct.
- Denver Water was established (1918).

The rest of the world:

- March 19, 1918: The U.S. Congress established time zones and approved daylight savings time (DST went into effect on March 31).
- May 15, 1918: The United States Post Office Department (later renamed the United States Postal Service) began the first regular airmail service in the world (between New York City, Philadelphia and Washington, DC).
- June 8, 1918: The total solar eclipse crossed the United States from Washington State to Florida, (in 2017 we experienced this for the first time since 1918).
- September 1918: The Boston Red Sox won the World Series and during the seventh inning of the first game the Star Spangled Banner was played for the first time at a major league game.
- November 11, 1918: World War I was coming to an end.

My thanks to each of you for your part in creating our future and creating a better world through better water. I am confident that the 22 water leaders who formed AWWA 137 years ago today would be amazed and proud of what AWWA has become and where all of you are taking it.

Thanks for everything you do each day and… Happy Birthday AWWA.

David B. LaFrance
CEO
American Water Works Association
6666 West Quincy Ave., Denver, CO 80235 USA
Direct Ex. 6 | **Mobile** Ex. 6
dlafrance@awwa.org | www.awwa.org

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 5/3/2018 11:44:11 AM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: Re: Water Associations Engagement Meeting

Yes, I will be there.

Tracy Mehan

Get Outlook for Android

From: Penman.Crystal@epa.gov <Penman.Crystal@epa.gov> on behalf of Forsgren, Lee <Forsgren.Lee@epa.gov>
Sent: Thursday, May 3, 2018 7:20:32 AM
To: Drinkard, Andrea; Campbell, Ann; Sawyers, Andrew; Grevatt, Peter; Stein, Raffael; Thompkins, Anita; Gueriguian, Leo; Brubaker, Sonia; Abhold, Kristyn; Penman, Crystal; AKrantz@nacwa.org; vandehei@amwa.net; cternieden@wef.org; Tracy Mehan; RFox@uswateralliance.org; teich4@ejwatercoop.com; Matt@nrwa.org; nohle@rcap.org; Julia Anastasio; aroberson@asdwa.org
Cc: Ross, David P; Lieberman, Paige; Tanner, Lee; Ted Stiger; Steve Dye; Ken Maynard; Sam Wade
Subject: Water Associations Engagement Meeting
When: Tuesday, May 15, 2018 9:00 AM-10:30 AM.
Where: 3233 WJCE

Dear Stakeholders,

As you know, EPA is committed to rebuilding the country's aging water infrastructure. We are also committed to working collaboratively with our stakeholders. Addressing infrastructure is complex, and we need your input to develop the most effective solutions.

You are invited to a discussion session with the leadership of EPA's Office of Water, as part of the 6th annual National Infrastructure Week. Topics of discussion will include affordability, governance, the Water Infrastructure Finance Innovation Act (WIFIA) and State Revolving Funds (SRFs). Targeted questions for each topic area will be shared in advance of the meeting.

The meeting will be on May 15th, 9:00 – 10:30 am, at EPA's Headquarters, 1200 Constitution Avenue NW, Washington, D.C.

Please RSVP at your earliest convenience to Crystal Penman (penman.crystal@epa.gov).
Sincerely,
Lee Forsgren

Message

From: Keith Heard [Keith@nrwa.org]
Sent: 5/14/2018 12:45:25 AM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Ex. 6 Obituary - Macon, MS | Clarion Ledger

Ex. 6

BKH

B. Keith Heard
NRWA
101 Constitution Avenue NW
Suite 850 East
Washington, DC 20001

Message

From: Keith Heard [Keith@nrwa.org]
Sent: 5/14/2018 12:38:10 AM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: Need to follow up on something

Thanks Lee. I don't land in DC until after 10:00 tonight. Can I call you in the morning before 9:00. My day gets crazy after that. Hope you are well!

Ex. 6

BKH

B. Keith Heard
NRWA
101 Constitution Avenue NW
Suite 850 East
Washington, DC 20001

On May 13, 2018, at 6:06 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Keith,
>
> Ex. 6
>
> Call when you get back and get settled.
>
> Lee
>
> Sent from my iPhone
>
> On May 13, 2018, at 5:40 PM, Keith Heard <Keith@nrwa.org> wrote:
>
> > Lee. I am so sorry I just saw this. Ex. 6
> >
> > Ex. 6
> >
> > My cell is Ex. 6
> >
> > BKH
> >
> > B. Keith Heard
> > NRWA
> > 101 Constitution Avenue NW
> > Suite 850 East
> > Washington, DC 20001
> >
> > On May 10, 2018, at 11:13 AM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
> >
> > > Keith,

I need to follow up with you on something. Can we find a time late this afternoon or tomorrow to chat? My direct line is 202-564-0311 or my EPA cell is Ex. 6

Thanks,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

Message

From: Brent Fewell [brent.fewell@earthandwatergroup.com]
Sent: 5/12/2018 8:37:52 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Fotouhi, David [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=febaf0d56aab43f8a9174b18218c1182-Fotouhi, Da]; Servidio, Cosmo [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f11f91d53e9a4cdaa8281be07e9034aa-Servidio, C]; Leopold, Matt [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=4e5cdf09a3924dada6d322c6794cc4fa-Leopold, Ma]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Veney, Carla [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c354b58bf2b1464d8afac7bbd2a7a88c-CVeney]; Michael Deane Ex. 6; Matthew J Corson [Matthew.Corson@amwater.com]; Eugene C Abruzzo [Chris.Abruzzo@amwater.com]; Colleen Newman [colleen@nawc.com]
Subject: Advance Materials for POTW meeting
Attachments: ATT00001.txt; Chevron Analysis - POTW 4262018 (EPA).pdf; POTW Options Analysis 4262018 (EPA).pdf

Lee et al, I'm attaching two documents for our meeting next Friday. Please feel free to share with your team as appropriate. Lastly, in-person attendance for NAWC and American Water will be the following:

Brent Fewell, NAWC
Colleen Newman, NAWC
Michael Deane, NAWC
Matt Corson, AW
Chris Abruzzo, AW

Look forward to seeing folks next week.

Brent

Brent Fewell, Esq. | Earth & Water Law Group
1455 Pennsylvania Ave., NW, Suite 400, Washington, DC 20004
Ex. 6 (o) | Ex. 6 (c) | www.earthandwatergroup.com

The Need and Justification for Greater Regulatory Clarity Governing POTWs

U.S. EPA's longstanding position on private ownership of a municipal wastewater treatment system remains a barrier to greater private ownership of such facilities and should be changed. Historically, EPA has taken the position that the ownership status of a municipal wastewater plant determines its regulatory status rather than the nature of the effluent being treated. This interpretation stems solely the Clean Water Act's (CWA or Act) use of the term "publicly owned treatment works" (POTW).

This memo offers an analysis of the Clean Water Act and its legislative history to determine whether a reinterpretation by EPA of the Act with regard to the term POTW would be legally defensible and afforded Chevron deference in the event of a future legal challenge.

Issue: Does the term "publicly owned treatment works" under the Act generically apply to municipal domestic sewage plants, regardless of ownership status? That is, was the intent of Congress clear when it used the term POTW? If not, would the Agency's reinterpretation, extending the term POTW to privately owned systems, be permissible?

Answer: Although a superficial reading of term "publicly owned treatment works" could logically lead one to conclude the term by its plain meaning excludes private ownership based on common usage, the legislative history offers some support for a broader more flexible interpretation.

This memo is divided into several sections. Section 1 presents a history of EPA's historical position and the regulatory hurdles involving the disposition of POTWs to private owners. Section 2 presents the legislative history and legal analysis. Section 3 sets forth the conclusion.

1. Introduction

Since its enactment, the CWA (and EPA's interpretation) has created significant disposition hurdles for POTWs and regulatory uncertainty related to their operations for community stakeholders and private owners involving the following:

- **Secondary treatment standards** – EPA's secondary treatment standards apply to the treatment of wastewater of POTWs, establishing technology-based effluent limits for BOD, TSS and pH, etc. Uncertainty remains what treatment standards apply to privately owned systems. 40 CFR 133

- **Industrial pretreatment program** – Despite the fact that many private companies operate pretreatment programs under disposition agreements, confusion exists whether the pretreatment program under Section 307(b) of the CWA applies only to POTWs and not privately-owned systems. The IPP requirements under the POTW status of the CWA could be replaced by RCRA requirements applicable to hazardous waste treatment, storage or disposal facilities. 40 CFR 117.13 and 40 CFR 403

- **RCRA domestic sewage exclusion** – EPA's RCRA exemption for "domestic sewage" is narrowly tailored to POTWs, potentially subjecting privately owned systems to RCRA liabilities. 40 CFR 261.4(a). RCRA itself does not limit the exclusion to a POTW specifically, but rather "domestic sewage."

- **Combined sewer overflow policy** – EPA CSO policy currently only applies to POTWs and not privately-owned systems. 40 CFR 403.3(p)

For each of these issues, the scope and definition of "publicly owned treatment works" is directly at issue. EPA's position on this matter is outlined in substantive part in a 1987 Office of Water Memo, authored by Martha Prothro, then director of the water permits division, to EPA's regional water division directors. The Prothro memo states:

> On June 27, 1985, we sent you a draft document of questions and answers dealing with the NPDES permit and pretreatment implications of transactions that create private interests in municipal wastewater treatment works (i.e., privatization). In the draft memorandum we set out our conclusions on the applicable requirements for privatized facilities and discharges into such facilities and requested your comments.
>
> Based on the comments we received, it is clear that there is a good deal of misunderstanding in this area, particularly with respect to the relevant Clean Water Act and NPDES requirements and legal constraints. For example, several commenters did not agree that ownership of the treatment works should be the determining factor in the appropriate limitations and whether pretreatment applied. These commenters suggested that any treatment plant treating primarily domestic waste should be regulated as a POTW (i.e., subject to limits based on secondary treatment, with contributors subject to pretreatment) regardless of whether it is publicly or privately owned. The Clean Water Act, however, does not allow for such approach. Under the Act, whether a facility is subject to secondary treatment (and its users to pretreatment) requirements or whether other technology-based limits (BAT, BCT) apply depends solely upon whether the plant is publicly or privately owned, and not on the nature of the wastes being treated. (emphasis added here) (underlining in original document)

The Prothro memo, often cited as EPA's current position, provides a cursory and superficial interpretation the Clean Water Act, and was authored by the Office of Water, not the Agency's General Counsel's office or its lawyers.

Subsequently, in 2000, EPA issued guidance entitled "Guidance on the Privatization of Federally Funded Wastewater Treatment Works," seeking to overcome these barriers. According to EPA, when federal grants have been used to fund the construction of a sewage treatment facility, the privatization transaction or disposition of the federally funded assets of the federal grantees must comply with the federal construction grant and property disposition regulations. As EPA explained the history:

> As the pace of construction water pollution control facilities escalated in the 1970s, due to federal and state environmental legislation and EPA's Construction Grant program, there was an increased interest by the private sector in wastewater operations. In the 1980s, the availability of tax incentives (tax-exempt debt, accelerated depreciation, and investment tax credits) for private investment in public utilities stimulated interest in the privatization of publicly owned wastewater treatment works (POTW). However, tax laws and Internal Revenue Service (IRS) rulings that affect privatization have been modified over the years. The Tax Reform Act of 1986 removed many of the tax incentives for public-private partnerships and reduced interest in certain types of privatization. In 1997, IRS Revenue Procedure 97-13 on Qualified Tax-Exempt Bonds allowed management contracts for up to 20 years instead of 5 year period previously allowed. This change provides a longer recovery period for any private investments in a POTW.
>
> [D]isposition agreements require Agency review and approval prior to signing the contract. Under EPA's administration of its property disposition and grant regulations, any concession

type payment or non-operational review payments to the local government results in the private entity encumbering the title or other interests in the asset. A privatization agreement that involves non-operational or periodic payments to the local government may be considered a contract operation type arrangement by some parties, however, EPA views these types of agreements as disposition agreement that must receive prior Agency approval.

If all components of the facility are sold to a private entity, the facility and any industrial dischargers to the facility would be regulated under the Clean Water Act and may be subject to requirements under the Resource Conservation and Recovery Act (RCRA). The private ownership status means that industrial pretreatment requirements under the POTW status of the CWA may be replaced by RCRA requirements. In such a situation, higher treatment costs may occur if the wastewater treatment facility is designated as a RCRA hazardous waste treatment, storage or disposal facility. When an asset sale occurs, the private entity will have to apply for a new NPDES permit under its own name. The permit limits under private ownership will likely be similar to those of the previous POTW's permit.

In light of the above limitations, the following provides a legal assessment were EPA to reinterpret the term POTW under the Act so that domestic waste treatment systems would be treated the same under the law, regardless of ownership.

2. Analysis

When the CWA was enacted, is it possible Congress used the term "publicly owned treatment works" generically and broadly to refer to treatment works primarily involved with the treatment of domestic sewage without regard to ownership? Unfortunately, neither the legislative history nor case law directly answers this question. Thus, EPA's reinterpretation of the Act's use of that term and, if such interpretation was subsequently challenged, would involve a case of first impression and decided based on a Chevron analysis:

> The central question for the reviewing court under Chevron "is whether the agency's construction of the statute is faithful to its plain meaning, or, if the statute has no plain meaning, whether the agency's interpretation 'is based on a permissible construction of the statute.'" [A] court first asks "whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress." [I]f the court finds that "the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction of the statute." (citations omitted).

Shays v. FEC, 337 F. Supp. 2d 28, 47-49 (D.D.C., Sept. 18, 2004).

While courts ordinarily do not look to legislative history at Chevron step one, "reference to statutory design and pertinent legislative history may often shed new light on congressional intent, notwithstanding statutory language that appears superficially clear." *NRDC v. Browner*, 57 F.3d 1122, 1127 (D.C. Cir. 1995); *accord Ethyl Corp. v. EPA*, 51 F.3d 1053, 1063 (D.C. Cir. 1995) (reviewing legislative history under Chevron step one and concluding that "at best, the legislative history is cryptic, and this surely is not enough to overcome the plain meaning of the statute"); *City of Cleveland v. Nuclear Regulatory Comm'n*, 68 F.3d 1361, 1366 n.4 (D.C. Cir. 1995) ("We may consider a provision's legislative history in the first step of Chevron analysis to determine whether Congress' intent is clear from the plain language of the statute.").

A recent EPA interpretation of the Act involving a similar long-standing agency position that was subsequently challenged involving *Trout Unlimited v. EPA*, 846 F.3d 492 (2nd Cir. 2017) offers some helpful insight on how the POTW issue might play out. In the Trout Unlimited case, the court was asked to reverse an EPA regulation that exempted inter-basin water transfers from the Clean Water Act program. At issue was whether a water transfer constituted a discharge of a pollutant from a "point source" under the CWA. On its face, the statutory language and legislative history weighed strongly in favor of permits. Thus, the plaintiffs argued that the case should be resolved at *Chevron* step one because the CWA unambiguously requires permits for water transfers. The case has a long history, but ultimately the 2nd Circuit Court sided with EPA, agreeing that the CWA was silent and that EPA's interpretation was not unreasonable.

In analyzing the question, the court opined:

> Even careful analysis of the Clean Water Act's legislative history does not help us answer the interpretive question before us. Although we are generally "reluctant to employ legislative history at step one of Chevron analysis," legislative history is at times helpful in resolving ambiguity; for example, when the "'interpretive clues [speak] almost unanimously,' making Congress's intent clear 'beyond reasonable doubt.'" But here Congress has not left us a trace of a clue as to its intent. The more than 3,000-page legislative history of the Clean Water Act appears to be silent, or very nearly so, as to the applicability of the NPDES permitting program to water transfers. As we noted in Catskill I, the legislative history does not speak to the meaning of the term "addition" standing alone, suggesting that the history is similarly silent as to the meaning of the broader phrase that includes this term, "addition . . . to navigable waters."
>
> Finally and tellingly, neither the parties nor amici have pointed us to any legislative history that clearly addresses the applicability of the NPDES permitting program to water transfers. What few examples from the legislative history they have cited—such as the strengthening of the permit requirements in Section 301(b)(1)(C) to include water quality-based limits in addition to technology-based limitations, and broad aspirational statements about the elimination of water pollution and the need to regulate every point source by the report of the Senate's Environment and Public Works Committee, provide at most keyhole-view insights into Congress's intent. They do not speak to the issue before us with the "high level of clarity" necessary to resolve the textual ambiguity before us at Chevron Step One. The question is whether Congress has "directly spoken," to whether NPDES permits are required for water transfers—not whether it has made a stray or oblique reference to that issue here and there. (citations omitted)

Turning to the present question, Congress's use of the term POTW in the CWA is similarly complex, with very few clues as to what Congress' clear intent was. Similar to the water transfer issue, Congress has not "directly spoken" to the issue. In one respect the term appears clear and unmistakable with regard to public ownership as a requisite for seeking federal funding under the construction grants program, but for regulatory purposes (*e.g.*, treatment standards, pretreatment requirements, and CSOs) there is even greater ambiguity. With regard to its regulatory use, the term is often used interchangeably with municipal domestic sewage treatment and is commonly used to distinguish domestic sewage or conventional treatment from commercial and industrial waste.

As discussed below, the term "treatment works," a defined term under the Act, appears many times alone without reference to ownership status, and there are other times (less numerous), where it is

connected with ownership status. In fact, the term "treatment works" is used over 200 times independently, without reference to private or public ownership; whereas, the term "publicly owned treatment works," a subset of treatment works, is used only 66 times, and is not defined.

Ownership status appears particularly critical within the context of the former construction grants program under Section 201, where public ownership was central to the eligibility and role of federal financing of new treatment works. ("[I]t is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works") (33 USC 1251(a)(4)); ("The Administrator is authorized to make grants to any State, municipality, or intermunicipal or interstate agency for the construction of publicly owned treatment works.") (33 USC 1281(g)(1). Thus, in such context, it seems clear with respect to those systems seeking federal financing, Congress intended their eligibility to be limited to local public bodies or municipal authorities (as opposed to private entities). This interpretation is consistent with EPA's historic position on federal financing under the CWA. Importantly, however, this limitation is not inconsistent with the argument that a municipal sewage system could also be privately-owned; but it would simply not be eligible to apply for federal construction grants. That is, the ownership status determines not whether the system is a municipal treatment plant, but whether the system is eligible for public funding. This distinction is critically important for regulatory purposes.

As mentioned above, the issue of ownership also comes into play with respect to EPA's regulatory requirements, including secondary treatment standards and management of CSOs. ("The Administrator shall . . . publish proposed regulations establishing pretreatment standards for introduction of pollutants into treatment works (as defined in section 212 of this Act) which are publicly owned for those pollutants which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such treatment works.) (33 USC 1317(b)(1)); ([T]he determination of the priority to be given each category of projects for construction of publicly owned treatment works . . . shall include . . . correction of combined sewer overflows.") (33 USC 1295). It is important to understand these references in historical contest.

At the time the CWA was enacted, Congress was concerned primarily with addressing two broad types water pollution (1) commercial and industrial wastes and (2) domestic sewage. With regard to the latter, there were many cities in the early 1970s that were simply without any centralized waste collection and treatment system, and Congress was committed to providing funding for those communities. Congress's primary focus was to help those communities construct new domestic treatment works through new federal funding and establish a system for equitable recoupment of tax payer funds from private commercial and industrial interests that discharged into such centralized municipal waste treatment systems.

Here's a glimpse into the debate involving Section 204(b) of the Act that required a "system of charges to assure that each recipient of waste treatment services within the applicant" as a condition of federal funding:

> A major new condition for receiving a grant relates to the establishment of user charges. This section specifically provides that the Administrator shall not approve any grant for publicly owned treatment works, after June 30, 1973 unless the applicant has adopted or will adopt a system of user charges to assure that each recipient of waste treatment services within his jurisdiction, as determined by Administrator, will pay its proportionate share of operation, maintenance (including replacement) and expansion costs. The applicant's jurisdiction means his entire service area.

> The Committee believes it is essential to the successful operation by public agencies that a system of fair and equitable user charges be established. The Committee recognizes that differing circumstances and conditions in local areas may call for especially designed systems and has therefore proposed that the Administrator promulgate general criteria and that such general criteria allow for variations to meet local conditions. This section contains standards the Committee believes should be taken into account by the Administrator; foremost among these is the underlying objective of achieving a local system that is self-sufficient.
>
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>
> In connection with industrial users of publicly owned systems, the Committee desired to establish within the user charge system an arrangement whereby industrial users would pay charges sufficient to bear their fair portion of all costs including the share of Federal contributions for capital construction attributable to that part of the cost of constructed facilities attributable to use by industrial sources. It is the Committee's view that it is inappropriate in a large Federal grant program providing a high percentage of construction funds to subsidize industrial users from funds provided by the taxpayers at large. Accordingly, the bill imposes an obligation on the part of publicly owned systems to incorporate into their user charge schedule a component to recover, without interest, that proportion of the total Federal grant to the community for construction purposes attributable to industrial users. The committee recognizes that there will be some administrative difficulties involved in establishing classes of industrial users and has left to the local system the obligation to set up an effective and equitable system, subject to the approval of the Administrator, inasmuch as the establishment of such a system is a precondition to Federal grants.

92 Cong. House Report 911, FWPC72 Leg. Hist. 20. This excerpt reinforces the notable distinction between how Congress intended to treat centralized municipal systems versus industrial users that discharged to the same systems. One of the major purposes was to assure self-sufficiency on the part of local treatment works through the use of an ad valorem tax, something only government entities have the authority to impose. Congress was intent on helping local communities establish a sustainable centralized treatment system, based on equitable charges of its various users.

At the time of CWA's passage, all or virtually all domestic waste treatment systems were owned by municipalities or municipal authorities. As noted earlier, private treatment works were predominantly understood by Congress to be industrial or commercial in nature. It is not at all clear how many, if any, private treatment works were involved in municipal domestic sewage treatment.

Reference to the term "private" in the text of the Act appears a total of 48 times, all within the context of private research, private property, private educational institutions, and nonprofit private agencies. In 1972, the Act contained not a single reference to privately owned treatment works,

which is understandable given the fact that the private sector was essentially nonexistent for purposes of treating and managing municipal sewage. The record, containing thousands of pages of hearing, floor debates and committee reports, contain few references to private treatment works.

Congressman Williams (PA) offered an amendment that required the EPA to approve all "treatment works, whether publicly or private owned" before being constructed. 92 Cong. House Debates 1972; FWPC72 Leg. Hist. 8. But this was a reference to "treatment works" broadly and appears to have included industrial, commercial and sewage or a subset of those.

Governor Anderson of Minnesota submitted the following testimony:

> The House should also be commended for raising the federal share of funding sewage treatment works to 75 percent. Minnesota still has 346 municipalities with no collection systems or combined treatment facilities. Seventy-eight percent of these towns have less than 500 people. They must, therefore, depend on larger governmental units to finance the cost of such facilities. And we would appreciate your assurance that section 211 of this bill will allow grants to these existing municipalities for collection systems.

92 Cong. House Debates 1972; FWPC72 Leg. Hist. 7. Again, the primary focus here is on the type of waste (domestic sewage) and funding needed to help these communities. The focus is not whether they are privately or publicly owned, as the operating assumption at the time is that such systems were under public ownership.

As noted above, the element of ownership also appears to come into play for purposes of treatment standards. The legislative history is devoid of a full explanation for this dual scheme. However, at the time, the Philadelphia Bar Association raised concerns regarding the applicability of secondary treatment standards to publicly owned but not privately owned treatment works:

> The Committee is disturbed that S. 2770, HR 118951 and HR 11896 would apply a looser standard to "publicly owned treatment works" than to other dischargers. Under Section 301 of each of those Bill, sewage plants in operation or construction by January 1, 1976 will not be required to provide better than secondary treatment if they are publicly owned. We see no justification for perpetuating such a lax standard. In Pennsylvania, for example, sewer plants – whether publicly or privately owned – are typically required to provide at least tertiary treatment, as a condition to any new expansion. Further, we know of no adequate basis for distinguishing between publicly owned and privately owned sewer works. It is particularly unreasonable to apply the more lax standard to public sewer works, which are eligible for substantial Federal assistance to defray the cost of attaining modern treatment standards. Inadequately treated municipal sewer wastes are a major cause of the degradation of streams in more populated areas of the Nation and, therefore, full compliance by existing plants should be mandated.

92 Cong. House Report 911; FWPC72 Leg. Hist. 20. In only one other isolated reference to this dual scheme, the House offered the following:

> Subsection (b) of section 301 establishes a technological basis for the determination of effluent limitations for any discharge of pollutants provided that such limitations, at a minimum, are, when applied to all point sources, adequate to meet existing or new water quality standards as provided under section 303. Subsection (b) requires that all point sources of discharge of pollutants, other than publicly owned treatment works, achieve not later than January 1, 1976, effluent limitations requiring the use of the best practicable control technology currently

available. Publicly owned treatment works in existence on January 1, 1976, or those approved for construction grants prior to June 30, 1974, must meet effluent limitations based upon secondary treatment as defined by the Administrator.

It has been argued before the Committee that privately owned point sources should not be held to a strict standard than publicly owned treatment works which are required to meet secondary treatment or the equivalent. This argument was rejected by the Committee. Secondary treatment as considered in the context of a publicly owned treatment works is generally concerned with suspended solids and biologically degradable, oxygen demanding materials (BOD). Such a standard in the minds of some, if applied to effluents containing materials other than suspended solids and BOD, would be an empty standard. Best practicable control technology currently available might mean "secondary treatment" for some effluents but it is not a synonym for secondary treatment. (emphasis added)

92 Cong. House Report 911; FWPC72 Leg. Hist. 20. Congress' above response is notable for the following reasons. First, it's notable that Congress referenced private treatment interests as "privately owned point sources" as opposed to "privately owned treatment works." This may superficially appear to be a rejection of the application of secondary standards to privately owned treatment works, but the term "point source" (as opposed to "treatment works") was commonly used to reference private industrial and commercial wastes, not domestic sewage. Second, it also is clear that Congress understood that "publicly owned treatment works" were "generally concerned with suspended solids and biologically degradable, oxygen demanding materials," which is tantamount with municipal domestic waste, not industrial or commercial wastes. Here, this passage reflects it is the nature of the influent rather than the ownership status per se that was central to Congress's intent regarding the appropriate and applicable standard. This directly contradicts the central thesis of the Prothro Memo that it was the ownership status rather than the type of waste treatment that determines the treatment standards.

Further reinforcing the notion that Congress used the term POTW interchangeably with municipal sewage treatment, the same House Report discusses the Act's pretreatment standards:

It should be understood that [Section 307] authorizes the Administrator to prohibit the discharge of certain industrial and commercial wastes which are unavoidably detrimental to municipal treatment works and to require treatability studies on those pollutants for which there is inadequate existing information available to assess treatability in municipal systems. It is not intended that private pre-treatment facilities be required as a substitute for adequate municipal waste treatment works. The administrator would be expected to prohibit the discharge of any industrial pollutants which adversely affect the functions of treatment works. Conversely there may be industrial wastes which stimulate the performance of conventional treatment works, or which are consistent with alternative control strategies. The latter should be identified. For example, the Committee's hearing indicated that in some cities, the discharge of residue for the production of beer has greatly assisted in the production of commercial fertilizers. (emphasis added)

Once again, as reflected in the above, municipal treatment was construed synonymously with domestic sewage treatment or "conventional treatment works," which at the time was almost exclusively provided by public authorities.

It wasn't until five years later, in 1977, when Congress amended the Act to recognize and expressly include the term and provisions for some "privately owned treatment works." This is the first and only time that term appears in the Act. Under this amendment, Congress allowed small private

treatment works to have access to federal grant funding under limited circumstances. Senator Randolph commented:

> A major policy change, which I did propose, permits Federal grants for construction of privately owned treatment works where a public body, not the person but a public body applies on behalf of a number of such units where we can be assured that they are properly operated and maintained and will be more cost effective than the central systems, the large massive systems which we have in the cities which are not applicable to the rural sections of the country.

95 Cong. Senate Debates 1977; CWA77 Leg. Hist. 14. A lengthy floor colloquy between Senators Muskie, Chafee, Stafford and Domenici ensued involving the purpose of this provision during markup, wherein the scope and applicability to private systems was debated at length. What is clear from the legislative history, as reflected in the above passage by Senator Randolph and floor debates, was that Congress intended public funding be made available to small private treatment works where no "central systems" or "large massive systems . . . in the cities," was available. Large privately owned domestic treatment systems were not even contemplated by Congress, which is consistent with the fact that private ownership of large domestic systems was nonexistent. This also reinforces that it was the nature and type of treatment system that mattered most, and ownership class was a secondary consideration.

Almost 20 years after the 1975 Amendments, Congress attempted to amend the CWA in 1995, defining "publicly owned treatment works" to expressly included privately-owned systems and authorized the sale of publicly owned wastewater assets to qualified private entities. Such efforts, however, were unsuccessful.

3. Conclusion

EPA has historically construed the term "publicly owned treatment works," an undefined term under the CWA, as applicable only to domestic sewage treatment systems under ownership of municipalities or other public authorities. In contrast to investor-owned community drinking water systems in 1972 (for which there were many), history and the legislative record are largely devoid of any privately-owned community wastewater systems engaged primarily in the business of treating domestic sewage.

Based on the legislative history, it appears clear that public ownership was critical to the issue of eligibility for public funding under the construction grants program. However, the issue of ownership as a central and determining factor is less clear in terms of the regulatory standards applicable to domestic waste treatment works, as Congress often used the term interchangeably with municipal or conventional sewage treatment provided by a community. In this context, the term POTW was used by Congress primarily to distinguish domestic sewage waste treatment from industrial or commercial wastes (under private ownership) that would be discharged to municipal waste treatment systems (at the time, exclusively under public ownership).

***

Administrative Options for POTWs

(1) Reinterpret the term "publicly owned treatment works" to include all treatment works primarily engaged in the treatment of domestic sewage, regardless of ownership. Revise EPA's regulatory definition of POTW at 40 CFR 403.3(q) (revisions in red).

> (q) The term Publicly Owned Treatment Works or POTW means a treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act) or treatment works that is owned or operated by a State-regulated public utility. This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant. The term also means the municipality as defined in section 502(4) of the Act, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works. In the case of such a facility that is privately owned, such term includes only those facilities that, with respect to such industrial wastes, are carrying out a pretreatment program meeting all the requirements established under section 307 and paragraphs (8) and (9) of section 402(b) for pretreatment programs (whether or not the treatment works would be required to implement a pretreatment program pursuant to such sections.)

(2) Issue new guidance from EPA Headquarters (joint OW/OGC) for the Regional Offices that

> (a) clarifies that treatment standards and RCRA domestic sewage exclusion applicable to POTWs are applicable to a new private owner, under specific circumstances, including, for example:
>
> i. Private owner agrees to step into the shoes of the POTW and continue to operate the system in substantial compliance with all terms/conditions of applicable NPDES permit.
>
> ii. NPDES permit will be transferred to the new owner as the new permittee with substantially similar requirements that applied to the municipality.
>
> iii. The disposition agreement between the municipality and the private owner includes a contractual provision, acceptable to EPA, regarding the new owner's willingness and capacity to assume responsibilities of the pretreatment program. The pretreatment program can be outlined in the NPDES permit and the permittee's rate schedule.
>
> (b) streamlines administrative procedures, including time frames for EPA to review and sign-off on disposition agreement and any grant deviation procedures; and
>
> (c) expressly rescinds 1987 Prothro Memo.

(3) Clarify that domestic sewage exclusion is applicable to privately or publicly owned treatment works primarily treating domestic sewage. This would require EPA to change its current interpretation and reinterpret RCRA as not excluding private systems primarily engaged in the treatment of domestic sewage.

(4) Other

Message

From: Hunter, David [DHUNTER@epri.com]
Sent: 4/19/2018 9:15:01 PM
To: Hunter, David [DHUNTER@epri.com]
CC: Washington Seminars [WashingtonSeminars@epri.com]
Subject: EPRI's 21st Energy and Climate Research Seminar, May 17, Washington DC
Attachments: EPRI 21st Energy and Climate Seminar draft agenda.pdf

Dear Colleague,

You are cordially invited to attend EPRI's 21st Annual Energy and Climate Research Seminar, on Wednesday, May 17th in Washington DC. The Seminar will be held at the Washington Marriott Georgetown, 1221 22nd St NW. It will begin with a networking breakfast at 8:00 am and conclude with a reception from 5:15 to 7:30 pm.

The seminar will include sessions on the following:

- Understanding Company Climate Scenarios and Emissions Goals
- Scientific Understanding of Extreme Events and Climate Impact
- Electrification and the Future of Transport
- Policy and Market Trends for Energy Storage and Renewables
- Puerto Rico and the U.S. Department of Energy's Approach to Resiliency

The draft agenda is attached.

Please rsvp name, title, company, email and phone number to WashingtonSeminars@epri.com. There is no charge to attend, but space is limited. Additional information, including accommodations, can be found here.

See below for select additional upcoming EPRI events.

Regards,

David E. Hunter, Ph.D.
Sr. Government and External Representative
Electric Power Research Institute
1325 G ST NW Suite 1080
Washington, DC 20005
Tel: Ex. 6 (m)
Fax: 202-293-6187
Email: dhunter@epri.com

Upcoming EPRI events:

July 19: EPRI Washington Seminar: The Fuels of the Future

Co-hosted by the International Energy Agency (IEA)
EPRI Washington DC office, 1325 G ST NW Suite 1080, Washington DC
11:30 am to 2:30 pm. Lunch will be provided.

EPRI is pleased to be joined by the International Energy Agency (IEA) as a cohost for this EPRI Washington Seminar. Please rsvp to WashingtonSeminars@epri.com . There is no charge to attend, but space is limited. Additional details TBA.

August 20: EPRI/ IEA Workshop on Cross-Border Energy and Capacity Trading

Long Beach, CA

EPRI is pleased to join the IEA in hosting this day-long workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing relevant IEA member countries and other stakeholders to learn from the CAISO-Mexico example and bring their own experiences to bear. This workshop will be co-located with Electrification 2018. Please email WashingtonSeminars@epri.com for additional details.

August 20-23: Electrification 2018 International Conference and Exposition

Long Beach Convention Center, Long Beach, CA

EPRI's biggest event of the year, Electrification 2018, will be a 3 day international conference and exposition taking place in Long Beach, CA, Aug 20-23. Electrification will explore the critical issues, benefits, and opportunities of electrification with an unparalleled collection of industry experts:

- Learn about the capabilities and potential of today's electric technologies
- Understand the disruptive benefits and impacts of emerging electric technologies
- Discuss key policy, regulatory, and environmental issues
- Participate in expert training sessions and other professional development opportunities
- Experience a diverse array of technologies in our exposition hall
- Network with industry, government, and academic leaders to form collaborations and help build the future of electrification

Be sure to register early to get discounted rates!

Save the Date: November 6-8: EPRI-IEA Challenges in Electricity Decarbonization Expert Workshops

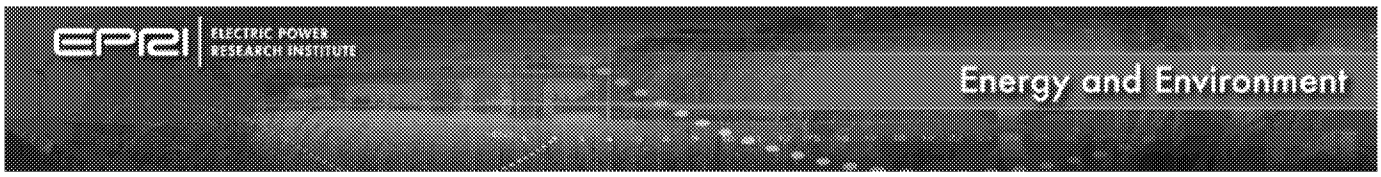
Paris, France

The 5th Annual EPRI-IEA Challenges in Electricity Decarbonization Expert Workshop will again focus on electrification and its implications for the electricity sector. The workshop will be held jointly with the 18th EPRI-IEA-IETA GHG Emissions Trading Workshop. Details TBA. Space is limited. Please email WashingtonSeminars@epri.com with expressions of interest.

Hope to see you there!

To no longer receive these notices, please email WashingtonSeminars@epri.com with the subject line: "unsubscribe".

this message is not intended to be an electronic signature, instrument or anything that may form a legally binding agreement with EPRI. If you are not the intended recipient, please contact the sender by reply email and permanently delete all copies of this message. Please be advised that the message and its contents may be disclosed, accessed and reviewed by the sender's email system administrator and/or provider. ***



21st Energy and Climate Research Seminar

In conjunction with EPRI's Washington Seminar Series

Washington Marriott Georgetown, 1221 22nd St NW, Washington, D.C.

DRAFT AGENDA (times are approximate and subject to change)

WEDNESDAY MAY 17, 2017		
TIME	**TOPIC**	**PRESENTER**
8:00 a.m.	Registration and breakfast	
8:45 a.m.	Welcome and Introductions	David Hunter, *EPRI*
8:55 a.m.	Opening Remarks	Rob Chapman, *Vice President, EPRI*
Session 1: Understanding Company Climate Scenarios and Emissions Goals Chair: Morgan Scott, *EPRI*		
9:10 a.m.	Grounding good intentions: A technical foundation for considering global climate scenarios and greenhouse gas goals	Steve Rose, *EPRI*
	Panel Discussion • American Electric Power • Financial Sector Perspective	Scott Weaver, *Director Air Quality Services, AEP* Marisa Buchanan, *Executive Director, Sustainable Finance, JP Morgan Chase*
10:25 a.m.	Break	
Session 2: Science Research Frontier Chair: Delavane Diaz, *EPRI*		
10:55 a.m.	National Oceanic and Atmospheric Administration Climate Science Update	Benjamin DeAngelo, *Deputy Director, Climate Program Office, NOAA*
11:20 a.m.	Attribution of Extreme Events	Stephanie Herring, *Senior Advisor and Climate Scientist, NOAA*
11:45 a.m.	Making Sense of Equilibrium Climate Sensitivity and Other Climate Responses	Chris Forest, *Associate Professor of Climate Dynamics, Penn State University*
12:10 p.m.	Lunch	

Session 3: Electrification and the Future of Transport
Chair: David Hunter, *EPRI*

1:10 p.m.	EPRI's National Electrification Assessment and Its Outlook for Transportation	Geoff Blanford, *EPRI*
	Panel Discussion • Advanced Energy Economy • Natural Resources Defense Council • U.S. Department of Energy	Matt Stanberry, *Vice President, AEE* Noah Garcia, *Transportation Policy Analyst, NRDC* TBD, *DOE*
2:25 p.m.	Break	

Session 4: Policy and Market Trends for Energy Storage and Renewables
Chair: John Bistline, EPRI

2:55 p.m.	Panel Discussion: • Federal Energy Regulatory Commission • Energy Information Administration • Bloomberg New Energy Finance • Utility perspective	Mary Wierzbicki, *Group Manager, Office of Energy Policy and Innovation, FERC* Cara Marcy, *Renewable Electricity Analyst, EIA* Yayoi Sekine, *Energy Storage Analyst, BNEF (tbc)* TBD
4:10 p.m.	Keynote: Puerto Rico and the U.S. Department of Energy's Approach to Resiliency	Katie Jereza, Deputy *Assistant Secretary, Office of Electricity Delivery and Energy Reliability, DOE*
4:45 p.m.	Summary	Francisco de la Chesnaye, EPRI
5:15-7:30 p.m.	Reception	

Message

From: Patricia Chism [pchism@awwa.org]
Sent: 5/2/2018 3:34:34 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: Water Associations Engagement Meeting

Hi Lee,

Do you mean to block the hours of 9am -10:30am?

The calendar invite says 4:30am.

Patricia Chism
Office Coordinator
American Water Works Association
Direct Ex. 6
pchism@awwa.org | www.awwa.org

-----Original Appointment-----
From: Tracy Mehan **On Behalf Of** Forsgren, Lee
Sent: Wednesday, May 02, 2018 11:32 AM
To: Patricia Chism; Drinkard, Andrea; Campbell, Ann; Sawyers, Andrew; Grevatt, Peter; Stein, Raffael; Thompkins, Anita; Gueriguian, Leo; Brubaker, Sonia; Abhold, Kristyn; Penman, Crystal; AKrantz@nacwa.org; vandehei@amwa.net; cternieden@wef.org; Tracy Mehan; RFox@uswateralliance.org; teich4@ejwatercoop.com; Matt@nrwa.org; nohle@rcap.org; Julia Anastasio; aroberson@asdwa.org
Cc: Ross, David P; Lieberman, Paige; Tanner, Lee; Ted Stiger
Subject: FW: Water Associations Engagement Meeting
When: Tuesday, May 15, 2018 4:30 AM-6:00 AM (UTC-05:00) Eastern Time (US & Canada).
Where: 3233 WJCE

Must go to this! Tracy Get Outlook for Android

From: Forsgren, Lee
Sent: Wednesday, May 2, 2018 3:01:56 PM (UTC) Coordinated Universal Time
To: Forsgren, Lee; Drinkard, Andrea; Campbell, Ann; Sawyers, Andrew; Grevatt, Peter; Stein, Raffael; Thompkins, Anita; Gueriguian, Leo; Brubaker, Sonia; Abhold, Kristyn; Penman, Crystal; AKrantz@nacwa.org; vandehei@amwa.net; cternieden@wef.org; Tracy Mehan; RFox@uswateralliance.org; teich4@ejwatercoop.com; Matt@nrwa.org; nohle@rcap.org; Julia Anastasio; aroberson@asdwa.org
Cc: Ross, David P; Lieberman, Paige; Tanner, Lee; Ted Stiger
Subject: Water Associations Engagement Meeting
When: Tuesday, May 15, 2018 8:30 AM-10:00 AM.
Where: 3233 WJCE

Dear Stakeholders,

As you know, EPA is committed to rebuilding the country's aging water infrastructure. We are also committed to working collaboratively with our stakeholders. Addressing infrastructure is complex, and we need your input to develop the most effective solutions.

You are invited to a discussion session with the leadership of EPA's Office of Water, as part of the 6th annual National Infrastructure Week. Topics of discussion will include affordability, governance, the Water Infrastructure Finance Innovation Act (WIFIA) and State Revolving Funds (SRFs). Targeted questions for each topic area will be shared in advance of the meeting.

The meeting will be on May 15th, 9:00 – 10:30 am, at EPA's Headquarters, 1200 Constitution Avenue NW, Washington, D.C.

Please RSVP at your earliest convenience to Crystal Penman (penman.crystal@epa.gov).
Sincerely,
Lee Forsgren

Message

From: Gordon, Robert [Robert.Gordon@heritage.org]
Sent: 4/19/2018 6:13:02 PM
To: Gordon, Robert [Robert.Gordon@heritage.org]
Subject: Invitation: Saving "Endangered" Species or Regulating with Bad Data (April 25)

Saving "Endangered" Species or Regulating with Bad Data

Featuring

Rob Roy Ramey, Ph.D.
Wildlife Biologist

Jonathan Wood, Esq.
Attorney, Pacific Legal Foundation D.C. Center

Rob Gordon
Visiting Senior Fellow, The Heritage Foundation

Hosted by

Becky Norton Dunlop
Ronald Reagan Distinguished Fellow, The Heritage Foundation, and
former Assistant Secretary for Fish, Wildlife and Parks, U.S. Department of the Interior

The Endangered Species Act (ESA) will reach the half century milestone in several years and yet, many of the relatively few species that have supposedly "recovered" because of the law were, in reality, never endangered. Similarly, many species now regulated under the ESA were put on the list using erroneous data. The law's problems are both in the way it is written and implemented and have made it so contentious that it has not been reauthorized in several decades. Federally regulated species can impose substantial burdens on private property owners and create huge conflicts in federal land management. This is true even when the data used to proclaim them endangered is erroneous which wastes scarce conservation resources.

Wednesday, April 25, 2018 at 2:00 p.m.

The Heritage Foundation's Lehrman Auditorium

RSVP online | or call (202) 675-1752
Terms and conditions of attendance are posted at heritage.org/Events/terms.cfm
All events may be viewed live at heritage.org
News media inquiries, call (202) 675-1761

214 Massachusetts Avenue, NE | Washington, DC 20002 | (202) 546-4400

Robert Gordon
Senior Research Fellow
Institute for Economic Freedom
The Heritage Foundation
214 Massachusetts Avenue, NE
Washington, DC 20002
Ex. 6
heritage.org

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 7/30/2018 7:36:33 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: NYTimes.com: The Children of Flint Were Not 'Poisoned'

From The New York Times:

The Children of Flint Were Not 'Poisoned'

Stop using this word. It's inaccurate and all it does is terrify the people who live here.

https://www.nytimes.com/2018/07/22/opinion/flint-lead-poisoning-water.html

FYI.

GTM

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 3/28/2018 8:18:48 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: FW: The Cost of Unsustainable Promises & Neglect
Attachments: Why states are so strapped for cash-from The Wall Street Journal March 28 2018.pdf

In case you are not a subscriber to WSJ, see attachment without the nifty graphics.

GTM

From: Tracy Mehan
Sent: Wednesday, March 28, 2018 3:45 PM
To: Tracy Mehan [Ex. 6]
Subject: FW: The Cost of Unsustainable Promises & Neglect

Why states are so strapped.

GTM

From: Kevin Mann
Sent: Wednesday, March 28, 2018 3:21 PM
To: Tracy Mehan <tmehan@awwa.org>
Subject: The Cost of Unsustainable Promises & Neglect

https://www.wsj.com/articles/why-are-states-so-strapped-for-cash-there-are-two-big-reasons-1522255521

Kevin Mann
CFO, American Water Works Association
Direct [Ex. 6] | Fax 303-794-1929
kmann@awwa.org | www.awwa.org

https://www.wsj.com/articles/why-are-states-so-strapped-for-cash-there-are-two-big-reasons-1522285521

U.S.

Why Are States So Strapped for Cash? There Are Two Big Reasons

The proportion of state and local tax revenues dedicated to Medicaid and public pensions is the highest since the 1960s

By Cezary Podkul and Heather Gillers
March 28, 2018 12:45 p.m. ET

The only speaker standing between state budget officers and the opening cocktail hour at a Washington conference was the U.S. Secretary of Health and Human Services. What he said left no one in a celebratory mood.

Medicaid costs, said then-Secretary Michael Leavitt, were projected to grow so fast that within 10 years they would "crowd out virtually every other category of spending." State spending on higher education, infrastructure and safety, he predicted, would all get squeezed.

In 2008, then Health and Human Services Secretary Michael Leavitt predicted Medicaid costs would "crowd out virtually every other category of spending" for states within 10 years. PHOTO: ALI ABBAS/EPA/SHUTTERSTOCK

Nearly 10 years after that October 2008 speech, Mr. Leavitt's prediction—part of HHS's first-ever annual projection of Medicaid's costs—is looking prescient.

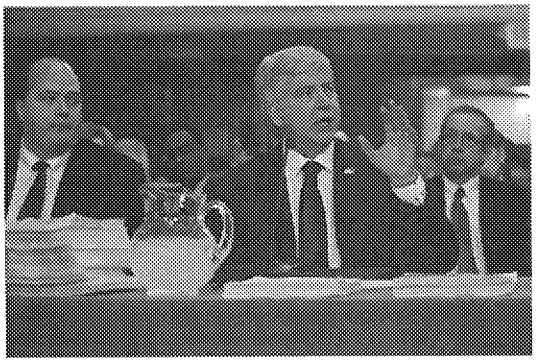
As state and local officials prepare their next budgets, many are finding that spending decisions have already been made for them by two must-fund line items that barely mattered when baby boomers such as Mr. Leavitt were growing up: Medicaid, the state-federal health insurance program for the poor and disabled, and public-employee health and retirement costs.

These days, they consume about one out of every five tax dollars collected by state and local governments. That is the highest share since Medicaid was created in 1965. Postretirement health benefits, which are harder to quantify, add to that burden and have cumulatively cost states more than $100 billion since 2008, according to government financial disclosures compiled by Merritt Research Services.

Those costs are outpacing growth in tax revenue year after year. In 2016, state and local governments collected about $136 billion more in taxes than they did in 2008, adjusting for inflation. Two-thirds of those additional dollars went to fund pensions and Medicaid, according to a Wall Street Journal analysis of Commerce Department spending data.

"The more we stare at the data, the more we realize all roads lead back to Medicaid and pensions," says Dan White, a director at Moody's Analytics who has studied the issue.

The resulting revenue squeeze is making it harder for governments to pay for core services such as education, infrastructure, police and fire protection.



Michigan Gov. Rick Snyder, center, tapped John Nixon, left, to run the state's budget. PHOTO: AL GOLDIS/ASSOCIATED PRESS

It also is fueling bitter state budget battles. Twenty-two states faced budget shortfalls in 2017. Ten couldn't agree on a new budget before the start of their next fiscal year. Illinois's credit rating was downgraded nearly to junk status.

To save money, states are sending less aid to cities. Many cities, in turn, are increasing fees and fines on everything from garbage collection to parking tickets. Others, such as Hartford, Conn., have teetered on the brink of bankruptcy.

The cash crunch is likely to get worse. Federal actuaries predict that Medicaid's annual cost, which was $595 billion in 2017, will exceed $1 trillion in 2026. States and many localities pay about 38% of that tab. The remainder is covered by the federal government.

Policy makers in Washington have talked about revamping entitlement programs such as Medicaid, but so far their efforts have gained little traction. That leaves it up to states to try to contain spending—and make do with less.

Nearly 70 million Americans, about one-fifth of the population, depend on Medicaid for health coverage, including more than 28 million children. The biggest financial beneficiaries are the disabled, the elderly and poor working-age adults.

Medicaid costs have transformed state budgets. In 1964, states' top three spending items were education, highways and public welfare, according to data from the Council of State Governments. As of 2014, public welfare, which includes Medicaid, had moved into the No. 2 position.

"Governments are spending less on what they want so they can spend more on what they must spend," says Don Boyd, a senior research fellow at Rockefeller College in Albany, N.Y. "There's been a lot of crowding out."

Public-employee pensions are legally protected in most states. With Medicaid, states can set criteria for coverage, but then must pay for anyone who qualifies.

"Whatever that bill is, you have to cover it," says John Nixon, a former state budget director for Utah. In 2010, Michigan Gov. Rick Snyder tapped him to run that state's budget. At the time, Michigan was spending about $1.5 billion more than it collected, Mr. Nixon says. The governor wanted to close the gap and boost funding for the state's underfunded pension and retiree health plans, among other priorities.

Mr. Nixon couldn't touch Medicaid, which then took up almost a quarter of Michigan's general fund. So he and lawmakers looked for savings elsewhere as they wrote the state's 2012 budget. Eventually, they agreed to cut $222 million from higher education, $452 million from K-12 education and $105 million from statutory tax revenue sharing with Michigan cities. Mr. Snyder, a Republican, said "tough decisions" were necessary to close Michigan's fiscal gap.

State and local governments nationwide shed 286,000 employees from 2008 to 2016, shrinking to 19.4 million, according to the U.S. Census Bureau's public-employment survey.

Over the past two years, Mississippi closed 10 of its 95 county health clinics, eliminating 153 positions and two inpatient drug-treatment centers. Nonprofit drug-treatment providers also lost funding.

"We have an opioid crisis going on," says Amy Turner, who runs a nonprofit drug-treatment center near Biloxi. Mississippi cut Ms. Turner's grant for treating female drug addicts by 33%.

Nationwide, state spending on higher education and local tax revenue sharing, adjusting for inflation, have both declined since 2008, according to the Journal's analysis. So has state and local spending for infrastructure.

For college students, shrinking state higher-education budgets mean paying more to attend public universities. In 1980, 48 of 50 states funded their college budgets mostly through annual appropriations of tax revenues, not from tuition. By 2017, that was true in just 20 states, as tuition had become the larger funding source in 28 states, according to data from the State Higher Education Executive Officers' Association.

"For the first time in our nation's history, we are at the cusp of college students and their families paying the majority of college costs," Robert Anderson, the group's president, testified at congressional hearing in February.

For cities, the budget squeeze means they must rely less on state aid to balance their books. The Lincoln Institute of Land Policy , which tracks the budgets of 150 U.S. cities, found that 85 received less state aid in 2015 than they did in 2005. In 54 cities, aid declined by more than 10%.

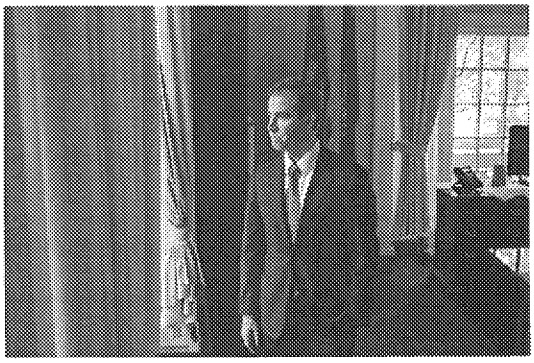
Last summer, a legislative standoff over Connecticut's debt and pension costs delayed the state budget and froze aid to municipalities. In the state's capital, Hartford, Mayor Luke Bronin warned he would seek bankruptcy protection if the city didn't receive additional aid from the state.

The aid finally arrived when lawmakers reached a budget deal in October. To find money for Hartford, lawmakers took aid away from other cities, prompting some towns to shelve infrastructure projects and consider tax increases.

"State and local governments made big commitments, particularly on pensions and retiree health care, but didn't adequately fund those liabilities," says Mr. Bronin, a Democrat.

Connecticut has just 31.7% of what it needs to pay its employees' future retirement benefits, according to state financial reports. A fund for teachers has 52.3%. Together, that adds up to more than $37 billion in unfunded pension liabilities, or about $10,300 per Connecticut resident.

Connecticut's unfunded pension liabilities resulted from nearly 40 years of politicians making promises about benefits without adequately funding them, according to a 2015 study by the Center for Retirement Research at Boston College.



Hartford Mayor Luke Bronin warned he would seek bankruptcy protection for the city if it didn't receive additional aid from the state. PHOTO: MICHELLE MCLOUGHLIN FOR THE WALL STREET JOURNAL

After the long bull market of the 1990s, seemingly flush with cash, Pennsylvania, California, New Jersey and many other states sweetened retirement benefits. In 2008, stock markets plunged and those promises became harder to fund. To balance budgets, many governments skimped on annual pension contributions. The average funding level of large public pensions dropped from 100% in 2001 to 72% in 2016, according to the Public Plans Database, which tracks 170 large public plans.

Cost was an afterthought when Medicaid was enacted in 1965 under President Lyndon Johnson, who championed free health care for the poor and elderly as part of his "Great Society" program. "I'll go a hundred million or a billion on health or education," Johnson told his vice president in a March 1965 phone call, according to a recording in his presidential library. "I'll spend the goddamn money. I may cut back some tanks, but not on health."

The Medicaid legislation didn't levy taxes to pay for the program. Most states copied that approach, tapping general funds as the main revenue source and sharing some costs with local governments.

Cost wasn't a problem in the 1960s, when health care wasn't as sophisticated. "People used to go to the hospital to die back then," said Joseph Califano, who served as President Johnson's chief domestic policy aide in 1965. As treatments and longevity improved, many states also expanded Medicaid eligibility. Enrollment and costs rose.

Since 1967, the state and local share of Medicaid has grown at a compound annual rate of about 7%, exceeding the 3% annual growth in their tax revenues, adjusting for inflation, according to the Journal's calculations.

The math can overwhelm states when they hit a rough patch in tax growth. Declining tax revenue is what led to Michigan's budget cuts in 2011.

Today, the state is doing better. It has a "rainy day" fund of $889 million and is gradually increasing transportation, higher-education and K-12 funding. Michigan even expanded Medicaid under the Affordable Care Act, bringing health coverage to an additional 675,000 adults through federal matching funds that President Donald Trump wants to scale back.

John Walsh, the state budget director, says Medicaid expansion has been "physically healthy for the individuals and financially healthy for the state," since it helps lower Michigan's uncompensated health-care costs. One out of every four Michiganders now benefits from Medicaid.

President Lyndon Johnson explains the importance of funding health care and education in a March 6, 1965, phone call president, Hubert Humphrey.

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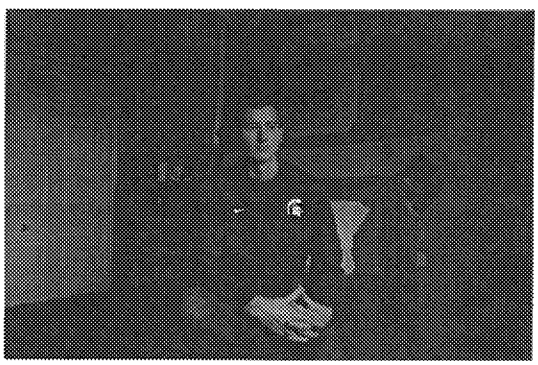
Source: LBJ Presidential Library

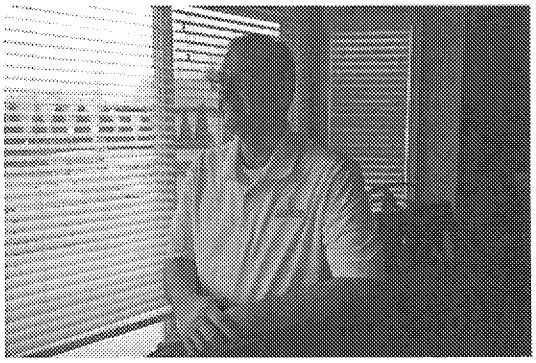
The financial picture is bleaker for many Michigan cities, including East Lansing, home of Michigan State University. Since 2009, annual state funding for the city and the school has fallen by about 17% each, adjusting for inflation. To offset the cuts, the university has increased tuition repeatedly. The city, which is struggling with almost $125 million in unfunded pension and retiree health-care liabilities, has been cutting services because state law caps property tax increases.



Things came to a head last summer when East Lansing asked MSU to pony up $100 million over 20 years to help shore up the city's underfunded pension plan. The alternative, the city said, was asking voters to approve a 1% income tax that would hit university employees and working students.

After negotiations went nowhere, the city brought the income-tax proposal before voters in a referendum last November.

Undergraduate student body president Lorenzo Santavicca, 21 years old, said the measure would take away from his generation. "We are getting the short end of the stick because of commitments that were made years ago," he said.



Lorenzo Santavicca, 21, top, says that to pay for his four years at Michigan State University, he and his father, Larry Santavicca, above, have borrowed about $63,000. PHOTO: ELAINE CROMIE FOR THE WALL STREET JOURNAL (2)

When his 53-year-old father attended Eastern Michigan University in the 1980s, state support for higher education was so generous that he was able to cover his tuition with the money he made raking hay on his grandmother's farm during summers and selling it for $3 to $4 a bale. He graduated debt-free in 1987.

Mr. Santavicca says that to pay for his four years at MSU, he and his father have borrowed about $63,000. He expects to graduate this spring with a degree in international relations and would like to someday work in government, but he is unsure he can afford to.

On Nov. 7, East Lansing residents shot down the income-tax referendum, forcing the city to debate what services to cut to save money for the pension obligations.

Staffing cuts in the police department are making it difficult for detectives to investigate opioid overdoses, according to a police memo. The city hopes to shed another 17 police and fire positions over the next two years, but even that won't provide enough savings, according to Erik Altmann, a Democrat on the city council.

At a public hearing late last year, Mr. Altmann suggested a long list of potential cuts to make more room in the budget for increased pension payments: closing the fire station on MSU's campus, shuttering the city's pool, aquatic center, dog park and soccer complex, suspending bulk leaf pickup and plowing of public sidewalks and ending annual jazz, folk, film and art festivals.

The city is now implementing some of these and other measures.

Write to Cezary Podkul at cezary.podkul@wsj.com and Heather Gillers at heather.gillers@wsj.com

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 7/30/2018 3:28:48 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: SRF-WIN "slashed"

Daily News

Draft Senate Bill Slashes Controversial EPA Water Infrastructure Program

July 27, 2018

Draft legislation the Senate is slated to consider as soon as next week proposes to slash authorized funding levels for a controversial EPA water infrastructure loan guarantee program -- to roughly 5 percent of what the environment committee originally approved -- in order to comply with Senate budget rules.

The draft manager's amendment to the water resources development bill, obtained by *Inside EPA*, would authorize funding for the so-called Securing Required Funding for Water Infrastructure Now (SRF WIN) program at $4 million for fiscal year 2019 and $5 million for FY20, with $1 million each year reserved for administrative expenses.

This is a significant reduction from the $100 million for each of those fiscal years that the Senate Environment and Public Works Committee (EPW) approved in May in its version of the Army Corps of Engineers authorization bill, S. 2800.

SRF WIN would amend EPA's Water Infrastructure Finance and Innovation Act (WIFIA) program to create a new class of loans that would be available exclusively to states to pay for projects listed on their state revolving fund (SRF) intended use plans.

WIFIA is an agency program that allows EPA to provide low-interest federal loans and loan guarantees from the U.S. Treasury that cover up to 49 percent of large infrastructure and water reuse projects, with utilities or states responsible for coming up with the remaining 51 percent of the project. WIFIA loans are aimed at projects that cost at least $20 million for large cities and $5 million for smaller municipalities, and may be combined with traditional SRF infrastructure financing.

The Senate's SRF WIN language has created a split among organizations representing water utilities, with proponents arguing the changes are necessary to provide additional funding for small and rural communities and opponents charging the bill will hamstring the existing WIFIA program and reduce overall federal water infrastructure funding.

Opponents, in a July 11 letter to EPW, said EPA analysis indicates the typical SRF WIN loan subsidized at interest rates of between 50 and 80 percent of the Treasury rate would leverage federal dollars at rates of only between 3.66-to-1 and 8.50-to-1.

This is significantly below the 92-to-1 rate in place for WIFIA loans to be awarded through the 2017 round of funding, as well as the 102-to-1 leveraging ratio estimated for WIFIA in FY19, the letter says.

Legislative Hurdles

While the environment committee attached the SRF-WIN provisions to pending legislation authorizing Army Corps of Engineers funding, the legislation is facing significant hurdles.

EPW Chairman John Barrasso (R-WY) announced earlier this month that the committee had pared back SRF WIN after the Congressional Budget Office estimated that the May bill would reduce federal revenues by $2.6 billion over 10 years and open the door to a point of order that would require 60 votes to overcome.

But Barrasso did not say by how much the authorized funding had been cut.

A water utility source opposed to the program says the amendment shows that lawmakers are seeking to preserve the proposed change but virtually killing the funding, making it unlikely that projects would receive financing.

"So apparently the Senate's solution to addressing the massive budget score associated with SRF WIN is to nearly eliminate the program's authorized funding," the source says. "This would not leave much money available to actually fund projects through SRF WIN, especially given the low leveraging ratio expected of that program."

In addition, the House appears to be opposed to the provisions. The House companion to the Senate Army Corps bill, H.R. 8, which cleared the House overwhelmingly earlier this year, is silent on the SRF WIN language.

In addition, outgoing transportation committee Chairman Bill Shuster (R-PA) is proposing legislation that would preserve the current WIFIA program while putting it on a stronger footing by increasing the size of the federal match and taking other steps that would ease the burden on utility recipients.

The Senate manager's amendment also preserves the current $50 million annual authorization for WIFIA. -- *Lara Beaven* (lbeaven@iwpnews.com)

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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 5/11/2018 2:27:03 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Water Associations Letter re SRF-WIN in Senate WRDA Bill
Attachments: SRF_WIN-AWIA_Letter_5-10-18.pdf

FYI.

GTM

Attachment

American Water Works Association

ASSOCIATION OF METROPOLITAN WATER AGENCIES

Water Environment Federation
the water quality people®

May 10, 2018

The Honorable John Barrasso
Chairman
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

The Honorable Tom Carper
Ranking Member
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper:

On May 8 our associations wrote to you in support of the introduced version of S. 2800, America's Water Infrastructure Act of 2018. We support that version of the bill in large part because it includes, among other provisions, a two-year extension of EPA's Water Infrastructure Finance and Innovation Act (WIFIA) program in its current form.

During the committee's subsequent May 9 hearing on this legislation we observed a significant degree of discussion of another bill: S. 2364, the Securing Required Funding for Water Infrastructure Now (SRF WIN) Act. The SRF WIN proposal is not currently part of S. 2800, and therefore was not addressed in our May 8 letter. However, given the amount of attention it received during the hearing we write to you again today to share our concerns about this proposal and urge you to omit the SRF WIN Act from any manager's amendment or other revisions that may be made to the introduced version of S. 2800.

We believe that SRF WIN Act is a fundamentally flawed proposal that, if enacted, would pose a severe threat to the future viability of the WIFIA program. For these reasons, our organizations will withdraw our support for S. 2800 if it advances with SRF WIN provisions.

It would be particularly disappointing for the committee to add the SRF WIN Act to S. 2800 when the former proposal has not been the subject of hearings where our associations – the stakeholders who were most directly involved with Congress' creation of WIFIA in 2014 – would have an opportunity to explain our concerns to the committee.

If such a hearing had been organized to consider the SRF WIN Act, we would have made a number of observations and recommendations to the committee. In response to the commentary on the SRF WIN Act that was shared with the committee on May 9, we would like to share our perspectives with you in this letter, so you may have a more complete understanding of why we so strongly oppose adding the SRF WIN Act to an otherwise strong WRDA bill.

WIFIA Background and History

Congress created the WIFIA program at EPA with a five-year authorization as part of the Water Resources Reform and Development Act in 2014. A product of close collaboration between multiple water sector stakeholders and bipartisan infrastructure advocates in Congress, WIFIA was carefully designed to complement EPA's existing State Revolving Fund (SRF) programs, which predominantly help communities undertake relatively modest infrastructure improvements necessary to achieve or maintain compliance with public health and environmental standards.

The general focus of the SRFs on smaller-scale projects is evidenced in EPA's data and state practices. For example, EPA's 2016 Drinking Water SRF Annual Report shows that through June 30, 2016 the DWSRF had provided a total of nearly $32.5 billion in funding assistance to communities nationwide through 12,827 individual assistance agreements – an average of just over $2.5 million per loan. Small communities serving 10,000 people or fewer received 9,044 of these assistance agreements since the program's inception – about 70 percent – while metropolitan water systems serving more than 100,000 people obtained a total of 897 DWSRF loans through 2016.[1] In addition, some states place limits restrict access to SRF loans by large cities, with the goal of ensuring that sufficient funding remains available for smaller projects and communities.

In contrast, WIFIA was designed to deliver low-cost financing for large-scale drinking water and wastewater infrastructure projects expected to cost in excess of $20 million. But cities and towns of all sizes are eligible to take part in WIFIA, and the program offers special eligibility incentives to rural communities: at least 15 percent of annual WIFIA funding is reserved for projects in rural areas (defined as communities serving not more than 25,000 people), and these projects need only cost at least $5 million – rather than $20 million – to qualify for funding. Congress also included a specific provision in the WIFIA statute that allows state SRF agencies to compile multiple small projects into a single WIFIA application, creating yet another avenue for small communities to access the program.

Congress made its first appropriation to support WIFIA loans in 2017, and after receiving 43 initial letters of interest EPA invited 12 projects to apply for funding. Those loans are beginning to be finalized, and in the program's first year WIFIA is expected to offer a total of $2.3 billion in water infrastructure loans – all from an initial FY17 appropriation of $25 million. The recently enacted FY18 omnibus appropriations bill more than doubles funding for WIFIA loans to $55 million – and in April EPA announced the availability of approximately $5.5 billion in new WIFIA credit assistance that could help support about $11 billion in total water infrastructure investment.

We fear that all of this progress could be put at risk due to the SRF WIN Act. Supporters of this bill claim it would make WIFIA more accessible to small communities and generate additional funds for state SRF programs, but in reality it would undermine the purpose and ability of WIFIA to effectively leverage limited federal dollars to support major water and wastewater infrastructure investments. Simply put, the SRF WIN Act is unnecessary, inequitable, and a threat to WIFIA's viability.

The SRF WIN Act is Unnecessary

The simplest argument against the SRF WIN Act is that it is unnecessary because the existing WIFIA program already allows state SRF agencies to compile multiple smaller-scale drinking water and wastewater projects together into a single WIFIA loan application. Specifically, Section 5026(8) of the WIFIA statute extends eligibility to "a combination of projects … for which a State infrastructure financing authority submits to the Administrator a single application," and which are eligible for SRF assistance through the Clean Water or Drinking Water SRFs. This is precisely how the 2017 WIFIA application of the Indiana Finance Authority, which proposed to "expand the reach of its Clean Water and Drinking Water State Revolving Fund programs and fund dozens of additional projects in communities across the state," was deemed eligible for WIFIA assistance.

[1] https://www.epa.gov/sites/production/files/2017-09/documents/2016_dwsrf_annual_report_508.pdf

The upcoming round of WIFIA funding that was announced in April will bring similar opportunities for state SRF agencies. In fact, an April 4 letter to the nation's governors from EPA Administrator Scott Pruitt told states to "think creatively" when contemplating potential WIFIA projects, and urged them to submit proposals that "expand the reach of your State Revolving Fund program with WIFIA funds, as Indiana is planning to do with 2017 funds."[2] This makes abundantly clear that no new congressional action is necessary to enable state SRF agencies to take advantage of WIFIA's leveraging potential.

Given these facts, it is unclear what purpose the SRF WIN Act would serve. The $1 billion authorized by the legislation over five years would be available only to state infrastructure financing authorities, for use exclusively on projects that are included on a state's Drinking Water or Clean Water SRF intended use plan. But again, these projects are already eligible to receive loans under the current WIFIA program. Moreover, the current WIFIA program also sets aside at least 15 percent of funding made available annually for projects serving rural communities. This means that in FY18, $825 million of the $5.5 billion of available WIFIA assistance will be offered first to rural drinking water and wastewater projects. There is clearly no need for a separate authorization to ensure that WIFIA offers loan opportunities to small communities.

Meanwhile, under the SRF WIN Act individual communities that wish to finance large-scale water and wastewater projects would be unable to take advantage of any of the funding made available through the new $1 billion authorization – leaving many potential large-scale projects across the country on the sidelines.

The SRF WIN Act is Inequitable

We also oppose the SRF WIN Act because it is inequitable in that it would establish preferential application, evaluation, and financing rules for state SRF agencies that applicants to the original WIFIA program would not have an opportunity to access. There is no reason why these special benefits should only be available to state-compiled projects, and not individual communities that may seek WIFIA assistance on their own.

The examples of the uneven playing field created by the SRF WIN Act are numerous. Under the legislation, states applying for SRF WIN loans would be exempt from WIFIA's application fees, exempt from caps that limit WIFIA financing to no more than 49 percent of a project's total cost, and exempt from loan restrictions that specify that the interest rate on a WIFIA loan may not be less than the prevailing Treasury rate. Meanwhile, EPA would be required to review SRF WIN applications on an expedited basis – a benefit not available to traditional WIFIA applicants.

Other special benefits extended to state applications by the SRF WIN Act could invite instances of abuse, such as the waiver from the selection criteria under Section 5028(b) of the current WIFIA statute that EPA must follow when evaluating potential projects. These criteria, which were developed by Congress with extensive stakeholder input, ensure that EPA's process of evaluating WIFIA applications is neutral and transparent, and that political considerations are not a factor when projects are being selected. The SRF WIN Act, in contrast, would completely bypass state applications under the new authorization from the selection criteria, and direct EPA to award funding based only on "need" as determined by the

[2] https://www.epa.gov/sites/production/files/2018-04/documents/al_4-4-18.pdf

Administrator. The bill offers no guidance on what constitutes "need" – is it the number of water infrastructure projects awaiting funding in a state? The degree to which projects may address a state's public health concerns? Whether a state's projects are seen as credit risks and unable to secure financing elsewhere? The SRF WIN Act is silent on how "need" shall be measured, which could lead to troubling opportunities for abuse or favoritism as funding leveraged from up to $1 billion in federal dollars are appropriated.

The SRF WIN Act's total elimination of selection criteria is even more puzzling due to the fact that the current WIFIA statute already offers modified selection criteria for WIFIA applications submitted by state SRF agencies. Section 5028(b)(3) of the present WIFIA law mandates a "special rule for combined projects" that applies to EPA's consideration of these applications, with EPA directed to not consider "the extent to which [a state SRF agency's] project is nationally or regionally significant, with respect to the generation of economic and public health benefits." In other words, Congress has already stipulated separate selection criteria upon which EPA must consider WIFIA applications put together by state SRF agencies, in recognition that many of the smaller-scale projects that are compiled into these applications are less likely to be viewed as nationally or regionally significant. The SRF WIN Act ignores this existing accommodation of state-compiled projects in its effort to exempt them from WIFIA's selection criteria altogether.

Another example of inequality in the SRF WIN Act is how the bill would continue the current eligibility of state-compiled projects under the existing WIFIA program, while making only these projects eligible for funding through the newly established authorization as well. As a result, state SRF agencies would have the option of submitting applications representing the same compilation of projects to two different WIFIA programs, each with its own eligibility rules. This structure is at best confusing, and will only complicate the ability of individual communities to access WIFIA for their own major projects.

In sum, the SRF WIN Act does not offer a level playing field to individual communities and water utilities that may wish to access WIFIA loans because it denies them the opportunity to access the preferential application, evaluation, and financing rules that would be available to state SRF agencies. And while there may be reasonable arguments in favor of making some reforms to the WIFIA program (such as allowing loan funds to cover more than 49 percent of a project's total cost and eliminating application fees) it would make little sense to offer these benefits only to applications submitted by state SRF agencies. By giving state-compiled projects a separate dedicated authorization – while also continuing to allow states to compete against individual water and wastewater projects through the original WIFIA program – the SRF WIN Act would turn WIFIA away from its mission to be a source of low-cost supplemental loans for regionally and nationally significant water infrastructure projects.

The SRF WIN Act Puts WIFIA's Viability At Risk

One of the strongest benefits of the WIFIA program today is its ability to leverage a relatively small initial federal investment into scores of additional infrastructure funding dollars. Indeed, the agency plans to leverage the $25 million appropriated for WIFIA projects in FY17 into $2.3 billion worth of loans to communities (a 92 to 1 ratio), and in FY18 EPA expects to do even better, leveraging $55 million into $5.5 billion. These robust rates enable the federal government to get a tremendous "bang for the buck" when appropriating funds for water and wastewater infrastructure.

But WIFIA's leveraging ability would dramatically decline under the SRF WIN Act, because the new bill would require EPA to offer much lower interest rates for projects funded through the new program. Section 5029(b)(4) of the current law specifies that the interest rate on a WIFIA loan "shall be not less than the yield" on a U.S. Treasury bill with a similar maturity date. This sets a floor below which the interest rate of a WIFIA loan may not fall, and does not establish any maximum interest rate.

The SRF WIN Act takes the opposite approach by mandating that a loan under the new program "shall be equal to the yield" on a Treasury bill of a similar maturity. This locks in a guaranteed rate for SRF WIN projects, but the bill then goes further and specifies two lower tiers of interest rates for states that received less than two percent of the total pot of Clean Water and Drinking Water SRF funds distributed to states in the most recent fiscal year. This rate would initially be set at 80 percent of the Treasury rate, unless there fails to be "sufficient demand" for loans from eligible states at this rate. In this case, EPA would have the option to offer loans at between 50 and 80 percent of the Treasury rate, again only to states that received less than two percent of total available SRF funding in the most recent fiscal year.[3]

While all borrowers would appreciate the opportunity to access lower interest rates, this does come at a cost: the lower the interest rate, the higher the interest rate subsidy must be provided by EPA. And the higher the subsidy, the lower the leveraging ratio of the WIFIA program. The lower the leveraging ratio, the fewer total dollars will be available through WIFIA to communities to access for water infrastructure projects.

The potential reduction to WIFIA's leveraging ability would be severe. According to an analysis conducted by EPA, the typical SRF WIN loan subsidized at interest rates of between 50 and 80 percent of the Treasury rate would leverage federal dollars at rates of only between 3.66 to 1 and 8.50 to 1. This is significantly below the 92 to 1 rate in place for loans to be awarded through the 2017 round of funding, as well as the 100 to 1 rate anticipated for 2018. It means that every dollar appropriated to the new SRF WIN program will support far less infrastructure investment than it would have if it had been directed to the original WIFIA instead. In other words, the SRF WIN Act would reduce, not expand, WIFIA's total leveraging ability and result in fewer opportunities for communities across the country to access low-cost loans for major water infrastructure projects.

This subcommittee should also seriously consider whether states that receive lower amounts of annual SRF funding should automatically be offered preferential interest rates, as the SRF WIN Act would do. In the case of the Drinking Water SRF, funding is allocated to states based on the results of EPA's quadrennial Drinking Water Needs Survey, with states that report higher drinking water infrastructure investment needs awarded a greater share of DWSRF funding. Those states that receive lower shares of DWSRF funding have reported fewer total drinking water infrastructure needs than others – offering little justification for why the SRF WIN Act should offer better interest rates to states whose water infrastructure needs are reported to be less severe.

---

[3] The SRF WIN Act also offers these reduced interest rates to states for which the president has declared a major disaster under the Stafford Act since January 1, 2017, provided that the loan is used to repair drinking water or wastewater infrastructure damaged by that disaster. Between that date and May 1, 2018 the president made 155 major disaster declarations, though all did not involve damage to drinking water or wastewater infrastructure. But because the SRF WIN Act separately requires projects to appear on a state's Clean Water or Drinking Water SRF intended use plan as a condition of receiving funding, the proposal as introduced is unlikely to represent a quick and efficient source of low-cost disaster recovery assistance.

The provision in the SRF WIN Act that guarantees lower interest rates to states that received less than two percent of total SRF funding in the most recent fiscal year also appears to be both arbitrary and extremely broad. According to EPA's data for the 2017 fiscal year, 35 states, plus the District of Columbia and Puerto Rico, received less than two percent of the year's total distribution of SRF loans.[4] So, had the SRF WIN Act been in place, fully 70 percent of states, in addition to the District of Columbia and Puerto Rico, would be entitled to access interest rates as low as half of the Treasury rate. The remaining 15 states with higher reported water infrastructure needs (including Illinois, New Jersey, Maryland, Massachusetts, and New York, among others) could only borrow SRF WIN funds at the full Treasury rate.[5] Meanwhile, individual communities and others applying to the original WIFIA program from any state across the nation would continue to incur rates somewhere above that level.

There appears to be no rational policy basis for these interest rate preferences, but the net effect is for the SRF WIN Act to artificially select winners and losers among state applicants while reducing the overall leveraging power of the WIFIA program. And if WIFIA is not able to effectively leverage its appropriation, its value as a source of affordable water infrastructure funding will markedly decrease.

Finally, we would encourage you to carefully consider the future implications the SRF WIN Act could carry for existing appropriations to the Drinking Water and Clean Water SRFs, as well as the original WIFIA program. In fact, the SRF WIN Act appears to itself acknowledge that it could pose a threat to these programs' regular annual appropriations, as it includes a provision attempting to prevent Congress from appropriating any SRF WIN funding during a fiscal year in which the SRFs or WIFIA do not receive appropriations equal to at least their fiscal year 2018 amounts.

This provision appears to recognize that the SRF WIN Act could be seen in the future as an alternative to traditional SRF and WIFIA appropriations; if not, then why include the provision at all? But given claims that the bill could leverage billions of dollars in additional funding for water infrastructure each year, all from an annual authorization of just $200 million, one may speculate whether a future Congress may seek to achieve budget savings by reducing or eliminating regular annual appropriations for the SRFs and WIFIA from EPA's budget. Of course, one cannot predict what actions lawmakers may or may not take in the future, but the inclusion of the "no impact on other federal funding" language in the SRF WIN Act indicates that the bill's supporters believe this to be a possibility.

Ultimately, we do not believe the SRF WIN Act's attempt to preserve FY18 funding levels for the SRFs or WIFIA would be successful. Nothing in the bill could stop future appropriators from waiving this provision for a given fiscal year and proceeding to fund SRF WIN, the SRFs, and WIFIA at whatever levels they choose. So in reality the bill does nothing to protect annual SRF or WIFIA appropriations that could be put at risk as a consequence of the SRF WIN Act.

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[4] EPA's data on annual DWSRF allotments is available at https://www.epa.gov/drinkingwatersrf/annual-allotment-federal-funds-states-tribes-and-territories#tab-6. The data for annual CWSRF allotments is available at https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-allotments-federal-funds-states. In sum EPA reports making $2,149,289,000 in DW and CW SRF funding available to states in FY17.

[5] The following states received more than two percent of total DW and CW SRF funding in 2017 ($42,985,780), which would have made them ineligible for reduced interest rates had the SRF WIN Act been in effect for that year: California, Florida, Illinois, Indiana, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas, and Wisconsin.

Conclusion

For the reasons outlined above, we strongly oppose the SRF WIN Act and fear that if enacted it would pose a serious threat to the WIFIA program and divert needed resources away from the major drinking water and wastewater projects it was designed to aid. Moreover, the evidence is clear that the existing program offers ample opportunities for small communities and states to access low-cost WIFIA loans, so there is no need for such a dramatic restructuring of the statute – especially considering the WIFIA program is still in the process of distributing its very first round of loans.

Our associations also wish to reiterate our support for S. 2800, America's Water Infrastructure Act of 2018, as introduced on May 8. We immediately endorsed this legislation based on its extension of the existing WIFIA program and our understanding that the committee only planned to make minor and uncontroversial technical changes to the proposal during a subsequent markup session. While we still hope that this is the case, we want to make clear that we will strongly oppose this or any other legislation that is amended to include components of the SRF WIN Act.

We remain willing to work with you to develop an alternate path forward that could further clarify state and small community access to WIFIA while leaving the existing program intact. We would be happy to discuss such options with you at your convenience.

Sincerely,

American Water Works Association
Association of Metropolitan Water Agencies
Water Environment Federation

cc: Environment and Public Works Committee members

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 4/9/2018 4:31:37 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Nagle, Deborah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33888a2bbe8f48aeb4ad9cc54259fb4e-dnagle]; svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Kevin Morley [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=userb930331d]
Subject: Correspondence on Perchlorate Matter
Attachments: AWWA Letter to AA Ross 20180409.pdf; AWWA Letter to Admin McCarthy 20160405.pdf

Dear Mr. Ross,

Attached please find my letter to you regarding the perchlorate matter along with a copy of my previous comment letter to then-Administrator McCarthy.

Thank you for your interest.

Sincerely,

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (direct)

Attachments

American Water Works Association

Dedicated to the World's Most Important Resource®

April 9, 2018

Mr. David Ross
Assistant Administrator, Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

Dear Assistant Administrator Ross,

First and foremost, I congratulate you on your confirmation as Assistant Administator for the Office of Water. It is a wonderful organization with many talented and commited staff whose shared mission is the application of sound science to guidance policy decisions.

In that regard, I would like to share our concerns with Agency's proceedings associated with perchlorate. Many of these concerns were expressed in a 2016 letter to Administrator McCarthy as the Agency was embarking on a third review effort following assessments by the National Academy of Science (2005) and EPA's Science Advisory Board (2013).

The Agency's current draft approach has not allayed our concerns. Our review supports the conclusions of prior studies that low levels of perchlorate have no demonstrated health consequence that can be scientifically validated with the confidence necessary to support regulatory action. While we support the modeling efforts applied by the Agency, the perchlorate model is not fit for purpose and, if accepted, would set a troubling precendent for the scientific integrity of the Agency's regulatory process.

AWWA appreciates the opportunity to share these concerns with you and share your commitment to ensuring that sound science guides the Agencies actions. If you have any questions, please feel to call Kevin Morley or me in our Washington Office at Ex. 6

Yours Sincerely,

G. Tracy Mehan, III
Executive Director – Government Affiars

Enclosure: Letter to Administrator McCarthy, April 5, 2016

CC: Lee Forsgren, OW
Peter Grevatt, OGWDW
Deborah Nagle, OST

American Water Works Association

Dedicated to the World's Most Important Resource®

April 5, 2016

The Honorable Gina McCarthy
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

Dear Administrator McCarthy;

The American Water Works Association (AWWA) is writing in response to the National Resource Defense Council's (NRDC) lawsuit, filed February 17, 2016, in the matter of *NRDC v. EPA*, Case No. 16-cv-1251 (S.D. N.Y), in which the NRDC is seeking to compel the U.S. Environmental Protection Agency (EPA) to finalize a rule regulating perchlorate pursuant to the Safe Drinking Water Act (SDWA).

We are deeply concerned that this litigation will unnecessarily truncate the EPA's current peer-review process. Any consent order resulting from this litigation should allow for a full review of scientific body of knowledge that has been gathered by the Agency prior to any final decision.

Given the importance of maintaining the integrity of the SDWA rule-making process, and the underlying science, AWWA has provided substantial comment to EPA and EPA's Science Advisory Board over the last decade on the regulatory determination of perchlorate under SDWA.

> Feb. 2, 2005 - Letter urging EPA to use sound science and requesting the Agency "make perchlorate a top priority, and to regulate this contaminant as expeditiously as feasible consistent with the requirements of the Safe Drinking Water Act."
>
> May 27, 2005 - Letter urging EPA use the framework of the Contaminant Candidate List (CCL) to make a regulatory determine for perchlorate. In addition, we encouraged the agency to identify knowledge gaps that needed to be filled and identify what EPA will do to close those gaps, if information prevented the agency from making such a determination.

Nov. 10, 2008 - Letter supporting EPA proposed negative regulatory determination for perchlorate based on the criteria established in the SDWA.

Sep. 18, 2009 - Letter restating AWWA's position that regulating perchlorate would not present "a meaningful opportunity for health risk reduction for persons served by public water systems." We also expressed concern regarding the appropriateness of using iodide deficiency to address the public health issue under SDWA and the omission of peer-reviewed studies that reflected inconsistencies in health impacts from exposure in drinking water in the subpopulations that were and continue to be the focus of the reassessment.

AWWA also offered substantive comments in four separate submissions to the EPA's SAB between July 2012 and March 2013 during the reassessment.

1. EPA's Decision-Making Under SDWA Must be Guided by Statutory Criteria, Not an Arbitrary Deadline Imposed by a Court

AWWA's interest in the NRDC litigation remains the same as it has been throughout this lengthy process, that is, to ensure that the integrity of the SDWA process is maintained, including the use of best available science to promulgate a national primary drinking water regulation for a contaminant found in drinking water. Toward this end, it is worth emphasizing the three broad criteria the agency must use in making a regulatory determination. SDWA requires the presence of all three of the following:

> (i) the contaminant may have an adverse effect on the health of persons;
>
> (ii) the contaminant is known to occur or there is a substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and
>
> (iii) in the sole judgment of the Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems. 42 USC §300g-1-(a)

As is well documented, the regulatory determination process for perchlorate has a long and complicated history, beginning in 1998, when perchlorate was first placed on SDWA's contaminant candidate list (CCL). After extensive review by EPA from 2005 through 2008, including a report by the National Academy of Sciences, EPA proposed a preliminary negative regulatory determination, concluding that there was not a "meaningful opportunity for health risk reduction" through a national drinking water regulation.. Consistent with its statutory

mandate under the SDWA, EPA issued a health advisory concurrently with this negative regulatory determination. Notwithstanding, in 2011, under a new Administration, the EPA subsequently reversed its decision, making an off-cycle positive regulatory determination.

The question whether to regulate perchlorate under SDWA has a long and complicated history, and underscores the concerns and criticisms levied by some regarding the inconsistency and lack of transparency in the regulatory determination process.[1] As noted by a 2011 GAO report, in light of the statute's granting of such broad discretion to EPA, Agency decision-making has the potential to be influenced – or the perception of influence - by factors other than best available science, including changes in Agency leadership. Certainly, EPA's change in leadership in 2009 has raised questions as to the role of non-scientific factors that may have led to the Agency's 2011 reversal.[2] As such, the AWWA strongly supported the Agency's decision in 2012

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[1] *See* written Testimony of David Trimble, GAO Report dated July 12, 2011, titled Improvements in Implementation Are Needed to Better Assure the Public of Safe Drinking Water, which states:

> [C]onsistency and accountability are lacking in this important program because EPA has not developed guidance on the application of the broad statutory criteria, which are susceptible to varying interpretations. In its comments, EPA highlighted that, under these criteria, ultimately it is the Administrator's judgment as to whether regulation of a contaminant in drinking water presents a meaningful opportunity for health risk reduction, after considering the information presented by agency staff. As stated in our report, the statutory criteria are so broadly stated that they could potentially be interpreted so as to lead to regulating all the contaminants on the candidate list, some of them, or none of them. It is precisely for these reasons that we believe it is essential for the staff to have sufficient guidance on applying the broad criteria consistently and transparently so that the Administrator's judgment can be based on sound and consistent information. Without such guidance, the basis for EPA's determinations and the quality of the documentation the staff use to support them can fluctuate over time as a result of, among other reasons, changes in agency leadership and staff.

[2] In her January 14, 2009, confirmation hearing, then Ms. Lisa Jackson, the nominee for EPA Administrator, engaged in the following colloquy with Senator Boxer:

> Senator Boxer: *A number of questions which I think for the most part you could say yes or no to, unless you want to elaborate. I want to get these things on the record. The first one is about perchlorate. Perchlorate is used to make rocket fuel. When it gets into drinking water, this toxic chemical can interfere with the thyroid and affect hormone systems, which control the way the body develops. Infants and pregnant women are especially vulnerable to perchlorate. It has contaminated drinking water supplies across the Country. California, my State, has 290 water sources with at least 4 parts per billion of perchlorate. The GAO found in 2005 that nearly 400 sites in 35 States had perchlorate. In 2006, the CDC found widespread human exposure to perchlorate in the U.S. And they found that many women who were exposed to perchlorate in drinking water had significant changes in thyroid hormone levels. A 2008 FDA study found perchlorate in 74 percent of all foods tested, including baby food. Yet, EPA recently refused to regulate perchlorate. We had quite a to-do over here in that hearing. And they won't regulate it in drinking water, and they sent the issue back to the National Academy of Sciences. Now, again, delay, delay, delay. We have had years of it and we need action. Do you commit to us to immediately review this failure to establish a drinking water standard for perchlorate and act to address the threat to pregnant women and children caused by this dangerous toxin?*
> Ms. Jackson: *Yes, Madam Chair.*

to enlist the support of the SAB and the more recent decision earlier this year, based on SAB's recommendation, to embark upon a rigorous peer-review of the Agency's dose-response modeling.[3]

We firmly believe that the current peer-review process is critical to ensuring the fidelity of the regulatory process and the soundness of its scientific underpinning. As such, we remain deeply concerned that the NRDC litigation may seek to truncate that process by imposing an arbitrary and unrealistic deadline influenced largely by timing and political considerations. In such case, it is likely that sound science would not be used in establishing an MCL.

2. EPA's 2011 Regulatory Determination May Need to be Revisited Based on the Agency's Peer-Review and PBPK Modeling

As noted above, SDWA also provides the Administrator "sole" discretion on whether a national drinking water standard "presents a meaningful opportunity for health risk reduction." Given information regarding perchlorate's frequency of occurrence and the fact that the states of California and Massachusetts already established MCLs under state law, 6 micrograms per liter (ug/L) and 3 ug/L, respectively, a legitimate question remains whether a national MCL is appropriate or even lawful. However, this question cannot be answered until the peer-review process has followed its proper course.

Although SDWA's statutory obligation to finalize an MCL within 18 months of a positive regulatory determination is not in dispute, if the peer-review process casts serious doubt on the effectiveness of a national MCL, as a matter of law, the Agency must reconsider its prior negative regulatory determination. EPA must also properly consider the effectiveness and cost-benefits of finalizing an MCL on protecting public health.

Toward this end, and in the context of the NRDC litigation, we would strongly urge the EPA against rushing to finish the peer-review process or agreeing as part of any litigation settlement to any arbitrary timeframe that truncates the process.

A court enforcing a statutory obligation to perform a non-discretionary duty, as in the present case, "may exercise its equity power" to set enforceable deadlines to achieve an ultimate and intermediate nature. *See Appalachian Voices v. EPA*, Civil Action No. 12-0523, Consolidated Case Nos. 12-0585 and 12-069 (D.D.C., Oct. 29, 2013). According to the District Court in *Appalachian Voices*,

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Senator Boxer: *Thank you.*

[3] Request for Nominations for Peer Reviewers for EPA's Biologically Based Dose-Response (BBDR) Model for Perchlorate in Drinking Water, 81 Fed. Reg. 10,617 (Feb. 9, 2016).

> [A] court may afford an agency additional time for compliance "where it is convinced by the official involved that he has in good faith employed the utmost diligence in discharging his statutory responsibilities." Generally, courts reject agency arguments that amount to no more than a general desire to further study an issue before acting, but in determining appropriate relief, a court is also charged to "separate justifications grounded in the purpose of the Act from the footdragging efforts of a delinquent agency." (citations omitted)

Here, it is clear that the EPA continues to diligently follow the mandates of the SDWA through using a peer-review process. We are confident that a court, if faced with the legal and evidentiary considerations, will properly conclude that such delay is appropriate and anything other than agency foot-dragging.

3. The Precedential Effect of Regulating Perchlorate Cannot be Underestimated

Legal considerations notwithstanding, given the growing list of unregulated contaminants that are under consideration by the Agency, we believe that the integrity of the process, focusing on best available science, is in the public's best interest. This includes consideration of the following:

Meaningful Opportunity – The current actions counter to the Agency Inspector General's conclusion that regulatory action under the Safe Drinking Water Act is not an appropriate or effective way to address the overarching public health issue - iodide deficiency.[4] The National

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[4] Office of Inspector General Scientific Analysis of Perchlorate, Report No. 10-P-0101, April 19, 2010, which states:

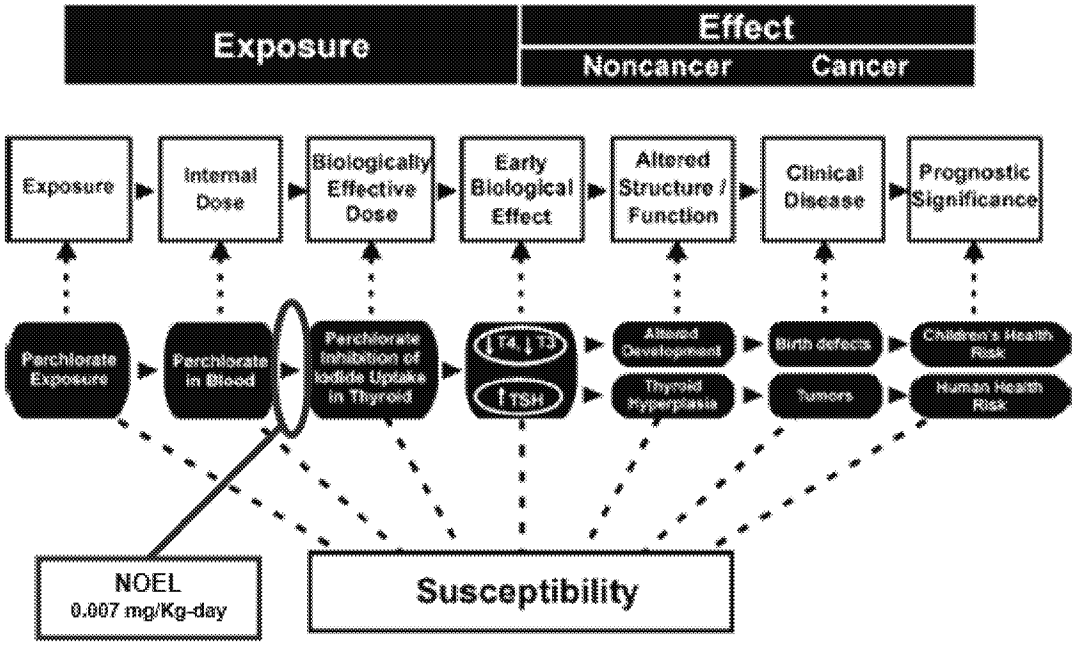
> Against established EPA risk assessment procedures, EPA derived the perchlorate RfD from a nonadverse biological effect instead of an adverse effect. The perchlorate RfD protects against all human biological effects from exposure, which is a stricter public health criterion than limiting environmental exposure to protect against adverse effects in humans. This shift in risk management constitutes a significant change in environmental policy.
>
> Based on our scientific analysis, perchlorate is only one of several chemicals that stress the thyroid's ability to uptake iodide. The other sodium iodide symporter (NIS) stressors include thiocyanate, nitrate, and the lack of iodide. All four of these NIS stressors meet EPA's risk assessment guidance for conducting a cumulative risk assessment using the dose-addition method. Our analysis implemented a cumulative risk assessment that found the following: 1) the risk from each of the four NIS stressors is not equal; 2) EPA's perchlorate RfD is conservative and protective of human health, and further reducing the perchlorate exposure below the RfD does not effectively lower risk; 3) increasing maternal total iodide intake to healthy levels will reduce the frequency and severity of permanent mental deficits in children; and 4) correcting moderate and mild iodide deficiency occurring in about 29 percent of the U.S. pregnant and nursing population is the most effective approach for reducing risk.

Academy of Sciences (NAS) assessment of perchlorate also recognized iodide deficiency as the larger public health issue of concern.

Research findings[5] indicate that the total dietary exposure (food and drinking water) of reproductive age women in the U.S. is approximately one-third of the NRC reference dose for perchlorate at the 95th percentile, which is complementary to the findings of the joint assessment prepared by EPA-CDC. Given this evidence related to limited exposure potentials and estimated intakes well below the RfD, it is questionable that perchlorate presents a significant adverse effect on the nation's health, including sensitive subpopulations.

Health Effects – The NAS RfD represents a point of departure (POD) that precedes the inhibition of iodine uptake by the thyroid. This is a departure from the Agency's traditional approach of using a No Observed Adverse Effects Level (NOAEL) for regulatory actions. The NAS's use of a No Observed Effect Level (NOEL) is based on "using a nonadverse effect that is upstream of the adverse effect [which] is a more conservative and health protective approach". The NRC's use of a precursor POD is represented in Figure 1.

Figure 1. Depiction of Point of Departure (POD) used to derive NOEL



[5] Mendez, W., Dederick, E., and J. Cohen. 2010. Drinking water contribution to aggregate perchlorate intake of reproductive-age women in the United States estimated by dietary intake simulation and analysis of urinary excretion data. *Journal of Exposure Science and Environmental Epidemiology,* 20, 288–297; doi:10.1038/jes.2009.50.

More recently, the Science Advisory Board's (SAB) assessment provides a sufficient level of doubt with regard to the potential for perchlorate to trigger *inferred adverse effects*. This led the SAB to recommends that the Agency use a physiologically based pharmacokinetic (PBPK) modeling approach; however the SAB noted that *the model is not capable of predicting an actual adverse effect*. In addition, the SAB review included no considerations of perchlorate dose-response levels required to trigger the onset of hypothyroxinemia, or any other adverse health endpoint, to support the SAB's recommendation. The current peer review process will help verify that such modeling limitations have been address appropriately and can determine if any causality can be established with an adverse effect, rather than inferred.

Sensitive Subpopulation - The SAB redefined the sensitive subpopulation as "hypothyroxinemic pregnant and lactating women and infants exposed to perchlorate through water-based preparations of formula or breast milk". Further peer review will help determine if there is sufficient scientific evidence available to justify altering the NRC's definition of sensitive subpopulation, i.e. the fetuses, particularly those of pregnant women who have hypothyroidism or iodide deficiency.

We do not wish to prejudge the conclusions of the current peer-review process, but note the multiple precedential issues that will benefit from a through review given the implications for future rulemakings.

AWWA appreciates the opportunity to comment on these important drinking water issues. If you have any questions, please feel to call Kevin Morley or me in our Washington Office at **Ex. 6** **Ex. 6**

Yours Sincerely,

G. Tracy Mehan, III
Executive Director – Government Affiars

cc: Joel Beauvais – EPA, OW
Peter Grevatt – EPA, OGWDW
Avi Garbow – EPA, OGC
Dawn Messier – EPA, OGC
John Cruden – DOJ, ENR
Kevin Morley
Steve Via

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 6/7/2018 2:37:23 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Wildeman, Anna [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=05dd0af69bfa40429e438b7646502b99-Wildeman, A]
Subject: FW: EPA Security Division Guidance Document
Attachments: SDC118060709260.pdf

FYI.

GTM

From: Steve Via
Sent: Thursday, June 07, 2018 10:22 AM
To: Tracy Mehan <tmehan@awwa.org>
Cc: Kevin Morley <KMorley@awwa.org>
Subject: FW: EPA Security Division Guidance Document

Tracy,

Here is the security division protocol we just talked about reduced to a page. Below is the email I sent this a.m. to the other division directors in OGWDW.

Steve

Steve Via
Director Federal Relations, AWWA Ex. 6

From: Steve Via
Sent: Thursday, June 07, 2018 10:10 AM
To: Eric Burneson <burneson.eric@epa.gov>; Christ, Lisa <Christ.Lisa@epa.gov>; Rodgers-Jenkins, Crystal <Rodgers-Jenkins.Crystal@epa.gov>; Harris, Adrienne <Harris.Adrienne@epa.gov>
Cc: Kevin Morley <kmorley@awwa.org>
Subject: EPA Security Division Guidance Document

Good morning,

I wanted to take a minute to alert you to a guidance document being developed through the Security Division entitled, Containment and Disposal of Large Amounts of Contaminated Water: A Support Guide for Water Utilities. As I understand it, this guidance document will be discussed by the Sector Coordinating Committee on June 20th but a webinar presenting the guide as though it were final is already scheduled and advertised. That webinar is scheduled for June 28.

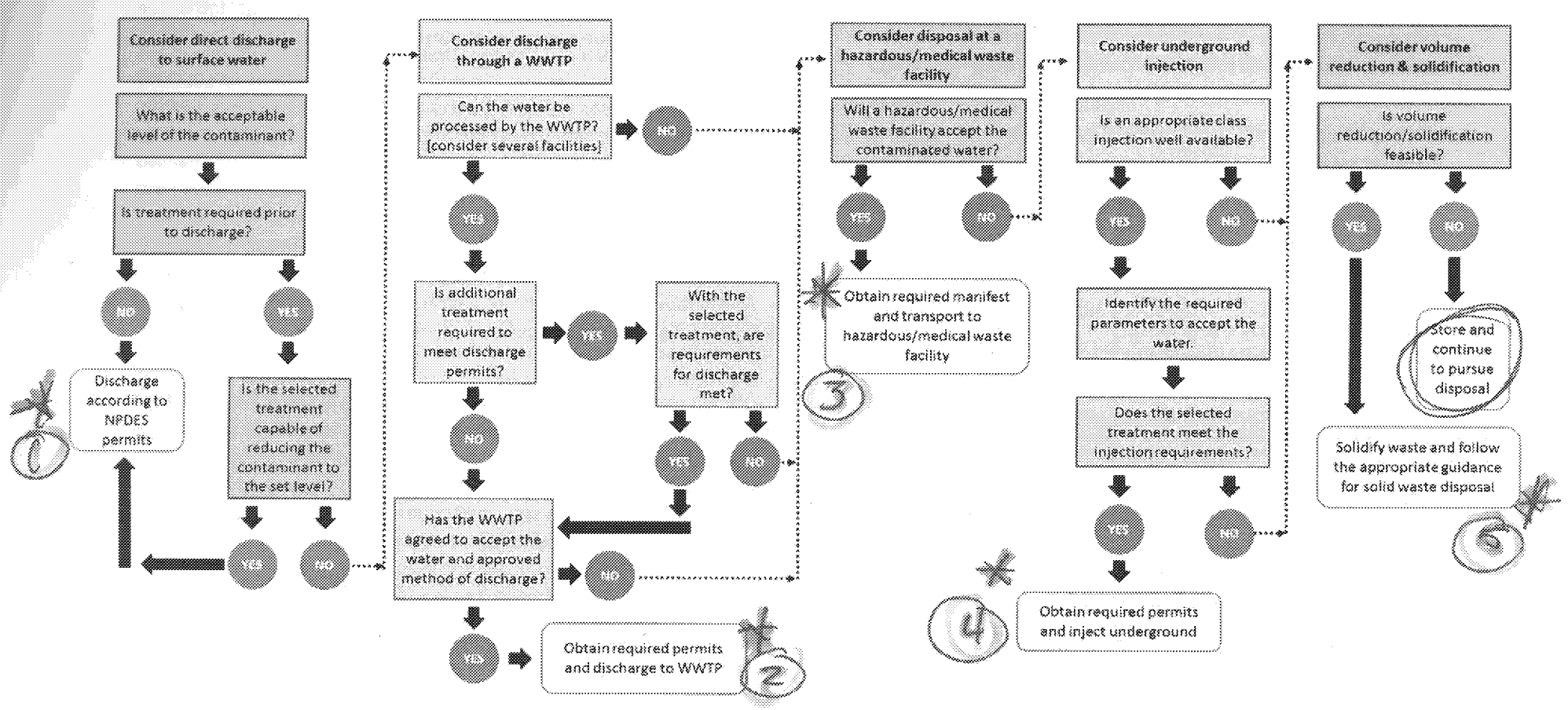
On brief review, there are a number of implications from this guide that do not appear to have been fully considered. Beyond some of the practical implementation challenges, you will notice conflicts with guidance the Agency has already distributed and on reflection you will see implications for event scenarios you contemplate in your work but are not top-of-mind for the Security Division.

Guidance on decontamination is something the sector sees as important, but it is a topic that needs to be carefully thought through. Apologies for interrupting your work on Pb, PFAS, PRIME, and the host of other priorities, but this document warrants additional consideration before it is published.

Thank you for your time and attention. Kevin Morley is available to discuss the new guidance document if you have questions regarding issues that arose at an initial briefing earlier this week. Kevin is available at Ex. 6

Best regards,
Steve

Steve Via
Director of Federal Relations
American Water Works Association
1300 Eye Street NW, Suite 701W
Washington, DC 20005-3314
Office Ex. 6 Direct Ex. 6
svia@awwa.org | www.awwa.org



Printable Framework for selecting disposal options for contaminated water

Figure 4: Framework for selecting disposal options for contaminated water

Adapted from Containment and Disposal of Large Amounts of Contaminated Water: A Support Guide for Water Utilities

Message

From: Gerstein, Arielle [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=B1F98D9FE1904BFEBA3BF37894CC6412-GERSTEIN, A]
on behalf of WIFIA [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=0437787F7584400C9465C18A12FC0C1C-WIFIA]
Sent: 4/27/2018 7:07:50 PM
To: THolmes@awwa.org; tmehan@awwa.org; Dlafrance@awwa.org; Michael@nawc.com; lwashington@dbia.org; aausel@dbia.org; eoneill@wef.org; sdye@wef.org; sdye@nexusgr.com; twilliams@wef.org; cternieden@wef.org; blarson@casaweb.org; esap@ensresources.com; timq@acwa.com; Akrantz@nacwa.org; CHornback@nacwa.org; mmeeker@werf.org; iwolf@watereuse.org; Julia Anastasio [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user20bb0324]; hartnett@amwa.net; vandehei@amwa.net; aroberson@asdwa.org; rfarrell@madisonassoc.com; dosterhoudt@asdwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1331704acdee4ed98be05112401ddfd3-dosterhoudt]; jgonzalez@acwa-us.org; berndt@nlc.org; randerson@usmayors.org; anthony@nlc.org; draymond@acec.org; MPaque@gwpc.org; roneill@ICMA.org; mchase@naco.org; leslie@narc.org; MPaque@gwpc.org; billo@nrwa.org; trittner@cdfa.net; tfisher@cdfa.net; lthorp@cleanwater.org; eolson@nrdc.org; jrumpler@environmentamerica.org; keegan@ruralwater.org; mindy.bridges@ncsl.org; psinicropi@watereuse.org; NGardner-Andrews@NACWA.ORG; nohle@rcap.org; tstiger@rcap.org; AKim@watereuse.org
CC: Stein, Raffael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=280af9f00275496d96dc7587ab473480-Rstein]; Jernberg, Jorianne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=Jernberg, Jorianne]; McDonald, Kevin [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d9b7d5bda85245ffb2fe1ccfe9781fce-McDonald, K]; Srivastava, Amit [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=da977cb1351d468faea4a00ef7c512ed-Srivastava,]; Escobar, Alejandro [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=26745674038145aebad597dbc04ff429-Escobar, Al]; Fligger, Karen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=cb773d1757d34806912570359c22e832-KFligger]; Mourant, Alex [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3b0584918f404949a0560e0fe7eb69fc-Mourant, Al]; Dorfman, Jordan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b2443612937410b87c6a0a816a216eb-Dorfman, Jordan]; Chandy, Danusha [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=72451172c2df457bb1679d9af915275d-Chandy, Dan]; Phan, Lan-Anh [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d2d4daab8b4b40dc8ea6c834e409afbd-Phan, Lan-A]; Gerstein, Arielle [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b1f98d9fe1904bfeba3bf37894cc6412-Gerstein, A]; Tiago, Joseph [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=73efdbd1bc1f45ba8fc76ceecc3ce5dc-Tiago, Joseph]; Corr, Elizabeth [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=691e1abf082a4a5b8723cc9ac8d9bdf0-ecorr]; Gueriguian, Leo [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=56c84fc3015c42ec9495637a3096d5f8-Gueriguian, Leo]; Thompkins, Anita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3b6aa114d53f4333bfb77d4385efe9f1-Thompkins, Anita]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Goodin, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eac342f280a4b9db4079c81f66d1913-JGoodin]; Best-Wong, Benita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6ee79b3d0fc0429b99f2c05481b0b957-bbestwon]; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Campbell, Ann

[/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Drinkard, Andrea [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=808a6b7b65bf447f93dad2f510feaf61-ADRINKAR]; Farris, Erika D. [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d37183fb40d3482187e8f179b5b85386-EFarris]; Nagle, Deborah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33888a2bbe8f48aeb4ad9cc54259fb4e-dnagle]; Walsh, Ed [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=51f3bac3af644626b6a70f087751baca-EWalsh]; Kahan, Howard [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7098d3081b254f3aaff1c0fb5eca25d8-HKAHAN]; Kohutiak, George [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=843fe63110614954a27b00350a4c44dd-Kohutiak, G]; McCurdy, Alaina [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2d3c3f5400ec4e52abb198a4b4130292-Amccurdy]; Ames, George [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=23fe9bb4f8ed4843ae2ec8398703514c-games]; Fort, Felecia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6859774b6a2447b2b9ea5e262c5e1365-Felecia Fort]; Schollhamer, Mary [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1f3d9cb938b74af5825edfbfd2e85abd-MSCHOLLH]

Subject: Availability of a Programmatic Environmental Assessment (PEA) and Finding of No Significant Impact (FONSI)

Good Afternoon,

The WIFIA program has prepared a Programmatic Environmental Assessment (PEA) to analyze the potential environmental impacts related to the issuance of credit assistance under WIFIA. The PEA evaluates the potential adverse and beneficial environmental impacts of water infrastructure projects eligible for WIFIA credit assistance in compliance with NEPA. Based on the environmental impact analysis in the PEA, EPA has made a preliminary determination that no significant environmental impacts are anticipated from the issuance of WIFIA credit assistance.

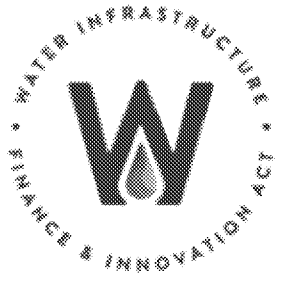
Today, a preliminary Finding of No Significant Impact (FONSI) was published in the Federal Register and is available for a 30-day review period. EPA is seeking public comment on its preliminary FONSI. The public can submit comments, identified by Docket ID No. EPA–HQ–OW–2018–0079 to the Federal eRulemaking Portal at http://www.regulations.gov. Comments must be received by May 29, 2018.

To receive announcements about the WIFIA program and notifications about additional resources, please sign up on our website.

Please contact me at (202) 566-1831 or Alejandro Escobar at (202) 564-9047 if you have questions.

Sincerely,

Jorianne Jernberg
WIFIA Program Director
Office of Wastewater Management
U.S. Environmental Protection Agency
Office of Water
Phone: 202-566-1831


WATER INFRASTRUCTURE FINANCE & INNOVATION ACT

Message

From: Hunter, David [DHUNTER@epri.com]
Sent: 5/3/2018 8:17:17 PM
To: Hunter, David [DHUNTER@epri.com]
CC: Washington Seminars [WashingtonSeminars@epri.com]; Smith, Wil [wsmith@epri.com]
Subject: Reminder: EPRI's 21st Energy and Climate Research Seminar, May 17, Washington DC
Attachments: EPRI 21st Energy and Climate Seminar Agenda final.pdf

Dear Colleague,

As a reminder, you are cordially invited to attend EPRI's 21st Annual Energy and Climate Research Seminar, on Thursday, May 17th in Washington DC. The Seminar will be held at the Washington Marriott Georgetown, 1221 22nd St NW. It will begin with a networking breakfast at 8:00 am and conclude with a reception from 5:15 to 7:30 pm.

The seminar will include sessions on the following:

- Understanding Company Climate Scenarios and Emissions Goals
- Scientific Understanding of Extreme Events and Climate Impact
- Electrification and the Future of Transport
- Policy and Market Trends for Energy Storage and Renewables
- Puerto Rico and the U.S. Department of Energy's Approach to Resiliency

The draft agenda is attached.

If you haven't yet registered please rsvp name, title, company, email and phone number to WashingtonSeminars@epri.com. There is no charge to attend, but space is limited. Additional information, including accommodations, can be found here.

You might also be interested in select additional upcoming EPRI events, below.

Regards,

David

Upcoming EPRI events:

July 19: EPRI Washington Seminar: The Fuels of the Future

Co-hosted by the International Energy Agency (IEA)
EPRI Washington DC office, 1325 G ST NW Suite 1080, Washington DC
11:30 am to 2:30 pm. Lunch will be provided.

EPRI is pleased to be joined by the International Energy Agency (IEA) as a cohost for this EPRI Washington Seminar. Please rsvp to WashingtonSeminars@epri.com . There is no charge to attend, but space is limited. Additional details TBA.

August 20: EPRI/ IEA Workshop on Cross-Border Energy and Capacity Trading

Long Beach, CA

EPRI is pleased to join the IEA in hosting this day-long workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to

further integration, while also allowing relevant IEA member countries and other stakeholders to learn from the CAISO-Mexico example and bring their own experiences to bear. This workshop will be co-located with Electrification 2018. For more information, and to register your interest in attending, please click here.

August 20-23: Electrification 2018
International Conference and Exposition
Long Beach Convention Center, Long Beach, CA

EPRI's biggest event of the year, Electrification 2018, will be a 3 day international conference and exposition taking place in Long Beach, CA, Aug 20-23. Electrification will explore the critical issues, benefits, and opportunities of electrification with an unparalleled collection of industry experts:

- Learn about the capabilities and potential of today's electric technologies
- Understand the disruptive benefits and impacts of emerging electric technologies
- Discuss key policy, regulatory, and environmental issues
- Participate in expert training sessions and other professional development opportunities
- Experience a diverse array of technologies in our exposition hall
- Network with industry, government, and academic leaders to form collaborations and help build the future of electrification

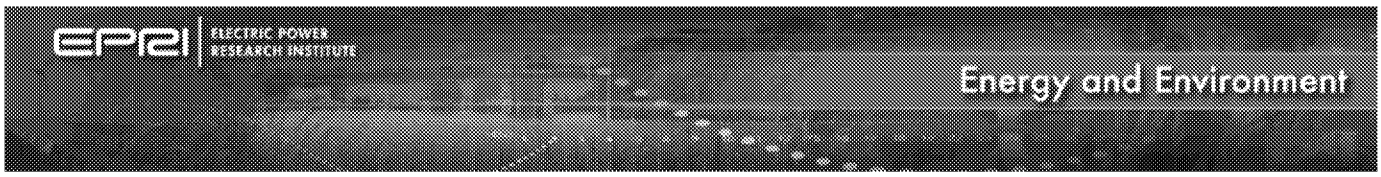
Be sure to register early to get discounted rates!

Save the Date: November 6-8: EPRI-IEA Challenges in Electricity Decarbonization Expert Workshops
Paris, France

The 5th Annual EPRI-IEA Challenges in Electricity Decarbonization Expert Workshop will again focus on electrification and its implications for the electricity sector. The workshop will be held jointly with the 18th EPRI-IEA-IETA GHG Emissions Trading Workshop. Details TBA. Space is limited. Please email WashingtonSeminars@epri.com with expressions of interest.

We hope to see you there!
Regards,

David E. Hunter, Ph.D.
Sr. Government and External Representative
Electric Power Research Institute
1325 G ST NW Suite 1080
Washington, DC 20005
Tel: Ex. 6 (m)
Fax: 202-293-6187
Email: dhunter@epri.com



21st Energy and Climate Research Seminar

In conjunction with EPRI's Washington Seminar Series

Washington Marriott Georgetown, 1221 22nd St NW, Washington, D.C.

(times are subject to change)

THURSDAY MAY 17, 2018

TIME	TOPIC	PRESENTER
8:00 a.m.	Registration and breakfast	
8:45 a.m.	Welcome and Introductions	David Hunter, *EPRI*
8:55 a.m.	Opening Remarks	Rob Chapman, *Vice President, EPRI*
Session 1: Understanding Company Climate Scenarios and Emissions Goals Chair: Morgan Scott, *EPRI*		
9:10 a.m.	Grounding Good Intentions: A Technical Foundation for Considering Global Climate Scenarios and Greenhouse Gas Goals	Steve Rose, *EPRI*
	Panel Discussion: • American Electric Power • JP Morgan Chase	Scott Weaver, *Director Air Quality Services, AEP* Marisa Buchanan, *Executive Director, Sustainable Finance, JPM*
10:25 a.m.	Break	
Session 2: Science Research Frontier Chair: Delavane Diaz, *EPRI*		
10:55 a.m.	National Oceanic and Atmospheric Administration Climate Science Update	Benjamin DeAngelo, *Deputy Director, Climate Program Office, NOAA*
11:20 a.m.	Attribution of Extreme Events	Stephanie Herring, *Senior Advisor and Climate Scientist, NOAA*
11:45 a.m.	Making Sense of Equilibrium Climate Sensitivity and Other Climate Responses	Chris Forest, *Associate Professor of Climate Dynamics, Penn State University*
12:10 p.m.	Lunch	
Session 3: Electrification and the Future of Transport		

Chair: David Hunter, *EPRI*

1:10 p.m.	EPRI's National Electrification Assessment and Its Outlook for Transportation	Geoff Blanford, *EPRI*
	Panel Discussion: • U.S. Department of Energy • Advanced Energy Economy • Natural Resources Defense Council	Rachael Nealer, *Program Manager, Vehicle Technologies Office, DOE* Matt Stanberry, *Vice President, AEE* Pamela MacDougall, *Fellow, Climate and Clean Energy Program, NRDC*
2:25 p.m.	Break	

Session 4: Policy and Market Trends for Energy Storage and Renewables
Chair: John Bistline, *EPRI*

2:55 p.m.	Panel Discussion: • Bloomberg New Energy Finance • Federal Energy Regulatory Commission • Rochester Institute of Technology • Energy Information Administration	Ethan Zindler, *Head of Americas, BNEF* Mary Wierzbicki, *Group Manager, Energy Policy and Innovation, FERC* Eric Hittinger, *Associate Professor, RIT* Cara Marcy, *Renewable Electricity Analyst, EIA*
4:10 p.m.	Keynote: Puerto Rico and the U.S. Department of Energy's Approach to Resiliency	Katie Jereza, *Deputy Assistant Secretary, Office of Electricity Delivery and Energy Reliability, DOE*
4:45 p.m.	Summary	Francisco de la Chesnaye, *EPRI*
5:15-7:30 p.m.	Reception	

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 5/17/2018 4:01:24 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Nothing regulated under the Safe Drinking Water Act since '96?

Dear Colleagues,

I have heard it said, often, around town that EPA has not done any regulation of drinking water since the 1996 reauthorization of the Safe Drinking Water Act other than arsenic. I have asked my staff to look into this claim. While we are still researching the question, and want to add some regulatory cost figures to the inventory, a preliminary, i.e, tentative, list of regulations issued under the SDWA, since 1996, looks like this:

*Arsenic Rule
*Radionuclides Rule
*Backwash Recycle Rule
*Stage 1 Disinfectants and Disinfection Byproducts Rule
*Stage 2 Disinfectants and Disinfection Byproducts Rule
*Interim Enhanced Surface Water Treatment Rule
*Long-Term 1 Enhanced Surface Water Treatment Rule
*Long-Term 2 Enhanced Surface Water Treatment Rule
*Groundwater Rule
*Revised Total Coliform Rule

These are now part of a list of 97 (by my count) parameters or contaminants regulated under Safe Drinking Water Act. In addition, we have seen several (many?) Health Advisories issues that often have the impact of de facto regulations, e.g, PFAS.

I will be reporting further on our research. But it seems that the idea that nothing has been regulated under the SDWA, since '96, is a bit of an overstatement. In the meantime, if I am missing something, or have made an error, please let me hear from you (I will be out of the office on vacation until May 29th).

Thanks.

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 Personal (direct)

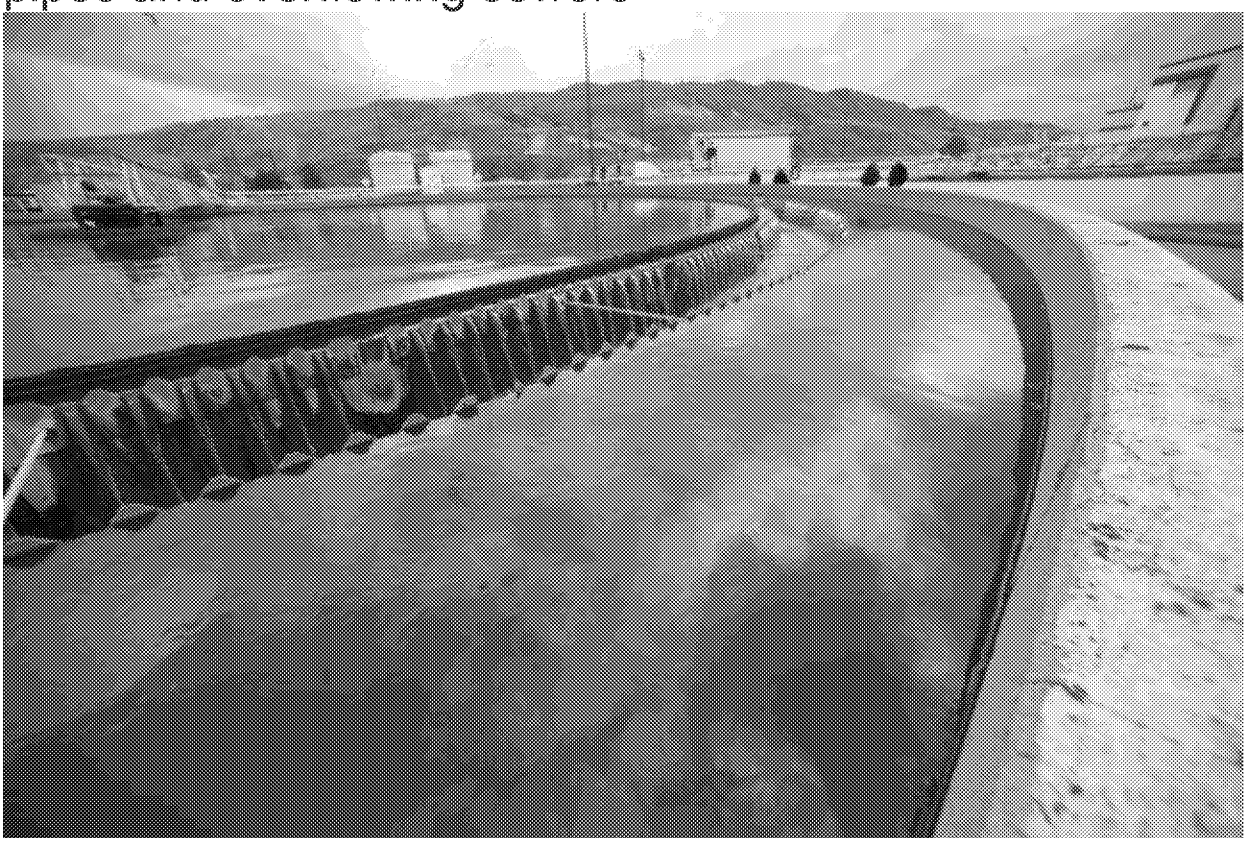
Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 3/15/2018 7:05:34 PM
To: Tracy Mehan [redacted] Ex. 6
Subject: from The Wall Street Journal

- U.S.

Why Your Water Bill Is Rising Much Faster Than Inflation

Rate increases average 5.5% a year as utilities race to fix corroded pipes and overflowing sewers



A wastewater-treatment plant in Salt Lake City, Utah. Water bills have been climbing around the country as cities repair pipes and systems. PHOTO: RICK EGAN/ASSOCIATED PRESS

By
David Harrison

- David Harrison
  The Wall Street Journal

- BiographyDavid Harrison
- @d_harrison
- david.harrison@wsj.com

March 15, 2018 5:30 a.m. ET

Water bills are surging nationwide as utilities try to fix corroded pipes and overflowing sewer systems, leaving many households struggling to pay and in some cases risking shutoffs and home foreclosures.

Bills started rising significantly faster than inflation in the mid-2000s as communities stepped up their repairs of aging water and sewer infrastructure. Over the past decade, the increases have averaged 5.5% a year, more than three times the rate of inflation, according to the Labor Department.

The median household bill for water and sewer service rose to $77 a month in 2016 from about $44 in 2006, a 75% increase, according to surveys by the American Water Works Association, a group representing water providers. Business and industrial customers saw similar increases during that time.

In Baltimore, water bills have climbed at least 9% a year since 2009 to build underground storage tanks and replace leaky pipes. Baltimore is also one of dozens of municipalities bound by agreements with the Environmental Protection Agency to comply with Clean Water Act rules limiting the amount of sewage discharged into waterways. The city has agreed to a 13-year, $1.6 billion to $2 billion sewer upgrade.

C. Rochelle Williams, 37 years old, a single mother of four in Baltimore who makes $50,000 a year as a medical billing specialist, said she can't cover her full bill, which averages around $120 a month, about six times what she paid when she moved into her house 16 years ago.

"I usually try to pay, like, $50 a month," she said.

The country needs to spend $655 billion over the next 20 years to upgrade water and sewer systems, the EPA estimates. Around 240,000 water mains break a year, contributing to $2.6 billion in lost drinking water, according to the agency.

For decades, water companies put off making repairs to keep prices low, creating public expectations of cheap water, said Jonathan Cuppett, research manager at the Water Research Foundation, an industry research group.

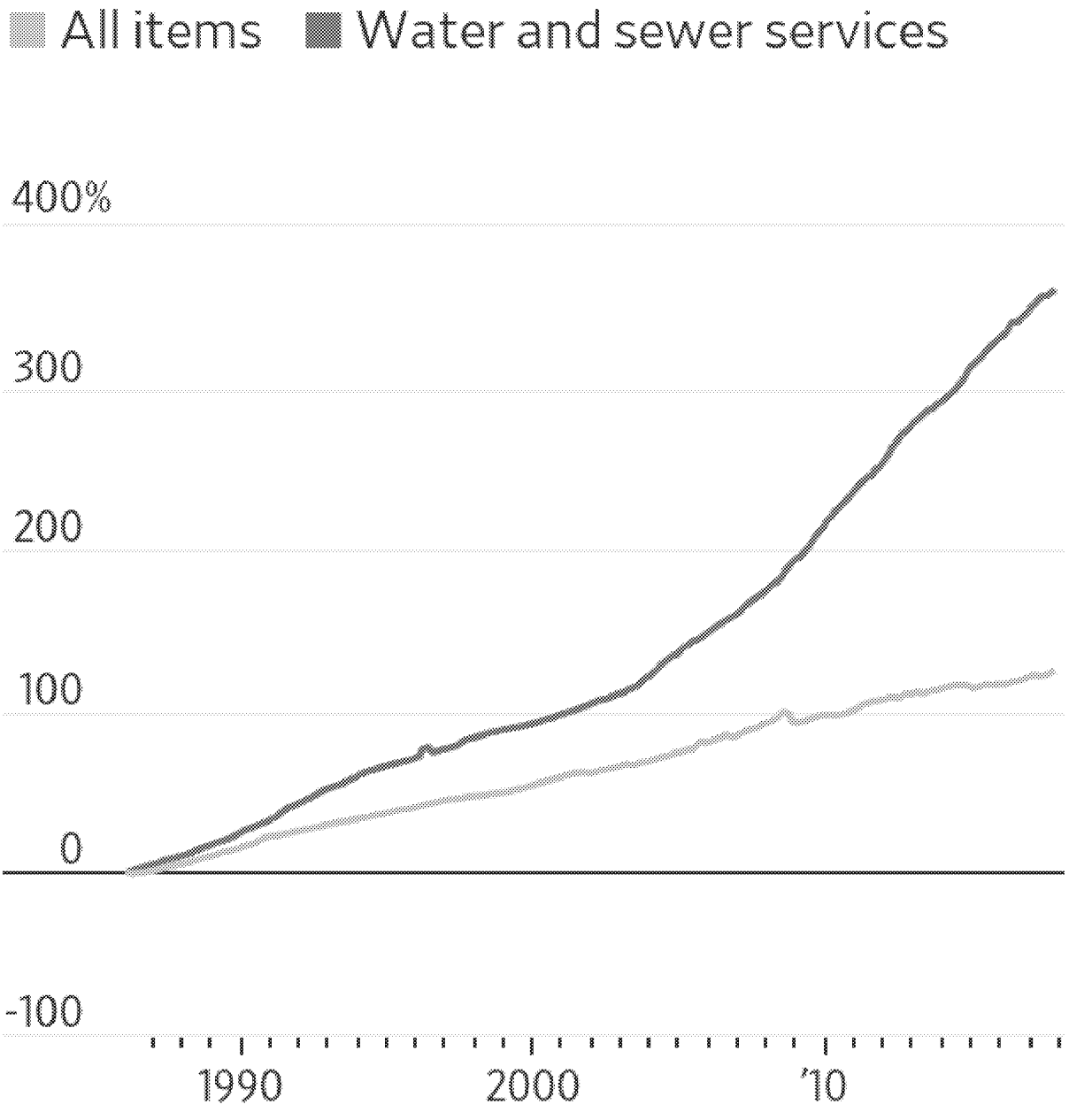
"We're moving towards those days being over," he said. "It's a valuable commodity and it requires resources to deliver that to any tap in your house 24 hours a day."

Most Americans get their water from one of the 52,000 municipal water utilities in the country. Some are government agencies, others are independent, public agencies. About 15% of customers get their water from private operators, according to Manuel Teodoro, a political scientist at Texas A&M University.

Created with Highcharts 6.0.4Under WaterChange in consumer price indexes since 1986Source: Labor Department
Created with Highcharts 6.0.4All itemsWater and sewer services19861987198819891990199119921993199419951996199719981999200020012002200320042005200620072008200920102011201220132014201520162017 2018-1000100200300400

Under Water

Change in consumer price indexes since 1986



Source: Labor Department

Sometimes the same agency provides both water and sewer service. Other times, the responsibilities are split.

Most of the typical household water bill reflects the amount of water consumed. The rest covers fixed costs such as meter reading, billing, infrastructure and environmental fees.

Utilities' funding comes almost entirely from their customers, with the U.S. government providing just about 4% of the total. The Trump administration in February proposed increasing federal spending on infrastructure by $200 billion, but it is unclear how much of that would go to water and sewer upgrades.

In Kansas City, Mo., local officials agreed to complete 121 sewer improvement projects over 25 years, costing $4.5 billion. Sewer fees are set to rise 13% annually in the coming years.

"To be able to afford those projects, from the department's perspective, we have to have our rates considerably higher for a period of time," said Terry Leeds, director of the city government's water department.

Customers unable to pay rising bills can see their service shut off. While there are no national data on shutoffs, some utilities say their numbers are rising. Kansas City said it shut off 18,333 accounts last year, up from 15,196 in 2014, and officials expect around 19,000 this year.

A survey of 81 large utilities across the U.S. by the environmental group Food & Water Watch found that 5% of customers—roughly 566,000 households—lost water service because of overdue bills in 2016.

Oakland resident Wendel Stevenson, 59, who lets homeless people fill water jugs from a tap in his yard, said he lost service for about a week last year when he couldn't pay a $256 bill. He showered at his mother's house, he said.

"To go to someone's house to shower, come on, man, that's not a good feeling," he said.

Water bills in Oakland have risen at least 7% in recent years as the service provider, East Bay Municipal Utility District, deals with infrastructure upgrades and the consequences of a severe drought that cut water usage.

Many utilities have assistance programs to help customers keep the water running. An Oakland program has enabled the utility district to reduce the number of shutoffs to 10,952 last year from 13,400 in 2014, according to EBMUD General Manager Alexander Coate.

Some local governments sell liens from unpaid property taxes and water bills to investors, allowing them to collect the debt from homeowners, often with hefty interest rates. If homeowners don't pay, the investors can foreclose on their homes. In most cases, however, investors are more interested in collecting the debt than in foreclosing on the property.

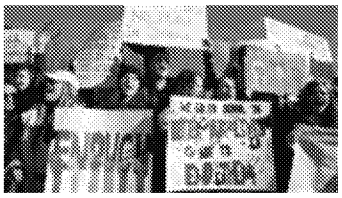
Owen Dutton, a 57-year-old from Baltimore who owed about $1,500 in unpaid water bills, learned last year that the city was planning to put the house he shares with his wife on the tax sale list. He had to borrow to pay down the amount and keep his home. His water bill has gone up at least 50% in the past few years, he said.

"I was disappointed in the city to even do something like that," said Mr. Dutton, who earns $42,000 a year as a home inspector. "I'd been living in my house at that present time for 33 years."

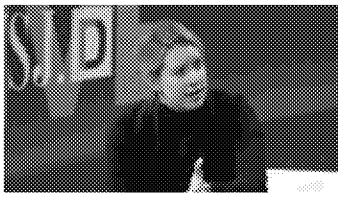
In December, in response to a public outcry over the practice, Baltimore Mayor Catherine Pugh said the city would no longer send properties to tax sale for delinquent water bills alone.

Write to David Harrison at david.harrison@wsj.com

Remembering Stephen Hawking



'This Day Matters to Us:' Parkland Students on the School Walkout



Theranos CEO: Company Did Not Rush to Market

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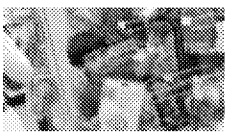
- 

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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 4/16/2018 1:31:09 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Burneson, Eric [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2cacb9a8d49f49af80531e9e2ccb9018-eburneso]
CC: svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]
Subject: FW: LSLR Collaborative: April 2018 Update, scheduling request for this Fall, and registration for the first in a new webinar series (April 25, 3-4 pm EDT)
Attachments: LSLRC Webinar 1 Outreach Tools.docx; LSLRC_Sample Promotions_Spanish Resources.docx

AWWA is an active partner in the ongoing Lead Service Line Replacement (LSLR) Collaborative. I though I would share this information as an example of the continuing work to develop lead replacement programs in the spirit of "shared responsibility."

Should you have any questions on this program, feel free to reach out to Steve Via of my office. Pax.

Tracy Mehan

From: Gail Bingham [mailto:gbingham@resolv.org]
Sent: Monday, April 16, 2018 9:26 AM
To: Abby Dilley <Adilley@resolv.org>; Alexis Woodrow <Alexis.Woodrow@denverwater.org>; Amanda Reddy (areddy@nchh.org) <areddy@nchh.org>; Andrew Grinberg (agrinberg@cleanwater.org) <agrinberg@cleanwater.org>; Ann Codrington (H) Ex. 6; Anthony Santiago (Santiago@nlc.org) <Santiago@nlc.org>; Ashley Blackwell <ashley@jsallc.com>; Beate Wright (bwright@waterrf.org) <bwright@waterrf.org>; Beth Weaver <bweaver@resolv.org>; Bill Ross (WCRoss@aquaamerica.com) <WCRoss@aquaamerica.com>; Charlotte Brody (cbrody@bluegreenalliance.org) <cbrody@bluegreenalliance.org>; Clyde Dugan - East Lansing Meridian Water and Sewer Authority (cdugan@elmwsa.com) <cdugan@elmwsa.com>; Colleen Arnold (CMArnold@aquaamerica.com) <CMArnold@aquaamerica.com>; Craig Patla (cpatla@ctwater.com) <cpatla@ctwater.com>; Dan Lawrence (DLawrence@aquarionwater.com) <DLawrence@aquarionwater.com>; Darrell Osterhoudt (dosterhoudt@asdwa.org) <dosterhoudt@asdwa.org>; David LaFrance <dlafrance@awwa.org>; David Lipsky <dlipsky@dep.nyc.gov>; Deborah M Watkins <DMWatkins@aquaamerica.com>; Diane Van de Hei (vandehei@amwa.net) <vandehei@amwa.net>; Don Edwards (don@jsallc.com) <don@jsallc.com>; Doug Farquhar (doug.farquhar@ncsl.org) <doug.farquhar@ncsl.org>; Edward Kaufman <ekaufman@oucc.IN.gov>; Erik Olson (eolson@nrdc.org) <eolson@nrdc.org>; Gail Bingham <gbingham@resolv.org>; Gary Naumick (Gary.Naumick@amwater.com) <Gary.Naumick@amwater.com>; George Hanson (Ex. 6 Ex. 6 ; Jack Rayburn (jrayburn@tfah.org) <jrayburn@tfah.org>; Jeff Oxenford (joxenford@comcast.net) < Ex. 6 ; Jeff Stuck - EPCOR Water USA (jstuck@epcor.com) <jstuck@epcor.com>; Jeff Swertfeger (jeff.swertfeger@gcww.cincinnati-oh.gov) <jeff.swertfeger@gcww.cincinnati-oh.gov>; Jennifer Li <JLi@naccho.org>; Jessica Eckdish <jeckdish@bluegreenalliance.org>; Jonathan Cuppett (jcuppett@waterrf.org) <jcuppett@waterrf.org>; June Swallow (june.swallow@health.ri.gov) <june.swallow@health.ri.gov>; Katherine Robb <Katherine.Robb@apha.org>; Kristie Trousdale <kristiet@cehn.org>; Lauren Wasserstrom <lwasserstrom@awwa.org>; Lindsay McCormick (lmccormick@edf.org) <lmccormick@edf.org>; Lynn Thorp <lthorp@cleanwater.org>; Mae Wu <mwu@nrdc.org>; Marta Woldu <marta@jsallc.com>; Mason Hines <MHines@resolv.org>; Maureen Swanson <MSwanson@ldaamerica.org>; Maureen Westbrook (mwestbrook@ctwater.com) <mwestbrook@ctwater.com>; Melissa Elliott (Melissa.Elliott@denverwater.org) <Melissa.Elliott@denverwater.org>; Michael Deane

(michael@nawc.com) <michael@nawc.com>; Mike Keegan <keegan@ruralwater.org>; Nse Obot Witherspoon (nobot@cehn.org) <nobot@cehn.org>; Patrick Bradley <Patrick.Bradley@richmondgov.com>; Price, Steve <Steve.Price@denverwater.org>; Queen Zakia Shabazz (Ex. 6 >; Rick Risoldi (rrisoldi@middlesexwater.com) <rrisoldi@middlesexwater.com>; Rob McCullough (robm@bluegreenalliance.org) <robm@bluegreenalliance.org>; Robert Steidel (Robert.Steidel@richmondgov.com) <Robert.Steidel@richmondgov.com>; Robert Stewart (Rstewart@rcap.org) <Rstewart@rcap.org>; Roy Soto <roy.soto@vdh.virginia.gov>; rrenner@waterrf.org; Sam Lovell <slovell@edf.org>; Samantha Lovell (Ex. 6) < Ex. 6 >; Sandra Whitehead <SWhitehead@neha.org>; Scott Biernat (biernat@amwa.net) <biernat@amwa.net>; Sherrie Turner Ex. 6 Sophie James (sjames@calwater.com) <sjames@calwater.com>; Sri Vedachalam <svedachalam@nemw.org>; Stephanie Schlea (schlea@amwa.net) <schlea@amwa.net>; Stephen Estes-Smargiassi (smargias@mwra.com) <smargias@mwra.com>; Steve Pellei (Steve.Pellei@vdh.virginia.gov) <Steve.Pellei@vdh.virginia.gov>; Steve Via <SVia@awwa.org>; Surili Patel (surili.patel@apha.org) <surili.patel@apha.org>; Suzanne Chiavari (Suzanne.Chiavari@amwater.com) <Suzanne.Chiavari@amwater.com>; Tia Taylor Williams <tia.taylor@apha.org>; Tom Conway <tomc@bluegreenalliance.org>; Tom Neltner (tneltner@edf.org) <tneltner@edf.org>; Tracy Mehan <tmehan@awwa.org>

Subject: LSLR Collaborative: April 2018 Update, scheduling request for this Fall, and registration for the first in a new webinar series (April 25, 3-4 pm EDT)

Hi all,

….and thank you to those who have been using the social media tools attached to promote the first in our series of LSL replacement webinars. Registration numbers are great and we're looking for more! Remember, ***the webinar series is for you and key staff and volunteers in your organizations who can help facilitate action at the state and local level.*** See description in the email below for more information.

> Collaborating to Replace Lead Service Lines: What You Need to Know from the Web Toolkit
> Registration: https://lslrc-whatyouneedtoknow.eventbrite.com
> Date: April 25, 2018
> Time: 3PM EDT- 4PM EDT

Please check out the suggested email text, Facebook posts, tweets, etc. in the attachments to this email and get the word out.

The next webinar will focus on funding full LSL replacement, with a particular emphasis on ways to fund the replacement of lines on private property…. So hold the date: May 30, from 3:00-4:00 pm eastern. Dates for future webinars are: July 18, September 26 and December 5 (all at the same time).

On another subject, we're increasing our efforts to add news articles to the Collaborative's web site based on input from many of you during the assessment process at the end of last year. Here's a link to an article Sam Lovell just added about a grant from the State of New York to Niagara Falls for LSL replacement: http://buffalonews.com/2018/04/04/state-to-fund-replacement-of-300-lead-water-lines-in-niagara-falls/. Check the general news page periodically: https://www.lslr-collaborative.org/news

Finally, a quick reminder to fill out the doodle for a fall, in-person member meeting. ***Replies by this Friday, April 20 would be appreciated***.

> The link to the doodle is: https://doodle.com/poll/v8wryrzdvk4p5xa3

Thank you!

Gail

Ph: Ex. 6 | Cell: Ex. 6

From: Gail Bingham
Sent: Friday, March 30, 2018 8:33 AM
To: Abby Dilley; Amanda Reddy (areddy@nchh.org); Andrew Grinberg (agrinberg@cleanwater.org); Ann Codrington (H) (Ex. 6); Anthony Santiago (Santiago@nlc.org); Ashley Blackwell; Beate Wright (bwright@waterrf.org); Beth Weaver; Bill Ross (WCRoss@aquaamerica.com); Charlotte Brody (cbrody@bluegreenalliance.org); Clyde Dugan - East Lansing Meridian Water and Sewer Authority (cdugan@elmwsa.com); Colleen Arnold (CMArnold@aquaamerica.com); Craig Patla (cpatla@ctwater.com); Dan Lawrence (DLawrence@aquarionwater.com); Darrell Osterhoudt (dosterhoudt@asdwa.org); David LaFrance (dlafrance@awwa.org); David Lipsky ; Deborah M Watkins; Diane Van de Hei (vandehei@amwa.net); Don Edwards (don@jsallc.com); Doug Farquhar (doug.farquhar@ncsl.org); Edward Kaufman; Erik Olson (eolson@nrdc.org); Gail Bingham; Gary Naumick (Gary.Naumick@amwater.com); George Hanson (Ex. 6); Jack Rayburn (jrayburn@tfah.org); Jeff Oxenford (Ex. 6); Jeff Stuck - EPCOR Water USA (jstuck@epcor.com); Jeff Swertfeger (jeff.swertfeger@gcww.cincinnati-oh.gov); Jennifer Li; Jessica Eckdish; Jonathan Cuppett (jcuppett@waterrf.org); June Swallow (june.swallow@health.ri.gov); Kristie Trousdale; Lauren Wasserstrom (lwasserstrom@awwa.org); Lindsay McCormick (lmccormick@edf.org); Lynn Thorp; Mae Wu; Marta Woldu; Mason Hines; Maureen Swanson; Maureen Westbrook (mwestbrook@ctwater.com); Melissa Elliott (Melissa.Elliott@denverwater.org); Michael Deane (michael@nawc.com); Mike Keegan; Nse Obot Witherspoon (nobot@cehn.org); Patrick Bradley; Queen Zakia Shabazz (Ex. 6); Rick Risoldi (rrisoldi@middlesexwater.com); Rob McCullough (robm@bluegreenalliance.org); Robert Steidel (Robert.Steidel@richmondgov.com); Robert Stewart (Rstewart@rcap.org); rrenner@waterrf.org; Sam Lovell; Samantha Lovell (Ex. 6); Sandra Whitehead; Scott Biernat (biernat@amwa.net); Sherrie Turner (Ex. 6); Sophie James (sjames@calwater.com); Sri Vedachalam; Stephanie Schlea (schlea@amwa.net); Stephen Estes-Smargiassi (smargias@mwra.com); Steve Davis; Steve Pellei (Steve.Pellei@vdh.virginia.gov); Steve Via (svia@awwa.org); Surili Patel (surili.patel@apha.org); Suzanne Chiavari (Suzanne.Chiavari@amwater.com); Tia Taylor Williams; Tom Conway; Tom Neltner (tneltner@edf.org); Tracy Mehan (tmehan@awwa.org)
Cc: Gail Bingham
Subject: LSLR Collaborative: March 2018 Update and registration for the first in a new webinar series (April 25, 3-4 pm EDT)

Greetings All,

I am happy to welcome the North East Midwest Institute as the newest members of the Collaborative. Their point of contact is Sri Vedachalam, Director of their Safe Drinking Water Research and Policy Program. Welcome Sri!

Announcing our 2018 Webinar Series

I am also excited to share that the Collaborative is launching a new webinar series. We have scheduled six webinars over the course of the year, which will cover topics crucial to building and implementing successful replacement programs. The first in the series, to be held ***April 25 from 3:00-4:00 pm EDT***, will be a user-friendly way to learn about the information in the Collaborative's online toolkit. There's more there than you realize!

Please also hold May 30, from 3:00-4:00 pm EDT for the second in the series, which will cover state and local funding strategies for full LSL replacement, with some great case examples.

The registration link for the first webinar is provided below. ***Our ask is that you help get people registered.*** Attached are some outreach tools to help, with suggested language and links for your listserv, an email and social media. Please distribute broadly, but we also hope that you will extend a personal invitation to a targeted few who you think would like to know more about LSL replacement or who are in a position to help others. If you've wanted to know more about what's on the web site yourself, we hope you will attend too!

> **Collaborating to Replace Lead Service Lines: What You Need to Know from the Web Toolkit**
> **Registration:** https://lslrc-whatyouneedtoknow.eventbrite.com
> **Date**: April 25, 2018
> **Time**: 3PM EDT- 4PM EDT

Webinar Description:
Lead service line (LSL) replacement is not a simple task. The LSL Replacement Collaborative has developed an online toolkit to help communities across the United States develop and implement replacement programs. This webinar – the first in a series of 6 webinars hosted by the LSL Replacement Collaborative – will provide an overview of the tools, examples, and types of information available on the Collaborative website. Whether you are a community leader, a public health professional, a drinking water professional, an elected leader, or a concerned consumer, this website has the answers – or can point you to the answers. "What You Need to Know from the Web Toolkit" will provide a deep dive into the online toolkit with the goal of motivating participants to make the most of these resources in their efforts to develop and implement LSL replacement initiatives.

Speakers:

- *Lynn Thorp*, National Campaigns Director, Clean Water Action
- *Stephanie Schlea*, Manager of Regulatory and Scientific Affairs, Association of Metropolitan Water Agencies
- *Sam Lovell*, Health Project Specialist, Environmental Defense Fund

Fall In-Person Member Meeting

We are starting to plan an in-person meeting of the Collaborative for this fall. Please let us know your availability by filling out the following doodle, so we can set a date that is best for the most people.

The link to the doodle is: https://doodle.com/poll/v8wryrzdvk4p5xa3

Outreach Activities

As a reminder, we've had more copies of the Collaborative brochure printed, now in both English and Spanish. If you would like some (or lots), please contact Beth Weaver (bweaver@resolv.org) . I've also attached a document with sample social media materials (tweets, FB posts, and share images) for you to use to promote the Spanish resources on the Collaborative website.

Finally, please let me or any member of the Steering Committee know about news that we can share with the wider Collaborative. We'd particularly like to hear about 2018 conferences and other events where LSLR is being discussed that could go on the web site.

Warm regards, Gail (on behalf of the Steering Committee)

PS. Please let me know if there have been any changes to the point of contact for your organization.

....And, as always, you can easily share the Collaborative's online tools with this link: http://www.lslr-collaborative.org/, and you can download the printable brochure from the FAQ page here: http://www.lslr-collaborative.org/faqs.html

LSLR Collaborative Webinar Series: Webinar 1 Outreach Tools

Webinar details

Collaborating to Replace Lead Service Lines: What You Need to Know from the Web Toolkit

Registration: https://lslrc-whatyouneedtoknow.eventbrite.com

Date: April 25, 2018
Time: 3PM EDT- 4PM EDT

Webinar Description:
Lead service line (LSL) replacement is not a simple task. The LSL Replacement Collaborative has developed an online toolkit to help communities across the United States develop and implement replacement programs.

This webinar – the first in a series of 6 webinars hosted by the LSL Replacement Collaborative – will provide an overview of the tools, examples, and types of information available on the Collaborative website. Whether you are a community leader, a public health professional, a drinking water professional, an elected leader, or a concerned consumer, this website has the answers – or can point you to the answers. "What You Need to Know from the Web Toolkit" will provide a deep dive into the online toolkit with the goal of motivating participants to make the most of these resources in their efforts to develop and implement LSL replacement initiatives.

Speakers:

- *Lynn Thorp*, National Campaigns Director, Clean Water Action
- *Stephanie Schlea*, Manager of Regulatory and Scientific Affairs, Association of Metropolitan Water Agencies
- *Sam Lovell*, Health Project Specialist, Environmental Defense Fund

E-mail, listserv, or newsletter content

The Lead Service Line Replacement Collaborative is launching a webinar series! These webinars will cover topics crucial to building and implementing replacement programs and feature available tools and resources. Learn everything you need to know from the Collaborative's online toolkit and what to expect from the series with the first webinar on April 25 3PM-4PM EDT. Register today! http://bit.ly/2GOsmrW

Have you been wondering what tools and resources are available on the LSL Replacement Collaborative website? Now's your chance to learn! Register for the first webinar (4/25 from 3PM-4PM EDT) in the Collaborative's new online series to learn what you need to know from the toolkit and hear about future webinars. http://bit.ly/2GOsmrW

Social media content

[Pair posts with sample share images below]

Twitter

Introducing the Lead Service Line Replacement Collaborative webinar series! Register for the first webinar on 4/25 to learn what you need to know from the online toolkit. #SafeWater http://bit.ly/2GOsmrW

Been wondering about the resources on the LSLR-Collaborative website? Now's your chance to learn what you need to know! Register for the webinar now: http://bit.ly/2GOsmrW

Facebook

The Lead Service Line Replacement Collaborative is launching a webinar series! Register for our first webinar on April 25 to learn everything you need to know from the online toolkit and hear what topics we will feature in future webinars! http://bit.ly/2GOsmrW

Lead service line replacement is not a simple task. Luckily, the LSL Replacement Collaborative has developed a toolkit to provide guidance to communities across the US. Learn everything you need to know from the toolkit with this webinar on April 25. Register now! http://bit.ly/2GOsmrW

Share images for Twitter, Facebook, or Linkedin


Webinar: Collaborating to Replace Lead Service Lines
Register to learn what you need to know from the online toolkit.


Webinar: Collaborating to Replace Lead Service Lines
Register to learn what you need to know from the online toolkit.


Webinar: Collaborating to Replace Lead Service Lines
Register to learn from the toolkit.

Sample Promotional Material – LSLRC Spanish Resources

Sample Tweets

Resources to aid Spanish communities tackling lead in water now available from the Lead Service Line Replacement Collaborative! #SafeWater http://bit.ly/2E8HeTr

Check out new Spanish materials, fact sheets, and webinars available on the Lead Service Line Replacement Collaborative toolkit. #GetTheLeadOut #SafeWater http://bit.ly/2E8HeTr

Sample FB Post

For communities with Spanish-speaking residents, Spanish resources are critical to educate and inform consumers about lead in drinking water issues. The Lead Service Line Replacement Collaborative has developed Spanish resources for stakeholders to reach Spanish-speaking audiences. See the resources here: http://bit.ly/2E8HeTr

Looking for Spanish resources on lead in drinking water issues? The Lead Service Line Replacement Collaborative toolkit now includes Spanish materials for community leaders, drinking water professionals, public health professionals, and concerned consumers. http://bit.ly/2E8HeTr.

Sample Text to add to newsletter/ email blast/ etc.

Spanish Resources on LSL Replacement
The Lead Service Line Replacement Collaborative has added Spanish resources to its online toolkit. Check out the Spanish pages with introductory information about LSL replacement and resources for concerned consumers.

Sample Share Images


Aprende sobre el plomo en el agua


Aprende
sobre el plomo
en el agua


Proteja a su familia
de la exposición al
plomo en el agua
Aprende más

Message

From: Radhika Fox [RFox@uswateralliance.org]
Sent: 5/7/2018 6:55:57 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Drinkard, Andrea [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=808a6b7b65bf447f93dad2f510feaf61-ADRINKAR]; Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Stein, Raffael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=280af9f00275496d96dc7587ab473480-Rstein]; Thompkins, Anita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3b6aa114d53f4333bfb77d4385efe9f1-Thompkins, Anita]; Gueriguian, Leo [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=56c84fc3015c42ec9495637a3096d5f8-Gueriguian, Leo]; Brubaker, Sonia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6055e643e5154f25b83a5515161e1705-sbruba02]; Abhold, Kristyn [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bfe730f27efa48beb8a6252c5ed0e71e-Abhold, Kri]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; vandehei@amwa.net; cternieden@wef.org; tmehan@awwa.org; teich4@ejwatercoop.com; Matt@nrwa.org; nohle@rcap.org; Julia Anastasio [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user20bb0324]; aroberson@asdwa.org; Ted Stiger [tstiger@rcap.org]; colleen@nawc.com; ngardner-andrews@nacwa.org; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Lieberman, Paige [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a7ee44223e874dd0a74b2260f3ca7ff9-Ingram, Paige]; Tanner, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=153d1b6b96fa4681a06c2868d5f8d691-Lee Tanner]; Steve Dye [sdye@wef.org]; Ken Maynard [kmaynard@awwa.org]; Sam Wade [sam@nrwa.org]; Scott Berry [sberry@uswateralliance.org]
CC: Emily Simonson [esimonson@uswateralliance.org]
Subject: May 15: Dialogue & Reception on the Value of Water - will you join us?

Dear EPA & Water Association Sector Colleagues:

I look forward to seeing many of you at the Tuesday morning 5/15 meeting that EPA is hosting. I wanted to also personally invite you to an event on Tuesday afternoon focused on how we can engage water reliant businesses in our work. I hope you will all come, and please stay for the reception to follow. Should be a wonderful networking opportunity.

For more details, and to RSVP, please see below
Radhika

Radhika Fox
CEO, US Water Alliance
Ex. 6
rfox@uswateralliance.org

Join us July 10-12 in the Twin Cities for One Water Summit 2018!

Register **here**

Value of Water CAMPAIGN

NATIONAL ASSOCIATION of COUNTIES NACo

NLC NATIONAL LEAGUE OF CITIES
CITIES STRONG TOGETHER

Join us! C-Suite Perspectives on the Value of Water

May 15 from 3:30-5:00pm 660 North Capitol St. NW, Washington, DC
Reception to follow from 5:00-7:00pm
RSVP here

Every business is a water reliant business. Without safe, reliable water and wastewater infrastructure, stores close and assembly lines grind to a halt. Water is also a main ingredient in our products and the processes we use to build them. Businesses rank water as a top corporate concern and a priority investment for a secure supply chain. As our water infrastructure ages, the status quo is no longer an option, and businesses are finding creative ways to use, reuse, and manage water safely and sustainably. By prioritizing holistic water management into business models, companies can enhance decision making, reduce costs, manage long-term water-related risks, improve resiliency and competitiveness, attract investor interest, and enhance their brand and reputation.

Join the Value of Water Campaign and senior private sector executives for a discussion on how companies are driving innovative water management practices and navigating the challenges of today's complex water landscape. This event is hosted in partnership with the National Association of Counties and the National League of Cities.

Opening Remarks:

- **Mayor Karen Freeman-Wilson** of Gary, Indiana, First Vice President of the National League of Cities
- **Penny Gross**, Supervisor, Fairfax County, Virginia

Confirmed Panelists:

- **Jason Andringa**, CEO, Vermeer Corporation
- **Michelle Patron**, Director of Sustainability Policy, Microsoft
- **Kimberly Kupiecki**, Global Lead for Sustainability, Advocacy, and Communications, DowDupont

Moderator:

- **Radhika Fox**, Director of the Value of Water Campaign and CEO of the US Water Alliance

RSVP here

On behalf of the Value of Water Campaign and hosted in partnership with the National Association of Counties and National League of Cities, join us for an Infrastructure Week reception following our panel discussion on the rooftop of 660 North Capitol St. NW, Washington, DC.

The Value of Water Campaign educates and inspires the nation about how water is essential, invaluable, and in need of investment. Spearheaded by top leaders in the water industry, the Value of Water Campaign is building public and political will for investment in America's water infrastructure.

Message

From: Adam Krantz [AKrantz@nacwa.org]
Sent: 5/14/2018 3:54:10 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: Water Associations Engagement Meeting

Thanks Lee - sorry to miss it but I had previous travel obligations. Hope you are doing well, Adam.

Adam Krantz | CEO | NACWA: Ex. 6


StratComm: H20 | June 6 – 7, 2018, Chicago, IL
Leading-Edge Communications Strategies for the NEW Clean Water Utility. ***Register now!***

On May 14, 2018, at 11:50 AM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Please check in no later 8:45am to allow ample time for Security Check in processing.
>
> Hello all,
>
> I'm pleased to see that so many of you are able to attend the meeting next week. As you prepare for the meeting, I wanted to share a few discussion questions that we plan to cover. I look forward to meeting with you!
>
> Sincerely,
> Lee Forsgren
>
> Discussion questions:
> 1. Affordability – What are the most important issues that need to change surrounding water infrastructure affordability? How would your sector characterize these issues?
> 2. Governance – What incentives are valuable for the water sector to consider in supporting less connected utilities in your watershed? (e.g. peer to peer assistance, regionalization?)
> 3. Financing – What are the biggest barriers for utilities when seeking financing through WIFIA and the SRFs? What information, tools, and/or resources can EPA provide to help address these?
>
> <Real ID Information.pdf>
>
> <5_15 Agenda_Water Associations Engagement Meeting.docx>
>
> <meeting.ics>

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 6/5/2018 3:34:18 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: FW: NRWA direction on PFAS if helpful for WUC.

FYI.

GTM

From: Mike Keegan [mailto:keegan@ruralwater.org]
Sent: Tuesday, June 05, 2018 11:21 AM
To: Tracy Mehan <tmehan@awwa.org>
Cc: Paul Fulgham <pfulgham@tremontoncity.com>
Subject: NRWA direction on PFAS if helpful for WUC.

[5/29/2018]

On Friday, the NRWA Regulatory Committee convened to craft association policy for a number of active policy issues including PFAS issues (May 25 committee agenda).

The Regulatory Committee unanimously adopted a policy recommendation that NRWA urge Congress and the EPA to resist a call for a national Safe Drinking Water Act MCL for PFAS and instead urge for alternative federal initiatives to *"assist"* communities dealing with PFAS contamination. In identifying the new policy for NRWA, the committee included the following findings:

- MCLs are regulatory enforcement levels for local governments that may result in fines and what is actually needed in affected communities is funding for treatment, monitoring assistance, on-site technical assistance for emergency operations, credible public health information, emergency access to safe drinking water and locally supported solutions.

- The Safe Drinking Water Act's mechanism of levying federal fines on local consumers for violations of MCLs is not a helpful solution for small and rural communities adversely affected by PFAS contamination.

- The federal government should identify at what level PFAS becomes unsafe in drinking water or acknowledge whether such a determination is possible. MCLs are not based on public health levels, but rather are determined by what a large metropolitan community can *"feasibly"* afford. There is a level authorized in the Safe Drinking Water Act for EPA to identify a health base level, the so-called "unreasonable risk to health" level.

- Most communities impacted by PFAS will be small and rural communities.

- Local governments are not responsible for PFAS contamination and responsible parties should be held accountable for remediation, treatment and providing alternative sources of safe drinking water.

The Regulatory Committee recommendation will be reviewed by the NRWA Executive Board of Directors on June 30th.

American Water Works Association
Dedicated to the World's Most Important Resource ®

Message

From: Hunter, David [DHUNTER@epri.com]
Sent: 3/22/2018 8:02:11 PM
To: Hunter, David [DHUNTER@epri.com]
CC: Smith, Wil [wsmith@epri.com]; Washington Seminars [WashingtonSeminars@epri.com]
Subject: Upcoming EPRI events: April 3, May 17, July 19, Aug 20-23, Nov 6-8
Attachments: NEA_NatPressClub_Roll_Out_Agenda.pdf

Dear Colleague,

EPRI has a great series of events lined up over the coming months, starting with the rollout of the National Electrification Assessment April 3rd. While there is no charge to attend (except Electrification 2018) space may be limited. For Electrification 2018—EPRI's biggest event of the year--register before March 31 to get steeply discounted rates.

I hope you to see you at any or all of these events!

David

April 3: EPRI's National Electrification Assessment

National Press Club, 529 14th ST NW, Washington DC
Noon to 3:00 pm; lunch will be provided

EPRI leadership will present the official release of EPRI's U.S. National Electrification Assessment (USNEA). Speakers, including EPRI President and CEO Mike Howard, EPRI Senior Vice President Anda Ray, Ontario Power Generation President and CEO Jeffrey Lyash, PNM Resources Chairman, President, and CEO Pat Vincent-Collawn, and NRDC Director Sheryl Carter will review key findings and discuss implications in the context of EPRI's Efficient Electrification Initiative. The agenda is attached. Click here to register. There is no charge to attend, but space may be limited.

May 17: EPRI's 21st Annual Energy and Climate Seminar

Washington Marriott Georgetown, 1221 22nd St NW, Washington DC
8:00 am to 6:00 pm, followed by a reception

In conjunction with EPRI's Washington Seminar Series, the 21st Energy and Climate Research Seminar will be held Thursday, May 17, 2018 at the Washington Marriott Georgetown, with a reception to follow. The Seminar will cover key energy and environmental topics of interest to the U.S. energy sector, including:

- Scientific understanding of extreme events and climate impact
- Policy update on leading state, federal, and/or international initiatives
- The future of electric transportation, storage, and distributed generation
- Resiliency approaches for the electric power sector

Please click here for additional information and to register, or email Wil Smith. There is no charge to attend, but space is limited.

July 19: EPRI Washington Seminar: The Fuels of the Future

Co-hosted by the International Energy Agency (IEA)
EPRI Washington DC office, 1325 G ST NW Suite 1080, Washington DC
11:30 am to 2:30 pm. Lunch will be provided.

EPRI is pleased to be joined by the International Energy Agency (IEA) as a cohost for this EPRI Washington Seminar. Please rsvp to Wil Smith. There is no charge to attend, but space is limited. Additional details TBA.

August 20: EPRI/ IEA Workshop on Cross-Border Energy and Capacity Trading

Long Beach, CA

EPRI is pleased to join the IEA in hosting this day-long workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing relevant IEA member countries and other stakeholders to learn from the CAISO-Mexico example and bring their own experiences to bear. This workshop will be co-located with Electrification 2018. Please email David Hunter for additional details.

August 20-23: Electrification 2018 International Conference and Exposition

Long Beach Convention Center, Long Beach, CA

EPRI's biggest event of the year, Electrification 2018, will be a 3 day international conference and exposition taking place in Long Beach, CA, Aug 20-23. Electrification will explore the critical issues, benefits, and opportunities of electrification with an unparalleled collection of industry experts:

- Learn about the capabilities and potential of today's electric technologies
- Understand the disruptive benefits and impacts of emerging electric technologies
- Discuss key policy, regulatory, and environmental issues
- Participate in expert training sessions and other professional development opportunities
- Experience a diverse array of technologies in our exposition hall
- Network with industry, government, and academic leaders to form collaborations and help build the future of electrification

Be sure to register before March 31 to get steeply discounted rates!

Save the Date: November 6-8: EPRI-IEA Challenges in Electricity Decarbonization Expert Workshops

Paris, France

The 5th Annual EPRI-IEA Challenges in Electricity Decarbonization Expert Workshop will again focus on electrification and its implications for the electricity sector. The workshop will be held jointly with the 18th EPRI-IEA-IETA GHG Emissions Trading Workshop. Details TBA. Space is limited. Please email David Hunter with expressions of interest.

Hope to see you there!

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DRAFT AGENDA

NATIONAL ELECTRIFICATION ASSESSMENT

April 3, 2018 • The National Press Club, Washington, DC

TUESDAY, APRIL 3		
TIME	**TOPIC**	**PRESENTER**
	Ballroom	
12:00 p.m.	Lunch/Reception	
12:45 p.m.	Welcome and Introductions	***Anda Ray, Senior Vice President, External Relations and Technical Resources, EPRI***
12:50 p.m.	EPRI Efficient Electrification Initiative and National Electrification Assessment Overview	***Mike Howard, President and CEO, EPRI***
1:00 p.m.	National Electrification Assessment Review • Analysis and Results • Energy End Use Perspective	***Geoff Blanford, Technical Executive, Energy and Environment, EPRI;*** ***Allen Dennis, Senior Program Manager Energy Utilization, EPRI***
1:30 p.m.	Panel of Respondents: How is Electrification and the National Assessment Important to Electric Utilities? • **Jeffrey Lyash**, President and CEO Ontario Power Generation, Inc.; EPRI Board Member (confirmed) • **Pat Vincent-Collawn**, Chairman, President, and CEO, PNM Resources, Inc.; EPRI Board Member (confirmed) • **Sheryl Carter**, Director, Power Sector, Natural Resources Defense Council; EPRI Board Member (confirmed)	***Anda Ray, Senior Vice President, External Relations and Technical Resources, EPRI***
2:15 p.m.	Audience Q&A	***All***
3:00 p.m.	Wrap up and Adjourn	***Anda Ray, EPRI***
3:00 p.m.	Media Interviews	***Clay Perry, Senior Media Relations Manager, EPRI***

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 4/16/2018 1:19:37 PM
To: Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Stein, Raffael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=280af9f00275496d96dc7587ab473480-Rstein]; Farris, Erika D. [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d37183fb40d3482187e8f179b5b85386-EFarris]; Abhold, Kristyn [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bfe730f27efa48beb8a6252c5ed0e71e-Abhold, Kri]; Brubaker, Sonia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6055e643e5154f25b83a5515161e1705-sbruba02]; Weiss, Kevin [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=793bc48d7a6743dcabff30de8c2175dd-keweiss]; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Bodine, Susan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8c2cc6086fcc44c3be6b5d32b262d983-Bodine, Sus]; pollins.mark@awwa.org
CC: Adam Krantz (akrantz@nacwa.org) [akrantz@nacwa.org]; Chris Hornback [CHornback@nacwa.org]; Nathan Gardner-Andrews [NGardner-Andrews@nacwa.org]; svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Wendi Wilkes [WWilkes@awwa.org]
Subject: New models for affordability and MHI
Attachments: Manny Teodoro Affordability for W and WW Journal Jan 2018.pdf

Again, thank you for your time last week.

As an example of the kinds of articles focusing on affordability, MHI, etc., appearing of late in the Journal AWWA, attached is a piece by Manny Teodoro an economist at Texas A&M. I don't necessarily endorse his recommendations. As the lawyers say, I do not offer it as proof of the matters asserted but as an example of increasing focus on these matters. That said, I think his critique of MHI is telling.

We look forward to continuing the conversation.

All the best.

Tracy Mehan

Attachment

Measuring Household Affordability for Water and Sewer Utilities

MANUEL P. TEODORO

Texas A&M University, College Station, Tex.

Rising costs and recent high-profile crises have brought renewed and increasing attention to the affordability of water and sewer service. Meaningful, accurate assessment of affordability is critical as utility leaders seek to serve low-income customers while also raising the revenue necessary to maintain and advance public health and conservation. Unfortunately, the predominant conventional method of measuring household affordability is fundamentally flawed and often misleading. This article advances a more accurate and meaningful method for measuring the affordability of water and sewer service for low-income households. The proposed method accounts for essential household water needs, income disparities, and core nonwater/sewer costs. After detailing the method, the new approach is used to measure water and sewer service affordability in the 25 largest US cities. The article concludes with a discussion of the new method's limits and general guidelines for its use in policymaking and rate design.

Keywords: *affordability, finance, measurement, rates*

This article advances a new method for measuring the affordability of water and sewer service for low-income households. Rising costs and recent high-profile crises have brought renewed and increasing attention to the affordability of water and sewer service for utilities that rely upon rate revenue to meet operating and capital needs. Consequently, communities across the United States and elsewhere are under increasing pressure to ensure that the most economically vulnerable can afford to pay for these essential services in an era of rising costs. Meaningful, accurate assessment of affordability is more critical than ever as utility leaders seek to serve low-income customers while raising the revenue necessary to maintain and advance public health and conservation (LaFrance 2017).

As with any organizational goal, getting affordability right requires measuring affordability accurately; unfortunately, the predominant method of measuring household water and sewer affordability is fundamentally flawed. The conventional approach measures affordability as a community's average cost of water and sewer service as a percentage of that community's median household income (%MHI), with values <2.0 or 2.5%—4.0 or 4.5% combined—deemed "affordable" (Mack & Wrase 2017). Originally intended as a means of gauging a community's overall financial capability for purposes of negotiating regulatory compliance, this standard has been widely misapplied to household affordability. As a result, evaluations of household water and sewer utility affordability are inaccurate at best and misleading at worst.

This article offers a more meaningful and accurate method for measuring the affordability of water and sewer service at the household level. Unlike the conventional approach, the proposed affordability ratio (AR) accounts for essential household water needs and core nonwater/sewer costs. Further, because the main concern for affordability in the United States and other developed countries is for low-income households, the proposed method assesses affordability at the 20th income percentile (AR_{20}), rather than at median income. Basic household water and sewer cost is expressed in terms of hours of labor at minimum wage (HM) and offered as a useful complementary affordability measure. Together, these two metrics offer a more defensible and practically useful way of assessing utility affordability for purposes of budgeting, planning, rate-setting, and policy design.

This article begins by summarizing the current conventional %MHI approach to measuring affordability and the ways in which it fails. The proposed new and improved method is then presented, along with a discussion of its advantages over the conventional approach. As an illustration, the new method is used to measure water and sewer affordability in the 25 most populous US cities. The article concludes with a discussion of the new method's applicability, limitations, and general guidelines for use in budgeting and rate design. Significant portions of the current article draw on Davis and Teodoro (2014), which first introduced the AR method.

THE CONVENTIONAL APPROACH AND WHY IT IS WRONG

As noted previously, the most widely applied method of measuring water and sewer affordability in the United States is to calculate the average residential water and sewer bill for

a given utility as a percentage of the community's MHI. Usually, this percentage is calculated for an entire utility, but sometimes it is calculated for a subset of customers, such as a neighborhood or a census tract. Typically, this percentage is compared with a set affordability standard, most often 2.0% or more, recently, 2.5%. A simple binary declaration follows this standard: if a utility's average bill as %MHI is less than this standard, then it is deemed "affordable"; if it is greater, then it is "unaffordable." Sometimes these %MHI standards are applied separately to water and sewer rates; at other times, they are combined water plus sewer costs. Often used but rarely considered carefully, the 2.0 or 2.5%MHI (4.0 or 4.5%MHI combined) standard has become the default basis for analyzing water and sewer affordability in recent published research (Mack & Wrase 2017, Janzen et al. 2016), with no other rationale than that it is convenient and conventional. Utility rate analysts typically follow suit; the University of North Carolina Environmental Finance Center's Water and Wastewater Rates Dashboard uses the %MHI method to guide rate design, for example (https://efc.sog.unc.edu/reslib/item/north-carolina-water-and-wastewater-rates-dashboard).

Despite its widespread use, the %MHI approach is seriously flawed. The main trouble with using it as a measure of affordability is that it does not measure affordability—at least not at the household level, in the way that most interested observers typically think of affordability. The %MHI method and accompanying 2.0% standard as developed by the US Environmental Protection Agency (USEPA) were intended as a gauge of a community's financial capability for purposes of negotiating regulatory compliance by its utilities. The idea of %MHI as a measure of financial capability can be traced to the USEPA's *Financial Capability Guidebook* (USEPA 1984). Identifying specific %MHI thresholds for determining financial capability appears to emerge from the agency's 1995 guidelines on Water Quality Standards (USEPA 1995) and Combined Sewer Overflow compliance schedule (USEPA 1997). For purposes of assessing financial capability, %MHI values for water and sewer would be calculated separately, with the sum of the two held up against the standard. For example, a 2.0%MHI standard for water and 2.0%MHI standard for sewer implies a 4.0%MHI combined standard. None of these USEPA documents offers a theoretical rationale for the 1.0, 2.0, or 2.5%MHI standards.

It is not clear when or how analysts began to conflate these utility-level financial capability metrics with household-level affordability, but as noted previously, %MHI is now widely used as a household affordability metric. Unfortunately, as a method of measuring household affordability, the %MHI method is flawed in at least four ways.

Average versus essential water use. Using average residential demand as a basis for affordability analysis inflates the cost of water and sewer service for purposes of affordability analysis. In nearly all US utilities of significant size, average residential water consumption is considerably higher than its median—that is, relatively conservative customers greatly outnumber high-volume customers. Consequently, in most utilities, a minority of high-volume customers drive up the average demand that the conventional method uses as the basis for affordability analysis. Further, most American water utilities exhibit significantly greater demand during summers because of residential outdoor irrigation, indicating that much of the "average" water bill is for usage that is not serving basic health needs. Public policy discussions of water and sewer affordability seldom are concerned with the cost of maintaining large lawns, swimming pools, or other discretionary outdoor use. Rather, affordability is typically thought of as the ability of customers to pay for water and sewer services that are adequate to meet their basic needs for drinking, cooking, health, and sanitation. For most US utilities, then, evaluating affordability as a function of average consumption implies an unduly high demand.

Median versus low income. Perhaps the most frequent criticism of the %MHI standard is that its focus on median income misses the real subject of affordability concerns: poor households (Stratus Consulting 2013, Baird 2010, Rubin 2001). The median-income household is unlikely to face serious water and sewer affordability problems in any but the smallest or most desperately poor communities. For low-income households, however, water and sewer services may force important economic tradeoffs. Measuring affordability as a function of an entire community's MHI obscures the effects of rate-setting on low-income customers, for whom utility leaders presumably have the greatest affordability concerns. Certainly the tenor of public policy debates surrounding utility affordability suggests that low-income residential customers are the focus of alarm. As income stratification in a community increases, the degree to which %MHI masks potential affordability problems increases.

Essential costs of living. Water and sewer services are vital, but are not the only vital goods and services customers must purchase. Housing, food, health care, home energy, and other essential goods and services also affect water and sewer affordability to the extent that they constrain households' financial flexibility. These nonwater/sewer costs vary widely across utilities. Water and sewer bills may be low as a percentage of income, but much higher as a percentage of disposable income if the costs of housing or health care are high, for example. In such cases, water and sewer bills that are nominally low or are a small percentage of MHI may force serious sacrifices for low-income customers. The conventional approach to affordability measurement is insensitive to these differences in costs of living.

An arbitrary, binary standard. Whether the affordability standard is set at 1.0, 2.0, 2.5, or any other %MHI, the standard represents a value of water and sewer service that is rarely (if ever) rooted in any philosophical reasoning

or as a result of a deliberative process. Instead, analysts simply cite precedent and invoke the standard. Whatever its origins, the 2.0 (or 2.5) %MHI affordability threshold has evolved into a "golden number" (Socolow 1976), now held up as a definitive measure of household-level affordability, apparently for no other reason than its familiarity and convenience.

The simple binary nature—either affordable or unaffordable—of the %MHI standard is also problematic. The affordability of anything is rarely a strictly yes/no phenomenon—in microeconomics, things are more or less affordable relative to the costs of other things. Although informal rules of thumb can be useful, the %MHI standard has become a crutch that causes simplistic and misleading analyses. For example, simplistic application of the %MHI standard to census tracts led one recent study to report that "water rates are currently unaffordable for an estimated 11.9% of households" (Mack & Wrase 2017), with no attention to the validity of %MHI standard or the distribution of water consumption within the census tracts in which water was declared unaffordable. By the same token, leaders of a utility that satisfies the %MHI threshold can use the standard as an excuse not to address affordability, even if many of its customers struggle to pay their bills.

A BETTER WAY

This article offers a method for measuring water and sewer utility affordability that proceeds from an understanding of affordability as the ability of individual customers to pay for water and sewer services to meet their basic needs while maintaining the ability to pay for other essential costs (Davis & Teodoro 2014). This definition is similar to what the USEPA's National Drinking Water Advisory Council called "household relative affordability" (NDWAC 2003). The method aims to retain the intuitive appeal of the conventional approach while remedying its shortcomings. Specifically, the proposed method: (1) measures household-level affordability (rather than the entire utility's financial capability); (2) provides for basic water needs (rather than average consumption); (3) focuses on low-income households (not average- or median-income customers); and (4) accounts for essential costs other than water and sewer. The proposed method involves two complementary metrics: the AR and basic costs expressed as HM.

The AR. Household-level affordability (sometimes called micro-affordability) can be measured as the percentage or ratio of basic water and sewer costs to disposable household income for low-income customers. This measure may be calculated for an individual customer or aggregated statistically for any defined group of customers. For a given customer c, the AR (AR_c) is

$$AR_c = \frac{p_c(W + S)}{I_c - E_c} \quad (1)$$

where I is household income, E is essential household expenses (other than water and sewer services), p is the number of persons in the household, and W and S are the per capita cost of essential water and sewer services, respectively. The relevant time frame for calculating AR depends on the billing cycle used by the utility (e.g., monthly, bimonthly, quarterly).

The numerator in Eq 1 is the price of basic service to customer c, which varies according to the water volume considered necessary to maintain health, the utility's rates, and the number of people in the household. The denominator is c's disposable income, which depends on the customer's income and the cost of essential nonwater/sewer household expenses. The definitions of basic water needs and essential household expenses may vary from one utility to another, depending on local values and conditions. The resulting AR_c reflects the economic tradeoffs that customer c faces because of the costs of basic water and sewer service.

AR can be calculated for any customer, group of customers, or hypothetical customer. An assessment of AR_{20} provides a meaningful look at affordability for low-income customers. This focus on the 20th percentile household aligns the analysis of water and sewer affordability with mainstream assessments of welfare economics, which typically identify the 20th percentile as the lower boundary of the middle class. At this income level, "working poor" households have very limited financial resources, but may not qualify for income assistance programs. Public assistance programs vary considerably across the United States and across the world, and the absolute income level at the 20th percentile may qualify for significant assistance in some places. Still, the 20th percentile standard is a useful benchmark level for assessing the economic conditions of lower-middle-class and working-poor households. Analysts might choose to focus on a different income percentile when assessing affordability depending on the economic conditions or distribution of incomes in a particular community.

The ease and precision with which the AR can be calculated depend on the availability of household-level customer data. Calculating the numerator is straightforward, requiring only information about the utility's rates (or proposed rate). Ideally, the AR's denominator would be calculated using a comprehensive household-level consumer survey of the utility's customer base. Because such data are unlikely to be readily available, in most cases analysis will depend on estimates of household income and expenditures. Those estimates can draw from a variety of sources; the analysis presented in this article uses regression-based estimates, but a simpler approach could be to use more readily available data on local housing, food, medical, home energy, and tax costs for a given community.

Basic service costs as HM. A complementary way to measure affordability is to calculate the HM that would be necessary to pay for basic water and sewer service. As with the AR, the HM may be calculated for an individual

customer or aggregated statistically for any defined group of customers. For a given customer c, basic service costs as HM (HM_c) is

$$HM_c = \frac{p_c(W + S)}{A} \quad (2)$$

where p is the number of persons in the household; W and S are the per capita cost of essential water and sewer services, respectively; and A is the minimum wage in c's labor market. HM represents the cost of basic water and sewer service for low-income households, many of which work at or near minimum wage. HM is not sensitive to other essential costs as AR is, but it is intuitively appealing because minimum wage is a familiar economic touchstone.

Analytical assumptions. The AR and HM methods are generally applicable metrics flexible enough to accommodate specific conditions that apply in any utility. The definitions of basic service and (nonwater/sewer) essential expenses may vary depending on local community values, and the analyst should adjust assumptions as necessary. Basic service is a moving target because consumption patterns vary across utilities and are broadly trending downward in the United States (Rockaway et al. 2011). For purposes of this analysis and as a guideline for affordability analysis in the United States, basic service is defined as 50 gpcd. This standard is a typical assumed minimal residential wastewater flow for purposes of sewer system design (Bowne et al. 1994) and is meant to reflect indoor, nondiscretionary water use to maintain health in a contemporary US home. In a similar vein, the Texas Water Development Board (2004) recommended 50 gpcd as its standard for indoor water use in crafting a water conservation plan. Significantly less than average consumption of 91 gpcd (DeOreo et al. 2016) but greater than the 35.6 gpcd standard that Chenoweth (2008) identifies as the "minimum water requirement for social and economic development," the 50 gpcd assumption represents a reasonable, conservative level of basic service for purposes of evaluating affordability across large numbers of utilities. Values of AR can be calculated for any household size, but a four-person household is assumed for this analysis. This is significantly greater than the average household size in the United States, which is 2.64 people (ACS 2015). As such, an assumed four-person household yields a conservative measure of affordability.

Essential household expenses in the present analysis include the costs of taxes, housing, food, medicine, health care, and home energy. These categories are considered essential because they are either inevitable (taxes) or at least as important as water for maintaining health. Any of these elements may be adjusted to reflect local conditions and values. For example, if the analyst believes that 50 gpcd is too high or too low a standard for basic service, then the AR_{20} formula can be adjusted accordingly. Similarly, essential household costs may be expanded to include other expenses (e.g., child care, transportation, telephone service) as appropriate according to local preferences and conditions. The definition and measurement of essential costs should be based on the needs of low-income households locally. Local organizations that provide assistance to low-income households can provide useful information about these costs.

AFFORDABILITY IN MAJOR US CITIES

Water and sewer utility affordability in the 25 most populous US cities are analyzed here with the new affordability measurement as an empirical demonstration of the method and to provide a descriptive profile of affordability in the country's largest cities. Capital costs, operational expenses, rate structures, demographics, and economic conditions change frequently within and across utilities; therefore, the following information should be considered a snapshot of affordability in early 2017.

Data. To calculate basic service costs, water and sewer rates were gathered from utility websites during spring 2017. Because rate structures vary considerably across utilities in ways that affect the prices that individual customers pay, to maintain comparability and capture affordability, basic service costs were calculated assuming a single-family residential customer with a ⅝ in. meter connection, billed monthly. For utilities that bill bimonthly or quarterly, volumes and charges were converted to monthly to maintain comparability. A four-person household and 50 gpcd were assumed. In cases in which rates vary seasonally or across geographic zones, the highest seasonal and/or zone rates were assumed. Although it might be argued that these assumptions lead to unduly high basic costs, they actually result in a conservative, worst-case scenario test of affordability. Utilities that use seasonal and/or zone rates might opt to calculate basic costs by averaging across time and/or space. However, the current analysis uses a worst-month scenario to calculate affordability because a low-income household is most likely to be stressed by a single high bill than its average bill. Because basic service is assumed to include indoor use only, the same volume is applied to both water and sewer charges.

In most cases, water and sewer services are provided by a single organization (e.g., a city government). In cases in which different entities provide water and sewer services, costs were calculated using the rate structures from both organizations. Some of the utilities in this analysis calculate bills in thousand gallon units, whereas others use hundred cubic foot units; in each case, bills were calculated in the appropriate units for the utility being analyzed.

Many utilities (including several analyzed here) offer discount, subsidy, or other assistance programs aimed at improving affordability. Crucially, the current analysis does not account for such assistance programs in assessing affordability because the analytical goal is to measure affordability in the absence of policy intervention. In this sense, accurate affordability measurement helps gauge the need for assistance programs. Including assistance programs would complicate attempts to measure affordability across large numbers of utilities because such programs

vary widely in scope, structure, and implementation. When using AR_{20} and HM to analyze rates in a utility, calculations can be made with and without assistance programs to understand their potential effects.

Income data—including 20th percentile household income—were drawn from the 2015 American Community Survey five-year estimates. Essential nonwater/sewer expenses were estimated on the basis of the Bureau of Labor Statistics' 2015 Consumer Expenditure Survey (CEX), which includes a probability-weighed national sample of 23,683 households that reported several categories of expenditures as well as income and demographic information. The American Community Survey and CEX data include public assistance programs in determining net income. These data were used to develop regression models that estimate essential expenditures (e.g., taxes, health care, food, housing, home energy) for low-income households. The CEX includes intentional oversamples of several metropolitan areas. Where the CEX included more than 200 households from a given utility's service area, those data were used to calculate essential expenditures for that utility. For all other utilities, the full national sample was used to estimate essential expenditures. These regression models are reported in the appendix. CEX sampling is based on metropolitan areas, whereas the present affordability analysis is based on cities. This sampling unit mismatch limits the accuracy of the essential expenditure estimates used here because expenses can vary considerably within metropolitan areas. Metropolitan area subsamples are used when available because they are likely to be more representative of their respective cities than the full national sample. Coefficients from these models were combined with parameters for each city; the essential expenditures were then estimated at each city's 20th income percentile, assuming a four-person household and single-family home. The legal minimum wages in each utility's political jurisdiction that was in effect on June 1, 2017, were used to calculate HM.

Example: Dallas, Tex. Analysis of affordability in Dallas provides an illustration of how these affordability metrics are calculated. Table 1 shows the monthly basic water and sewer cost calculation for Dallas. Dallas bills water service using units of 1,000 gal; at 50 gpcd, basic service for a four-person household is 6,200 gal monthly. Dallas water rates include a fixed monthly charge of $5.25 for a ⅝ in. meter and increasing block volume charges of $1.90/1,000 gal for the first 4,000 gal and $4.25/1,000 gal for volumes of 4,000 to 10,000 gal. (Dallas water rates include additional blocks that apply for volumes beyond the basic demands analyzed here.) The city's sewer rates include a fixed monthly charge of $4.70 and a uniform $5.31/1,000 gal winter average volume. These rates generate a basic cost of $59.82/month.

Table 2 combines this basic monthly cost with income, essential expenditure, and minimum wage information to illustrate the calculation of AR_{20} and HM values for Dallas, where 20th percentile household annual income is $18,585 ($1,549 monthly) and minimum wage is $7.25/h. A four-person household in Dallas at that income level would have estimated essential expenses of $864/month, leaving $685 as disposable income. The basic water and sewer cost of $59.82 thus translates into an AR_{20} of 8.74% and an HM of 8.25. In plain language, this result indicates that basic water and sewer service costs a lower-middle class, four-person household in Dallas ~9% of its disposable income, or ~8 h of HM.

TABLE 1 Basic monthly water and sewer costs, Dallas, Tex.[a]

Monthly basic volume—*gal*	6,200
Water charges	
Fixed	$5.25
Volume (4,000 gal at $1.90/1,000 gal, 2,000 gal at $4.25/1,000 gal)	$16.95
Sewer charges	
Fixed	$4.70
Volume (6,200 gal at $5.31/1,000 gal)	$32.92
Total water and sewer charges	$59.82

[a]Based on 2017 rates

A big-city snapshot. The results of this affordability analysis for the top 25 US cities are reported in Table 3, which is arranged by population. The average single-family residential bill at 6,200 gal (8.3 ccf) across these cities is $83.58/month, although costs and rate structures vary considerably across these cities, from a low of $39.68 (Phoenix, Ariz.) to a high of $180.70 (Seattle, Wash.). Incomes also vary widely, with AR_{20} ranging from $9,436 (Detroit, Mich.) to $33,342 (San Jose, Calif.) annually. After accounting for essential nonwater/sewer expenses, disposable income averages $780/month. Hourly minimum wages vary from the federally mandated $7.25 to Seattle's $15.00.

TABLE 2 Affordability metrics for Dallas, Tex.[a]

A. Basic monthly water and sewer cost	$59.82
AR	
B. AR_{20} annual income	$18,585.00
C. Monthly income (B ÷ 12)	$1,548.75
D. Estimated monthly essential expenses[b]	$864.11
E. Monthly disposable income (C – D)	$684.64
AR_{20} (A ÷ E)	8.74%
HM	
F. Minimum wage per hour	$7.25
HM (A ÷ F)	8.25

AR—affordability ratio, AR_{20}—affordability at the 20th income percentile, HM—hours of labor at minimum wage

[a]Based on 2017 rates
[b]Estimates based on regression analysis of 2015 Consumer Expenditure Survey. See appendix.

TABLE 3 Affordability in largest 25 US cities in 2017[a]

Population Rank	City, State	Monthly Basic Service Cost $	20th Percentile Annual Income $	Affordability Ratio, Four-Person Household		Minimum Wage $	HM
				Estimated Disposable Monthly Income at 20th Percentile $	AR_{20} %		
1	New York, N.Y.	81.78	18,085	579	14.1	12.00	6.8
2	Los Angeles, Calif.	73.11	19,063	888	8.2	10.50	7.0
3	Chicago, Ill.	47.27	17,386	576	8.2	10.50	4.5
4	Houston, Tex.	74.87	19,109	642	11.7	7.25	10.3
5	Phoenix, Ariz.	39.68	21,401	825	4.8	10.00	4.0
6	Philadelphia, Pa.	58.54	13,546	524	11.2	7.25	8.1
7	San Antonio, Tex.	55.16	19,517	933	5.9	7.25	7.6
8	San Diego, Calif.	108.71	26,381	636	17.1	11.50	9.5
9	Dallas, Tex.	59.82	18,585	685	8.7	7.25	8.3
10	San Jose, Calif.	104.47	33,342	1,188	8.8	10.5	9.9
11	Austin, Tex.	91.20	24,438	1,108	8.3	7.25	12.6
12	Jacksonville, Fla.	68.23	19,817	873	7.8	8.05	8.5
13	San Francisco, Calif.	176.85	24,946	658	26.9	13.00	13.6
14	Columbus, Ohio	106.36	18,784	840	12.7	8.15	13.1
15	Indianapolis, Ind.	97.60	17,395	724	13.5	7.25	13.5
16	Fort Worth, Tex.	66.67	21,817	831	8.0	7.25	9.2
17	Charlotte, N.C.	68.84	23,135	1,044	6.6	7.25	9.5
18	Seattle, Wash.	180.70	27,290	961	18.8	15.00	12.0
19	Denver, Colo.	64.91	21,698	884	7.3	9.30	7.0
20	El Paso, Tex.	54.45	17,879	787	6.9	7.25	7.5
21	Washington, D.C.	112.51	22,526	785	14.3	11.5	9.8
22	Boston, Mass.	99.51	14,913	618	16.5	11.00	9.0
23	Detroit, Mich.	92.68	9,436	379	24.4	8.90	10.4
24	Nashville, Tenn.	65.95	21,153	926	7.1	7.25	9.1
25	Memphis, Tenn.	39.53	14,913	618	6.4	7.25	5.5
	25-city average	83.58	20,262	780	11.4	9.19	9.0

AR_{20}—affordability at the 20th income percentile, HM—hours of labor at minimum wage

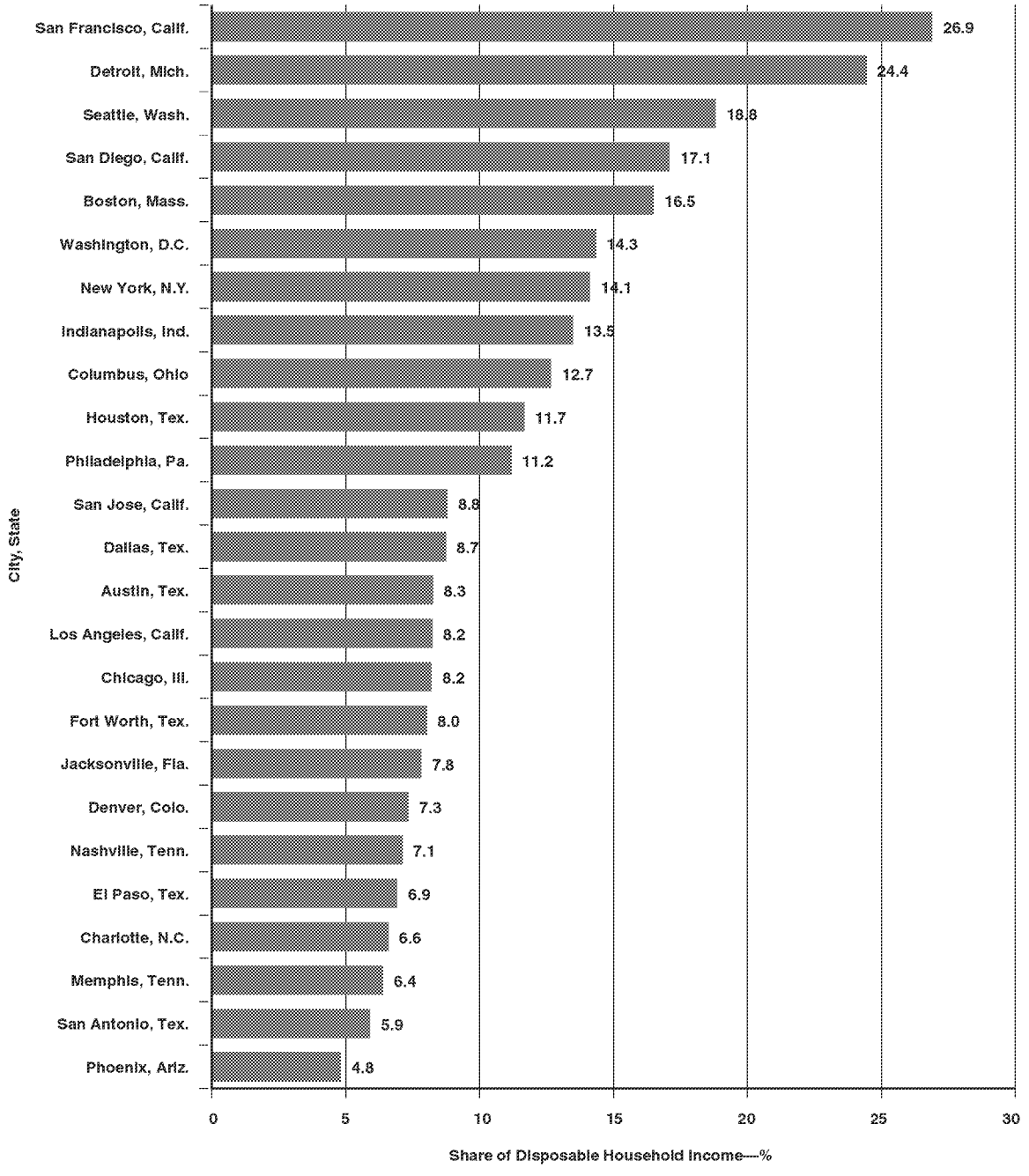
[a]Does not include low-income assistance programs

The resulting AR_{20} values average 11.4%, ranging from a low of 4.8% in Phoenix to a high of 26.9% in San Francisco. In terms of labor, basic monthly water and sewer service in the top 25 cities average 9.0 HM, with Phoenix and San Francisco again at the ends of the distribution (4.0 and 13.6 HM, respectively). Figures 1 and 2 depict these AR_{20} and HM results, with cities arranged from most to least affordable. These results should be considered with some caution because the assumptions underlying the AR_{20} and HM calculations may not be appropriate for all 25 cities and, as noted previously, do not reflect low-income assistance programs that some utilities provide.

The results appear to follow from several factors. Although discussions of utility affordability frequently focus on costs and revenue requirements, a cursory review of these 25 cities suggests that rate structures, particularly the level of fixed charges and rates paid for the first few units of water, also significantly affect affordability for low-income households. Put another way, from a low-income affordability perspective, how a utility collects rate revenue can be as important as how much total revenue it collects. The method applied here reveals the less obvious but critical ways that income distributions and essential nonwater/sewer expenses affect affordability, which are variations not reflected in the conventional %MHI metric.

The significance of these metrics becomes clearer when compared with the conventional %MHI approach to measuring affordability. Consider Dallas (AR_{20} = 8.7, HM = 8.3) and Boston (AR_{20} = 16.5,

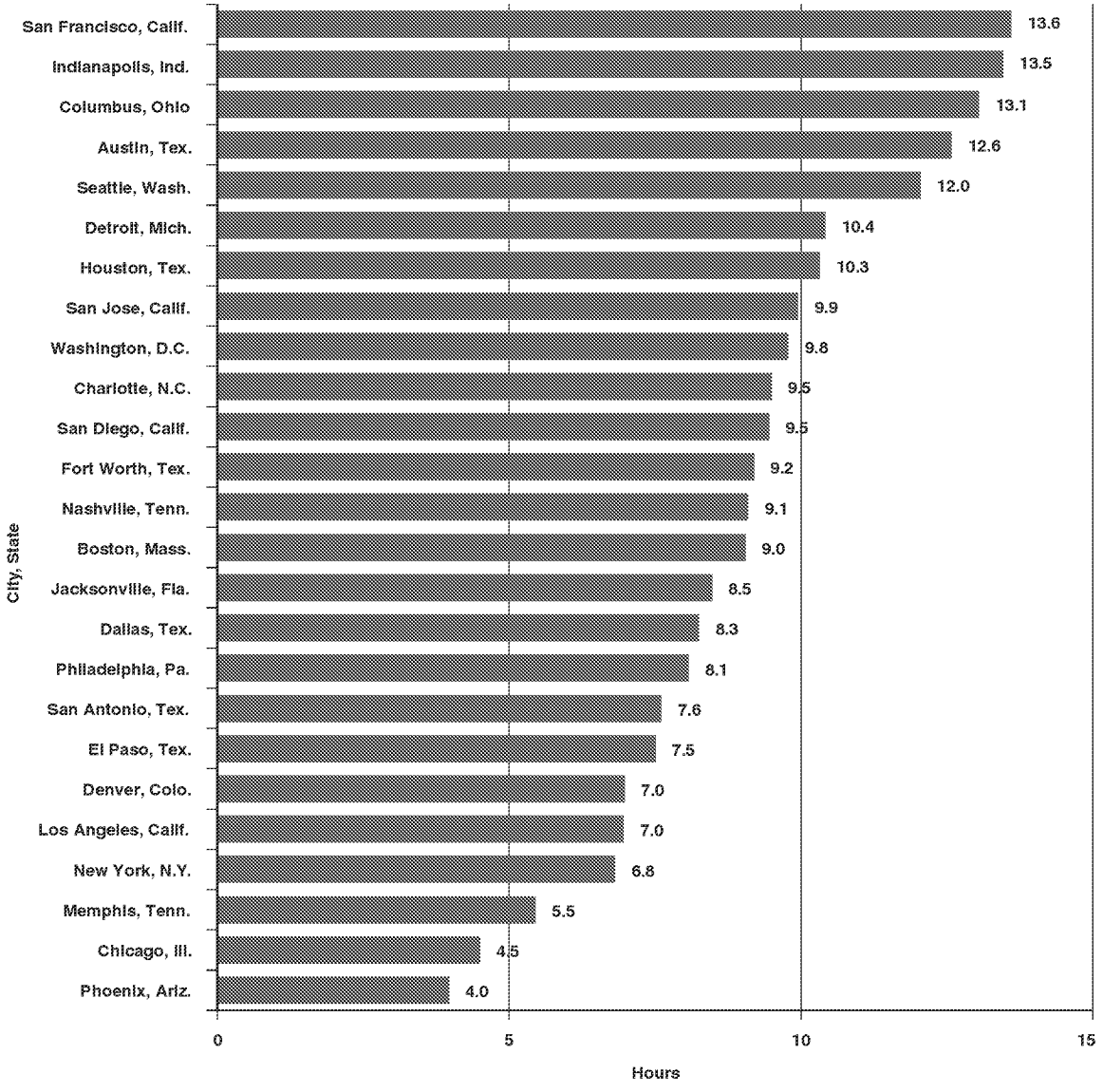
FIGURE 1 Basic water and sewer service AR_{20} for the 25 largest US cities in 2017



AR_{20}—affordability at the 20th income percentile

HM = 9.0): average single-family residential water consumption in Dallas is 8,300 gal, with billed sewer volume at 5,500 gal, resulting in an average bill of $65.04 (DWU 2016). With a median annual income of $43,781, the conventional metric puts Dallas' water rates at 1.8%MHI, which is well below typical affordability thresholds. Boston's average combined monthly average water and sewer bill is $87.83 and its median income is $62,775, making its average water and sewer cost just 1.7%MHI (BWSC 2017). Naïve application of the conventional standard to Dallas and Boston would lead to the conclusion that these two cities' water and sewer rates are affordable according to USEPA standards, and that they are roughly comparable in terms of affordability. The AR_{20} and HM metrics indicate that the real economic burden of these

FIGURE 2 Basic water and sewer service HM for the 25 largest US cities in 2017



HM—hours of labor at minimum wage

services is markedly greater for low-income households in Boston than in Dallas. (Data necessary for calculation of average sewer bills were not available for all 25 cities.)

DISCUSSION

With improved affordability metrics and a snapshot of affordability in major US cities established, discussion now turns to their limitations, implications, and applications.

Limitations. Although AR_{20} and HM offer major improvements over the conventional method of assessing affordability, they are not perfect. A clear drawback of the AR_{20} is the relative complexity of estimating it with the data typically available to analysts. Although AR_{20} is intuitive, estimating disposable household income in a given community requires a level of effort and/or technical sophistication greater than what is required of the conventional method. For all of its drawbacks, %MHI has back-of-the-envelope simplicity (even if that simplicity is misguided and misleading). Complexity is not an insurmountable barrier to using these metrics for any specific utility, however. Regression analysis of CEX data is not necessary for AR_{20} calculations in a single utility, and, for most, income distribution and reasonably accurate essential household estimates are possible with locally available data.

Two additional limitations are more serious for purposes of advancing the cause of affordability and should be considered when using AR_{20} and HM. First, the metrics

advanced here focus on single-family residential customers. Theoretically, the same metrics could be applied to any class of customer, but measuring affordability for households in multifamily or rental housing is difficult or impossible if those households do not pay their own water and sewer bills. Assessing and addressing affordability for these "hard to reach" customers is a perennial, vexing challenge for utilities (Raucher et al. 2017); unfortunately, the metrics advanced here offer little leverage on that challenge.

Second, and more fundamentally, AR_{20} and HM measure affordability; they do not define it. The metrics advanced here can significantly clarify the scope of the water and sewer affordability issues that utilities face, but they cannot in themselves define affordability.

What is affordable? Water and sewer affordability is a matter of community priorities. When confronting affordability questions, utility leaders and policymakers are actually asking: How much is reasonable to expect households of limited means to pay for these essential services? What economic sacrifices are reasonable to expect low-income households to make in order to pay water and sewer bills?

These are fundamentally normative questions. No metric, however well conceived and executed, can in itself define what is affordable; there is no scientific answer to a philosophical question. Just as incomes and essential expenditures vary from one community to another, so can social and political values: what one community considers affordable may not be considered affordable elsewhere.

As noted previously, one of the main weaknesses of conventional affordability analysis is that it declares utility rates "unaffordable" or "affordable" because they fall above or below a combined 4.0 or 4.5%MHI threshold—golden numbers with no underlying rationale. In the public policy arena, these arbitrary standards tend to preclude or preempt meaningful discussion of affordability. Better measurement of affordability can facilitate clearer thinking and discussion, and the metrics introduced here can serve as a framework.

Beware of cross-utility comparisons. The affordability snapshot of the 25 utilities developed here is interesting in its own right because it depicts the general state of affordability in large US cities; however, this snapshot is not especially useful for setting affordability policy in any given utility. There is a common (perhaps innate?) human tendency to think about performance in comparison with others, so it is tempting to think about a utility's affordability relative to others when developing policy. This kind of comparison distracts from the core issue of affordability. As a metaphor, consider water treatment: no responsible engineer would recommend a treatment technology for Boston based on measurements of average source water quality in the other top 25 cities; for purposes of designing treatment processes, the only relevant measurement is of Boston's source water. Developing affordability policy according to other utilities' affordability metrics is like designing a treatment plant for other communities' average source water. Utility rates and affordability programs ought to reflect their own communities' needs and values, not those observed elsewhere.

For these reasons, utility leaders and policymakers should resist the temptation to make decisions about affordability in their communities based on affordability conditions nationally or in neighboring communities. The relevant question is not how affordable our water and sewer rates are compared with other communities but rather if they are consistent with the value our community places on affordability.

Rules of thumb. Bearing in mind the dangers of "golden numbers" and cross-utility comparison, some simple rules of thumb for evaluating water and sewer affordability are offered here in response to queries from professionals and policymakers grappling with affordability in their utilities. These guidelines are not rooted in any theory of welfare economics, law, or philosophy; they simply reflect an intuitive answer to what trade-offs low-income households should be expected to make in order to pay for basic water and sewer service. The following double-barreled standard is suggested:

- an AR_{20} value of no more than 10%, so that a four-person household at the 20th income percentile pays no more than 10% of its disposable income on water and sewer service, and
- an HM value of no more than 8.0, so that a four-person household's basic monthly water and sewer bill requires no more than 8 h of labor at minimum wage.

These two standards have some visceral appeal ("10%, one day"), but the intuition behind them is that water and sewer are essential services, so it is reasonable to ask low-income customers to pay up to 10% of disposable income and/or work up to one full day at minimum wage to pay for them. Beyond these levels, water and sewer costs may begin to severely constrain the welfare and economic opportunities of low-income households.

Analysts, utility leaders, policymakers, and interested observers are urged to use these rules of thumb not as new golden numbers to supplant the conventional %MHI standard, but as starting points for discussion and development of affordability policies for their own utilities. These rules can help frame efforts to define affordability locally. Mumm and Ciaccia's (2017) pairwise comparison approach offers promising means of inferring community values about affordability, for example.

Based on the present analysis, 14 of the 25 largest US cities meet the first rule of thumb; only eight satisfy the second. Do these findings indicate that cities that fail to meet these standards have an affordability problem? Not necessarily. Several utilities fall just above or below the 10%/8 h thresholds; therefore, it would be simplistic to declare them "affordable" or "unaffordable" on the basis of rules of thumb. In some cases—most conspicuously, Detroit—high AR_{20} figures are driven more by very low 20th percentile incomes than by utility rates and so may not reflect the range of public assistance programs available to extremely low-income households. In other cases, 50 gpcd indoor water use may be an unrealistically high level of water use. Many of these utilities

use assistance programs to help address affordability concerns in ways that are not captured in AR_{20} or HM. Moreover, utility rates that exceed the rules of thumb may nevertheless be consistent with their communities' understanding of affordability. On the other hand, it is possible that some of these utilities have serious affordability challenges that are underappreciated because they satisfy a %MHI convention. The best solutions for any affordability problems identified with these metrics will vary from one utility to another.

Implications for practice. Better measurement can facilitate better decisions. Utility leaders, policymakers, and regulators should abandon %MHI as a measure of household water and sewer affordability. Instead, better metrics like AR_{20} and HM should be used when setting rates or developing affordability programs, because they capture the kinds of welfare tradeoffs that utility rates force low-income households to make. When considering alternative rate structures, budgets, and affordability programs, policymakers should tailor the AR_{20} and HM metrics to reflect local conditions, compare the AR_{20} and HM that would result under various alternatives, and then set policies to align those results with their communities' priorities. Abandoning the flawed convention in favor of the metrics advanced here can greatly strengthen the way that the utility community thinks about and responds to affordability concerns.

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https://doi.org/10.5942/jawwa.2018.110.0002

PEER REVIEW

Date of submission: 07/10/2017
Date of acceptance: 09/21/2017

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Appendix: Household Expenditure Estimates

The following tables report the regression models used to estimate essential household incomes using the 2015 Consumer Expenditure Survey (CEX) interview data. Essential expenses were calculated as the sum of average quarterly household expenditures on housing (CEX variable *sheltpq*), food (*foodpq*), health care (*healthpq*), home energy (*ntlgaspq+elctrcrpq+allfulpq*), and taxes (*totxest*), divided by 3 to represent monthly expenditures. Ordinary least squares (OLS) regression models employed robust standard errors to correct for heteroskedasticity, and applied the CEX's sampling weights (*finlwt21*). Models were estimated for all cities for which the CEX included at least 200 responses; cities with fewer than 200 responses were estimated using the national data set. Regression results are reported in Tables A1 and A2.

The coefficients from these models were used to estimate essential household expenditures at the 20th income percentile for each city, single-family home, and a four-person household. All other variables were estimated at the city's mean values.

TABLE A1 Essential household expenditure estimation models

DV: Log Essential Household Expenditures	National Sample	New York City	Los Angeles	Chicago	Houston	Phoenix	Philadelphia
Household size	–0.035	–0.027	–0.096	–0.019	–0.077	–0.01	–0.095
	(0.005)	(0.019)	(0.023)	(0.015)	(0.036)	(0.029)	(0.091)
Single-family home	0.0332	0.076	0.056	0.148	0.148	0.507	0.125
	(0.017)	(0.050)	(0.057)	(0.064)	(0.197)	(0.109)	(0.027)
High school graduate	0.134	0.194	–0.073	0.015	0.109	0.109	0.205
	(0.020)	(0.062)	(0.076)	(0.101)	(0.132)	(0.134)	(0.103)
College graduate	0.279	0.236	0.227	0.213	0.437	0.319	0.080
	(0.012)	(0.041)	(0.049)	(0.048)	(0.110)	(0.093)	(0.063)
Married	0.208	0.017	0.181	0.185	0.298	0.158	0.292
	(0.012)	(0.044)	(0.060)	(0.055)	(0.090)	(0.085)	(0.070)
Black	–0.122	–0.088	–0.164	–0.264	–0.584	–0.547	0.044
	(0.017)	(0.056)	(0.065)	(0.079)	(0.139)	(0.233)	(0.071)
Native American/Indian	–0.147	0.262	0.156		–0.109	0.145	
	(0.078)	(0.260)	(0.334)		(0.229)	(0.209)	
Asian/Pacific Islander	0.021	–0.091	–0.221	–0.118	–0.008	0.201	–0.040
	(0.022)	(0.062)	(0.072)	(0.079)	(0.108)	(0.206)	(0.133)
Multi-race	–0.075	0.031	–0.287	–0.506	–0.159	–0.526	–1.436
	(0.047)	(0.067)	(0.127)	(0.194)	(0.350)	(0.609)	(0.472)
Hispanic	–0.098	–0.052	–0.250	–0.254	–0.177	–0.118	0.169
	(0.017)	(0.050)	(0.058)	(0.073)	(0.122)	(0.095)	(0.118)
Income (log)	0.558	0.609	0.675	0.555	0.247	0.488	0.575
	(0.011)	(0.031)	(0.047)	(0.033)	(0.090)	(0.044)	(0.030)
Homeowner	–0.018	0.025	–0.025	–0.106	–0.097	–0.104	0.027
	(0.014)	(0.045)	(0.051)	(0.062)	(0.186)	(0.089)	(0.078)
Urban	0.301						
	(0.017)						
Intercept	0.728	0.695	0.307	1.339	4.496	1.495	0.906
	(0.103)	(0.307)	(0.469)	(0.335)	(0.892)	(0.425)	(0.285)
R^2	0.530	0.595	0.544	0.704	0.367	0.601	0.631
N	23,254	1,533	1,166	795	406	300	562

DV—dependent variable

Cells contain coefficients (robust standard errors in parentheses).

TABLE A2 Essential household expenditure estimation models (continued from Table A1)

DV: Log Essential Household Expenditures	Dallas and Fort Worth	San Jose and San Francisco	Seattle	Denver	Washington	Boston	Detroit
Household size	0.008	0.026	–0.004	–0.008	–0.033	–0.116	–0.023
	(0.022)	(0.038)	(0.037)	(0.025)	(0.030)	(0.024)	(0.029)
Single-family home	–0.009	0.167	–0.06	0.181	0.092	0.004	0.336
	(0.113)	(0.091)	(0.134)	(0.108)	(0.098)	(0.113)	(0.128)
High school graduate	0.291	0.327	0.405	0.461	–0.022	0.150	0.049
	(0.113)	(0.183)	(0.219)	(0.225)	(0.198)	(0.175)	(0.260)
College graduate	0.197	0.254	0.281	–0.158	0.239	0.065	0.332
	(0.058)	(0.084)	(0.008)	(0.066)	(0.085)	(0.065)	(0.067)
Married	0.140	–0.080	–0.096	–0.011	0.114	0.325	–0.001
	(0.085)	(0.087)	(0.081)	(0.087)	(0.088)	(0.078)	(0.090)
Black	0.072	–0.651	–0.347	0.172	–0.057	0.566	–0.017
	(0.085)	(0.158)	(0.116)	(0.180)	(0.093)	(0.128)	(0.085)
Native American/Indian	0.341			–0.050	0.079		–0.242
	(0.217)			(0.278)	(0.086)		(0.084)
Asian/Pacific Islander	–0.077	–0.036	0.183	–0.019	–0.115	–0.239	0.242
	(0.010)	(0.089)	(0.101)	(0.146)	(0.104)	(0.367)	(0.098)
Multi-race	–0.334	–0.108	0.302	–0.672	–0.236	–0.714	
	(0.161)	(0.118)	(0.247)	(0.170)	(0.186)	(0.319)	
Hispanic	–0.312	0.126	–0.400	–0.093	–0.155	–0.277	0.301
	(0.079)	(0.097)	(0.260)	(0.115)	(0.094)	(0.152)	(0.096)
Income (log)	0.426	0.638	0.503	0.754	0.641	0.645	0.737
	(0.044)	(0.055)	(0.072)	(0.055)	(0.068)	(0.048)	(0.077)
Homeowner	0.009	–0.231	–0.008	–0.571	–0.112	–0.050	–0.216
	(0.109)	(0.071)	(0.101)	(0.094)	(0.086)	(0.076)	(0.110)
Intercept	2.330	0.264	1.640	–1.015	0.568	0.508	–0.945
	(0.443)	(0.623)	(0.734)	(0.613)	(0.739)	(0.576)	(0.838)
R^2	0.556	0.726	0.521	0.674	0.574	0.704	0.632
N	449	327	280	261	413	285	323

DV—dependent variable

Cells contain coefficients (robust standard errors in parentheses).

Message

From: Sawyers, Andrew [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=49214552A00B4AB7B168EC0EDBA1D1AC-SAWYERS, ANDREW]
Sent: 4/15/2018 4:48:31 AM
To: Tracy Mehan [tmehan@awwa.org]
CC: Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Bodine, Susan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8c2cc6086fcc44c3be6b5d32b262d983-Bodine, Sus]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Adam Krantz (akrantz@nacwa.org) [akrantz@nacwa.org]; Nathan Gardner-Andrews [NGardner-Andrews@nacwa.org]; Chris Hornback [CHornback@nacwa.org]; svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Wendi Wilkes [WWilkes@awwa.org]
Subject: Re: Follow up to NAPA report on affordability, CSO guidance, MHI, etc.

Thanks Tracy - looking forward to working on this important issue.

Sent from my iPhone

On Apr 13, 2018, at 5:16 PM, Tracy Mehan <tmehan@awwa.org> wrote:

> Dear Andrew and Peter,
>
> Thank you for taking the time to meet with us today to discuss follow-up to the NAPA report. We appreciate your taking on this task, and both AWWA and NACWA are ready, willing and able to participate in a transparent, collaborative process to develop a new model of affordability accounts for the real-world impacts on lower-income ratepayers. We also stand ready to commit substantial resources to this process and mobilize the best available expertise on the subject.
>
> In addition, we look forward to broadening the conversation to your colleagues in OECA and elsewhere in the Agency as appropriate.
>
> Have a great weekend.
>
> Tracy
>
> G. Tracy Mehan, III
> Executive Director, Government Affairs
> American Water Works Association
> Ex. 6 (direct)
> (cell)

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 3/14/2018 6:05:00 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
Subject: FW: LCR Comments
Attachments: APWA.pdf; Detroit.pdf; Durango.pdf; ECOS LCR Comments.pdf; Ferndale.pdf; Grand Rapids.pdf; Mayors NLC NACO LCR Comments.pdf; MIAWWA EPA LCR Comments.pdf; MWRA LCR comments.pdf; Newport News LCR Comments.pdf; NRWA LCR Comments.pdf; Pueblo CO.pdf; Slaughter and Moore.pdf; South Bend.pdf

FYI.

Tracy

From: Steve Via
Sent: Friday, March 09, 2018 4:54 PM
To: Tracy Mehan <tmehan@awwa.org>
Subject: LCR Comments

Attached are utility and utility association comments other than ones you already have in hand.

Several states have uploaded comments as well.
Steve

Steve Via
Director Federal Relations, AWWA Ex. 6

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March 7, 2018

Ms. Iliriana Mushkolaj, PhD
Physical Scientist
Office of Standards and Risk Management
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460-0001

RE: Request for public comments Lead and Copper Rule UMRA/Federalism Consultations, Docket No. EPA-HQ-OW-2018-0007

Dear Ms. Mushkolaj:

The American Public Works Association (APWA) appreciates the opportunity to submit comments on the Environmental Protection Agency's public comments for the Lead and Copper Rule (LCR) UMRA/Federalism Consultations. APWA was grateful to participate in the federalism consultation meeting at EPA headquarters on January 8th, of this year, and we look forward to continuing the conversation about revising the LCR.

Protecting the nation's drinking water is essential to public health and the quality of life our citizens enjoy. APWA's over 30,000 members play a critical role in providing clean and safe water to their communities which are large and small, urban and rural. Chief among their responsibilities are the planning, design, construction, operation, and maintenance of water supply systems of all sizes. Our members include public works professionals from cities, counties, and special districts, as well as their private sector partners. Our members take their responsibilities seriously, and they are committed to a partnership with federal, state, regional, and local partners in assuring a sustainable future.

As you know, recent events have made lead exposure in drinking water a key subject for communities across the nation. The membership of APWA is committed to reducing lead

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contamination in our nation's drinking water. Moreover, our members will work to provide EPA information and expertise on how to best proceed in achieving that goal in all communities, both large and small, rural and urban.

With that in mind, APWA would like to make the following recommendations regarding revisions to the LCR:

1) Require all systems with known lead service lines, regardless of population served, to install and maintain corrosion control treatment (CCT).
2) Dedicate additional EPA and other federal funds to providing resources (direct funding, technical assistance, incentives, etc.) to small and disadvantaged systems to help in installing and maintaining CCT.
3) Make regular evaluation of their CCT a requirement for systems that would be reviewed by the state with primary regulatory authority.
4) Implement a "sliding scale" for installing CCT, with smaller systems a longer period to install and optimize CCT.
5) Make completing a full inventory of lead service lines an Agency priority, with the goal of allowing water utilities to use the inventory to assist in replacement of those lines in their service area.

As acknowledged at the January 8th meeting, the LCR has a multitude of issues that make implementation and enforcement difficult. First and foremost is the fact that the LCR requires sampling in homes, the only drinking water regulation with this requirement. This sampling is often done by consumers, and the specific sampling procedures outlined in the LCR are not always followed. This information often casts doubt on the efficacy of the samples provided to water utilities, leading to additional sampling being required by the utility.

Next, the LCR requires action by water systems only after an event, rather than prior to potential problems being identified. As specified under the LCR, action is only needed once the 90th percentile of samples exceeds the lead action level.

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Finally, one of the more cost-effective and proven solutions for reducing lead contamination, corrosion control treatment, is either not used, as is the case with smaller systems, or not fully optimized, as is the case in many systems of all sizes.

One solution that has been discussed at length in the past few years is that of full lead service line replacement. For the purposes of these comments, the term "lead service line" is taken to mean the lateral running from the water main into the residence. Various organizations across the country, in the wake of the crisis in Flint, Michigan, were quick to advocate for EPA to issue a mandate for this option. However, there are multiple issues with this alternative that make it unfeasible at the current time.

The first issue is that of our base knowledge about the location and number of lead service lines in the country. Estimates on the number of lead service lines have ranged from 6 million to 10 million. Our knowledge of the location of the lead service lines is also limited to using blueprints from home construction, as there is no single inventory of the lines. Creating such an inventory may be a step towards a long-term solution like full lead service line replacement but does little to prevent lead contamination right now.

Next, there is a question of how "full" this replacement process would be. In most communities in our country, the lead services lines are only partially owned by the water utility, requiring homeowners to replace the portion of the line that is privately owned. Many homeowners or renters would likely be unwilling or unable to replace the portion of the line in their home or residence. That being the case, replacing only the publicly owned portion of these lines would have limited effect on lead contamination, as there would still be many lead lines that service individual residences. Additionally, replacement of the lead service lines could have unknown effects on the distribution system, which would require additional planning and cost to remedy. In fact, there is significant evidence that a partial lead service line replacement could result in increased lead levels in homes.

Perhaps the most prohibitive factor in full lead service line replacement is the cost of replacement. A conservative estimate of 6 million lead service lines replaced at an average cost of $4,700 each would total $28.2 billion. In a worst-case scenario, that cost would balloon to

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$123 billion. That figure would be on top of the EPA-estimated $600 billion or more that is needed for investment in our nation's water infrastructure. These figures also may not account in full for permitting, municipal oversight, EPA oversight, reconstruction costs, prevailing wage laws, future compliance costs, and economic impact of the construction itself. Simply put, the cost makes full lead service line replacement unfeasible at the current time.

A reasonable case study would be the City of Ypsilanti, Michigan. The City, with a population of roughly 20,000, undertook a project in 2003 to replace a portion of the publicly-owned lead service lines within their drinking water distribution system. Overall, the City replaced 750 out of 3,000 lead service lines, at a cost of $1,800 to $2,000 per line. Adjusted for inflation, the City was able to replace only one quarter of the total lead service lines in its system at a cost of $2.25 million dollars (a figure that was in addition to regular operations and maintenance of the system). And, as previously noted, this project only replaced the publicly-owned portion of the line, which could very well generate increased lead levels within the residence. After the public portion was replaced, the resident was notified if there was lead on their side of the property line, and that they could replace that portion at their cost.

Our recommendations to the Agency, given what we have already stated, is to focus on CCT as the best option for immediate reduction of lead contamination in drinking water. That is not to say that installing and maintaining CCT does not have its own challenges. Water utilities will need to balance CCT with other demands from other National Public Drinking Water Regulations, as well as variables unique to that system, such as system composition and water quality.

Also, installing and maintaining CCT will have its own associated costs, which are not insignificant. However, when compared to the enormous costs of full lead service line replacement, the cost is much more manageable. The benefit of CCT, when compared to full lead service line replacement, also shows CCT to be the better option.

Phosphate-based corrosion inhibitors are widely used, and their effects are well-known. That being the case, there is little need for extensive research on implementing their wider use. There are other treatments, such as silica-based corrosion inhibitors, that require further research, and

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may be used in systems where phosphate-based methods are impractical for various reasons. Again, the associated costs with researching new corrosion inhibitors pales in comparison to full lead service line replacement.

To that point, the true costs of CCT implementation are significantly less than full lead service line replacement. According to the Agency, a water system serving between 25 and 100 customers that initiated a centralized orthophosphate treatment CCT would face capital costs of $18,000 and annual operations and maintenance costs of $2,000 per year. That second figure aggregates to an annual household cost of $78 per year. For larger systems, the cost is much more widely dispersed. A system serving 100,000 to 500,000 customers implementing the system previously mentioned would incur capital costs of $92,000 with annual operations and maintenance costs of $265,000 per year. The cost of operations and maintenance of such a system would average out to $2 per household.

On top of these costs, there is a need for EPA to install a more rigorous evaluation process for CCT in systems across the nation. It would serve the communities well for EPA, along with the states of primary regulatory authority, to conduct periodic reevaluations of CCT programs at systems to ensure that the treatment programs being utilized are truly optimized. This evaluation process should be more intense immediately after installation, to ensure that any necessary changes are made as quickly as possible.

While the costs of installing and maintaining CCT are much less than full lead service line replacement, they are not insignificant, especially for smaller or disadvantaged systems. Simply put, these systems do not have the resources to carry out this project on their own. It is important that EPA make every effort to ensure that these systems are provided every available resource to make the adoption of CCT as universal as possible.

For that to be the case, the Agency should make additional federal funding available for this express purpose. EPA should also continue its public outreach, technical assistance, and other education programs on CCT, specifically, for small and disadvantaged systems. Additionally, the Agency should explore ways to incentivize systems with optimized CCT in place to provide technical assistance to smaller and disadvantaged systems that do not. Finally, the Agency

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should investigate the potential for implementing a "sliding scale" of CCT installation and optimization. Under this scale, smaller systems, or those with less resources, are given a longer period in which to install CCT in their systems, given that they will require a longer period to amass the necessary resources for the enterprise.

On behalf of public works professionals nationally, we thank you for the opportunity to comment and urge you to give serious consideration to the above comments. We are committed to working with the Agency on our common goal of clean water. If you have any questions, please contact Sean Garcia in our Washington, D.C. office at sgarcia@apwa.net or at Ex. 6

Sincerely,

Scott D. Grayson

Scott Grayson
Executive Director

DETROIT
Water & Sewerage Department
CITY OF DETROIT

Office of the Director
Water Board Building
735 Randolph Street, Suite 506
Detroit, Michigan 48226-2830

March 8, 2018

Peter Grevatt
Director, Office of Ground Water and Drinking Water
1200 Pennsylvania Avenue, N. W.
Mail Code: 4601M
Washington, DC 20460

RE: Long-Term Lead and Copper Rule Federalism Consultation (Docket ID No. EPA-HQ-OW-2018-0007)

Dear Mr. Grevatt,

The Detroit Water and Sewerage Department (DWSD) of Detroit, Michigan appreciates the opportunity to offer comments to the U.S. Environmental Protection Agency as part of its federalism consultation on potential long-term revisions to the Lead and Copper Rule (LCR). Our system is a member of the American Water Works Association, a participating association in this federalism consultation, hence our submittal.

DWSD's service area has an estimated 2,700 miles of water mains serving a population of approximately 680,000, of whom over 35 percent have incomes below the U.S. federal poverty line. Detroit has an estimated 125,000 lead service lines (LSLs), aged and historically under-maintained water and sewer pipe networks, and high incidences of water and sewer line breaks.

The Great Lakes Water Authority (GLWA) – DWSD system, like all urban water suppliers, is complex. Public health protection is achieved through an array of functions (e.g., water treatment, transmission and distribution system operation) of which lead risk mitigation is but one aspect. Like many older U.S. cities, DWSD requires major system reinvestments to ensure its facilities can continue to deliver high quality potable water and provide adequate fire protection.

Water affordability is an acute issue in Detroit. Median residential monthly water, wastewater and drainage service costs are $71.94 per month or 3.3 percent[1] of Detroiters' Median Household Income, and already represent a high burden.[2] Further rate increases will be required to both pay for GLWA

[1] Median monthly service bills as listed on DWSD website, Explanation of Residential Charges: http://www.detroitmi.gov/Portals/0/docs/DWSD/Explanation%20of%20Charges%20-%20Residential%20Customers-%202017%20FINAL.pdf?ver=2017-08-04-104826-767, accessed January 17, 2018; Detroit Median Household Income in 2016 dollars based on U.S Census data: https://www.census.gov/quickfacts/fact/table/detroitcitymichigan/PST045217, accessed January 17, 2018

[2] Bill amounts are based on average monthly residential water usage of 5 CCF. The "High Burden" designation is based on EPA financial capability assessment guidance that uses utility costs as a percentage of Median Household Income to determine levels of economic burden. See United States Environmental Protection Agency, "Combined Sewer Overflows — Guidance for Financial Capability Assessment and Schedule Development," EPA 832-B-97-004,

services and support reinvestments in DWSD's infrastructure systems. Though DWSD has among the nation's most comprehensive and compassionate customer assistance programs, there are limits to the extent these programs can insulate low-income users from burdens of system-wide rate increases. It is through this context of water affordability that DWSD must consider revisions to both the state and federal Lead and Copper Rules (LCR).

DWSD is committed to a program to minimize lead risks in drinking water, including full lead service line replacements (FLSLRs), as expeditiously as practicable. We anticipate effecting 1,000 to 3,000 FLSLRs per year in conjunction with our repair or replacement of 30 miles or more of non-lead water mains in our distribution system. We hope to increase the pace of these replacements in the event that appropriate funding is made available given that the total cost for lead service line replacements in Detroit is estimated at $438 million to $625 million.[3] In the interest of minimizing near-term lead exposure risk, we are also implementing a variety of public communication and education measures, as well as changing operational protocols. DWSD is already advancing the intent of the proposed revisions to the Michigan LCR, and DWSD would like to see similar proactive measures become the norm across the water industry as part of the federal LCR.

The following sections present DWSD's responses to specific questions EPA presented at the Federalism Consultation Meeting.

What are the opportunities and challenges to state and local governments if EPA were to modify the LCR to:

– Require systems to create an inventory of lead service lines

The Detroit Water and Sewerage Department (DWSD) has made a proactive decision to begin a FLSLR program as a part of DWSD's comprehensive asset management-based infrastructure replacement program. Detroit has an estimated 125,000 of Michigan's 500,000 lead services. A critical starting point for an asset management program is an accurate inventory of assets and the condition of those assets. DWSD supports a requirement for water systems to create an inventory of lead service lines so they can notify customers of the risk of lead exposure and effectively design a lead service line replacement plan. An accurate inventory of lead service lines is the fundamental starting point for mitigating lead risks from drinking water systems.

EPA should consider the requirements for the lead service line inventory as in the proposed Michigan LCR. This includes a preliminary and verified lead service line inventory, assumes service lines of unknown material are lead until proven otherwise, and requires notifying the resident within 30 days of confirming a lead service line serving the home. The inventory must be updated every 5 years.

February 1997. USEPA Memorandum: "Assessing Financial Capability for Municipal Clean Water Act Requirements"; from Nancy Stoner and Cynthia Giles to EPA Regional Administrators, Regional Water Division Directors and Enforcement Division Directors; January 18, 2013, pp. 2.

[3] Based on estimated independent full LSLR unit costs of $3,500 to $5,000 per service line times an estimated 125,000 service line inventory. These costs may be moderated through integration of full LSL replacements into DWSD's asset management based water main replacement program. Preliminary estimates suggest that the incremental cost of full LSLR under the proposed Michigan LCR (that would require replacement of all lead service lines within 20 years) is approximately $444 million.

– Require proactive full lead service line replacement on a specified schedule (e.g., 10, 15, 25, 35 years from promulgation)

DWSD supports the full replacement of lead service lines as part of an overall asset management strategy as the most effective and efficient means of reducing lead risks in drinking water systems. All public water systems with lead service lines should develop a plan for replacing all lead service lines, and full lead service line replacement should be a standard practice in everyday operations. DWSD believes that a one size fits all schedule is not appropriate. Lead service line replacement schedules must accommodate the size and population served by the water system, the number of service lines, and balance other public health risks faced at the water supply.

Detroit faces daunting challenges in addressing the pernicious legacy of lead service lines and leaded plumbing in our community. We have by far the largest number of lead services among Michigan communities, roughly estimated at 125,000, and supply water to a residential population where over 35 percent of citizens live below the U.S. federal poverty line.[4] Nevertheless, DWSD is committed to a program to minimize lead risks in drinking water, including FLSLRs, as expeditiously as practicable. As mentioned previously, we anticipate completing 1,000 to 3,000 FLSLRs per year in conjunction with our repair or replacement of 30 miles or more of non-lead water mains in our distribution system through our asset management program.

Given the historical decline in residential property values and the acute poverty rates in our community, we recognize that full responsibility for funding FLSLRs cannot practically be laid on residential property owners.[5] We are investigating utility supplier measures to broaden funding responsibility and are evaluating potential service rate revenue constraints and impacts.

– Allow partial LSLR only for emergency repair or "unwilling or unable customers" when conducting infrastructure replacement (e.g., main replacement)

DWSD would like to see the revised LCR focus on achieving four outcomes: 1) Economic Prosperity, 2) Healthy Environment; 3) Reliable High-Quality Service, and 4) Value for Investment. A revised LCR that continues to allow and condone PLSLRs works against each of these outcomes. PLSLR is expensive, produces high lead release, leaves old high-risk service lines in place that are even more expensive to replace at a later date, and pushes complete removal further into the future leaving the cost to be borne by both the resident and the water utility in the future.

DWSD is working to limit partial lead service line replacements (PLSLRs) to temporary emergency situations when residents cannot be contacted prior to replacement of the LSLs. PLSLRs are happening every day in Detroit and in cities across the United States. Even though PLSLRs occur at significant cost, lead pipes must be repaired, replaced and reconnected for continuation of service. The practice of PLSLR creates a large documented, preventable release of lead to drinking water. The fact that trenches and pipes are already exposed for PLSLR means that the incremental cost for FLSLR at the time of PLSLR is

[4] This is more than twice the average Michigan poverty rate of 15 percent. Data from the U.S. Census Reporter. https://censusreporter.org/profiles/16000US2622000-detroit-mi/ — accessed December 29, 2017.

[5] Residential property owners were not historically apprised of the risks of lead service lines with the purchase of their homes, and in some cases, LSL replacement costs would represent a disproportionately large share of property value.

the smallest it will ever be. Water supplies need support from the LCR to remove the entire lead service line risk so that both cost and risk can be minimized.

– Require pitcher filters to be distributed and regularly maintained by the PWS for three months immediately following lead service replacement

After a comprehensive review of DWSD's lead service line replacement procedures, DWSD began distributing pitcher filters to all homes with lead service line replacements during construction and providing replacement cartridges to last six months. Based on DWSD's lead sampling results this is a necessary step to protect residents in the home from lead exposure during and following the replacement, and it is an appropriate step for all water systems that replace lead service lines. DWSD relies on pitcher style filters that do not require in-home installation. DWSD provides all the instructions for maintaining the filter provided by the manufacturer, as well as aerator cleaning and flushing instructions to be used during construction and following replacement. DWSD believes this provides customers with the resources necessary to protect themselves while not placing an undue and administratively problematic burden on DWSD for maintaining the filters during this period.

What are the opportunities and challenges to state and local governments if the LCR was modified to:

– Target systems required to install CCT differently:

- **Change the current system size threshold (50,000 people served), or**
- **Require systems with lead service lines (regardless of population served) to install and maintain CCT?**

DWSD believes that all water systems with lead service lines should be required to provide corrosion control treatment and this requirement should not be dependent upon the population served by the public water system. DWSD believes that revising the sampling protocol under the LCR and lowering the action level will provide critical incentives for public water systems to further evaluate and optimize corrosion control, resulting in reduced risk of lead exposure for all customers during the period when lead service lines are being permanently removed from service. This expanded focus on corrosion control treatment will require enhanced oversight from state public water system supervision programs to realize the greatest public health benefit.

The following revisions will also improve the reliability of corrosion control and public health protection provided by the LCR:

- The LCR should require a corrosion control study by default in anticipation of all source water and treatment changes, with sufficient time for states to evaluate and approve the appropriate treatment modifications necessary to maintain safe drinking water.
- There must be requirements for all water systems that exceed the action level to complete a corrosion control optimization study.
- All small and medium water systems applying corrosion control treatment must maintain treatment even after they drop below the action level. Ceasing the use of corrosion control treatment as soon as a water supply meets the lead action level does not result in reliable public health protection.
- If any water system exceeds the lead action level again after applying optimal corrosion control, they must re-evaluate their corrosion control treatment.

– Change the requirements for designating optimal CCT to:

- **Prescribe a default CCT that must be maintained unless a system can demonstrate equivalent CCT to the state, or**
- **Require the system to conduct a periodic re-evaluation of CCT to be reviewed by the state?**
- **Require system to find and fix problems in corrosion control treatment if a tap sample exceeds an action level?**

DWSD does not believe that a default CCT for all water systems will adequately address variability in source water quality and treatment; this strategy will result in unnecessary expenses for public water systems that do not contribute toward the goal of minimizing lead exposure for the entire community served by the water supply. Corrosion control treatment should only be used that is appropriate for a water systems' source water, treatment, and distribution system materials.

DWSD believes that corrosion control treatment decisions should be reviewed by the state. States should have the authority to require a system to conduct a re-evaluation of CCT at any time. Any system-wide action level exceedance should trigger an evaluation of corrosion control effectiveness to find whether issues with corrosion control treatment are the cause of the exceedance so that the appropriate fix can be made to minimize exposure to lead in drinking water system wide.

In addition, water quality parameters (WQPs) should be used only for monitoring corrosion control treatment; WQPs are not reliable indicators of lead release, so public water systems should not be issued violations when they exceed the designated WQP ranges for their system. States should be able to add relevant WQPs as appropriate based on PWS water quality and treatment, including chloride, sulfate, manganese, iron, aluminum, and others.

What do state and local governments think are the most effective ways for water systems to deliver educational information to consumers? What opportunities and challenges would state and local governments face if the LCR was revised to require:

– Water systems to provide on-going targeted outreach with a special emphasis on all customers with lead service lines?
– Water systems to provide notification to consumers within 24 hours of exceeding an action level (as required by the 2016 WIIN Act)?
– Water Systems to make information accessible to consumers on results of all tap sampling, results of water quality parameter (WQP) monitoring and the number and locations of LSLs?

DWSD believes that strategies for delivering educational information to consumers should be updated to reflect modern ways that we receive information. Modern technology should be used to enhance traditional media outreach. Direct email and texts, Twitter, and Robocalls can be used to quickly notify customers of lead levels either at individual homes or of a system wide action level exceedance. Posting information on a website is not effective outreach unless it is widely shared via email messaging, messages in bills, and other regular contact water systems have with customers. Newspapers and radio no longer have the reach that they achieved in past decades prior to the explosion of online media, streaming radio, and social media platforms. Additional strategies are necessary to adequately share information about lead risks.

Frequently the populations at greatest risk of lead exposure are even more challenging to reach due to non-English speakers, low literacy rates, high poverty, and limited time for staying current with news. The revised LCR must include requirements for reaching and communicating effectively with these populations. Smart phone applications, videos, and graphics heavy materials can be used to communicate with customers and receive information from customers, including service line pictures.

DWSD strongly believes that customers must be notified of the presence of a lead service line delivering water to their home. Customers cannot take appropriate precautions if they do not know the risk present in their home. Transparency is critical for maintaining trust in public water systems. DWSD is working to make information accessible to consumers on the results of all tap sampling, and the number and location of LSLs. Withholding this critical information places customers at risk of exposure and raises suspicions that public water systems are not adequately protecting public health.

DWSD supports providing lead in water information to schools, childcares, assisted living, and doctor offices so those groups can push information to their target audiences and communicate more effectively about the risk of lead in drinking water.

Water quality parameter monitoring should also be available to the public, but requires adequate explanation and interpretation to allow customers to understand the data.

What are the opportunities and challenges for states and local governments if the rule changed sampling protocols, including:

– Changing where water systems are required to collect tap samples?

- **At sites based on customer request,**
- **At schools served by the system**

DWSD offers sampling at homes based on customer request, but these are in addition to lead sampling according to the sampling plan required under the LCR. Sampling at homes per customer request is prudent to maintain trust in public water systems. However, customer requested samples will not provide a scientific sampling design on which to make compliance determinations. DWSD recommends that the revised LCR allows for sampling based on customer request, but these samples should be collected in addition to required compliance samples. The only appropriate exception would be if a customer requested sample meets all criteria for a compliance sample site and appropriate documentation is available to include that site in the sampling pool.

Lead exposure assessment at schools and other large buildings requires an entirely different sampling strategy compared to compliance sampling designed to measure treatment effectiveness under the LCR. Schools that receive water from public water systems should be responsible for providing low lead or lead free water on campus, rather than the public water system. Schools should have clear requirements for providing very low lead or lead-free water; any sampling at schools should not take away from compliance sampling at individual homes per the construct of the LCR. A separate set of requirements for schools to assess lead in drinking water is appropriate and should consider whether provision of lead filtering stations with verification sampling can provide an alternative remediation strategy. This could provide safe drinking water while delaying capital improvements to a time when the entire school is being renovated. DWSD believes that public water systems should work collaboratively with the schools they serve to address any water quality issues faced at the school.

– Change the way samples are collected to be more representative of exposure?

- **Increase the number of samples required**
- **Instruct consumers to sample when they are drawing water for drinking or cooking.**

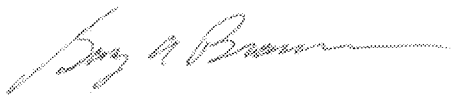
The sampling protocol in the proposed Michigan LCR requires two samples at each lead service line home for LCR compliance sampling: after a minimum of 6 hours of stagnation, the sampler collects the first liter and the sixth liter out of the tap. This sampling strategy greatly improves the detection of lead contributed by the lead service line and more accurately represents the risk of lead release from lead service lines. However, this continues the challenges of relying on homeowners to implement increasingly challenging sampling procedures.

While DWSD supports the improved quality of information from lead service line samples, DWSD recommends exploring alternative sampling strategies that can be more easily implemented by water utilities and provide better information for measuring lead release. A strategy relying on random daytime sampling would reduce the reliance on customers for maintaining stagnation time and proper sampling procedures, and it would allow public water system staff to collect proper samples to determine compliance with the rule. For example, EPA should consider the random daytime sampling approach used in the UK. EPA could explore pilot projects to evaluate and compare the effectiveness of different sampling constructs that could be used in a revised LCR. While this sampling approach would increase the total number of samples required under the LCR, it would allow public water systems to provide better quality control for sampling procedures and address some of the long-term challenges with maintaining a consistent sampling pool.

• EPA would appreciate any information, and specific data, state and local governments could provide on their experiences with:
– lead service line replacement

DWSD is willing to share our full lead service line replacement program.

Sincerely



Gary Brown
Director/CEO of the Detroit Water and Sewerage Department

Here are our comments to the proposed Pb/Cu rules from the City of Durango Water Treatment and Water Distribution Divisions

Lead service line replacement (LSLR)

- Monumental task to create inventory of lead service lines, and full replacement of identified lead lines. Will financial assistance be provided to small/medium sized systems who do not have the resources and other challenges (labor, money, weather constraints)? What kind of timeline is proposed for this task if it is enacted?
- Is this full service line replacement? Or is a partial line replacement being proposed?
- Partial LSLR for unwilling or unable customers defeats the purpose of lead replacement. If sampling at a consumer tap exceeds the AL, and the PWS is required to remove the LSL, and the consumer is unwilling to replace the LSL will the PWS face fines/corrective actions? What happens when the ownership of that residence/business changes? Will the PWS be required to replace LSL then?
- Pitcher filters after LSLR, will financial assistance be provided to medium sized systems? How does the PWS comply/document the pitcher is regularly maintained when it's in a private residence? What about systems who have non-aggressive water, would they be exempt?

Corrosion Control Treatment (CCT)

- Will financial assistance be provided to medium/small PWS's to engineer and install CCT? Will O&M training and guidance be provided to small/medium PWS's who lack the expertise in CCT optimization?
- Point of use treatment – Will financial assistance be provided to procure and install these devices? How does the PWS comply/document the device is regularly maintained when it's in a private residence? What about systems who have non-aggressive water, would they be exempt? This approach, while is cheaper at first is just a Band-Aid to the problem. Continues distrust in the safety of the PWS drinking water.
- Will waivers to be issued to PWS's who have non-aggressive water? How does a PWS demonstrate an equivalent CCT? Will the periodic re-evaluation be reduced if evaluations are consistent time and time again?
- Find and fix problems in CCT if a tap exceeds AL – What happens if there is a sampling error causing a false high positive? Some residents have taken the approach that if 6 hour stagnant time is required, why not a longer time, some have used a never/seldom used faucet to sample from resulting in skewed results not representative of the actual water consumed.

Transparency and Public Education

- Will EPA/CDPHE provide required language to be distributed to consumers? Will consumers believe the educational information PWS's give them? There is deep distrust in government at all levels.
- On-going outreach – What is that frequency, every year, 6 months, 3 months? Required language?
- How long will the results of all tap sampling, water quality parameter monitoring, and number and locations of LSL's be available to the public? Can that database be online? What happens when a LSL is removed, can that be removed from the public accessible database?

Tap sampling

- Sampling at schools would allow PWS's assurance that proper sampling techniques are being followed. Changing tap sampling site at consumers request can create problems for PWS trying to obtain representative samples.
- Increasing the number of samples, the challenge will be to find appropriate sites to sample for Pb/Cu. Instructing consumers where to sample sounds easy, but might not be able to comply due to minimum 6 hours water must remain still in plumbing, and consumers waking up having to go the bathroom and flush, or need a drink, but sampling must take place at kitchen faucet, and they forget.
- Household action level, would those limits be specific to each household, or one set of limits for all households? Who contacts the applicable health agency for follow-up?

Copper Revisions

- Who establishes and conducts the screen determining if water is aggressive to copper? Will a pilot distribution system be utilized, who is responsible for expenses to run and test pilot system?
- Why have separate sampling sites from lead sample sites? Creates additional in home sampling requirements when existing sampling for Pb/Cu is challenging as it is to conduct.

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ECOS

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March 8, 2018

U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

RE: Long-Term Lead and Copper Rule Federalism Consultation (Docket ID Number: EPA-HQ-OW-2018-0007)

The Environmental Council of the States (ECOS) appreciates U.S. EPA's early engagement with states and others through the federalism consultation on the Lead and Copper in Drinking Water Rule (LCR) held on January 8th. Early and continuous consultation is consistent with ECOS' Cooperative Federalism 2.0 initiative and with the Cooperative Federalism goal in EPA's FY18-22 Strategic Plan. ECOS has worked closely with the Association of State Drinking Water Administrators and the National Governors Association in considering the information shared in the consultation and provides the following comments on Lead and Copper in Drinking Water Rule revisions.

As the goal of the LCR is to reduce exposure to lead in order to protect public health, ECOS believes it is valuable to take a holistic approach and consider all sources of exposure, not just drinking water. We applaud the goal of Administrator Pruitt's "war on lead" of eliminating lead exposure to children in the U.S. To achieve this, there will need to be a coordinated effort across states, across the EPA program offices, and with other federal agencies such as the U.S. Department of Health and Human Services, the U.S. Department of Housing and Urban Development, and the Centers for Disease Control and Prevention. We encourage EPA to engage the states early in this effort.

As EPA develops proposed revisions to the LCR, ECOS asks that it be written to provide flexibility for states to determine how best to meet the lead and copper standards. The situation in every state is different, therefore successful implementation will be best served by providing states with the ability to match their approach to their conditions. State flexibility in meeting national standards is a key principle in Cooperative Federalism 2.0. While there is some guidance needed, providing a set of options for achieving the standards would give states essential flexibility while providing some level of standardization and would recognize that one solution does not fit all states.

The revised LCR rule should reflect the latest research around lead service lines, tap sampling that provides an accurate picture of exposure, and corrosion control treatment. With EPA's Office of Research and Development (ORD) actively studying lead exposure and drinking water treatment, this cutting edge information should be considered in rule development. For instance, ORD researchers are studying the current tap sampling protocol accuracy in measuring lead exposure from drinking water. Additionally, they are studying lead service lines that have been treated for corrosion control and the potential for creating other issues that need to be considered. Given this emerging research, ECOS urges those writing the revised rule to work with ORD researchers to understand the potential implications of revisions.

Discussion in the Federalism Consultation, focused heavily on lead service lines, however there are other sources of lead in drinking water lines such as lead-containing fixtures, galvanized pipes, and lead-containing solder. As Ohio found when it tested for lead levels in schools in the state, lead in end-of-pipe fixtures alone can raise lead levels in drinking water. Therefore ECOS believes the revised rule needs to consider all potential sources of lead in drinking water at the tap.

In addition to working with other federal agencies in addressing all sources of lead exposure, ECOS believes EPA should work with other agencies such as HUD to encourage responsible actions regarding lead service lines and lead-containing plumbing on private property such as individual homes. Effective communication and financial support will be key to having lead exposure addressed on private property.

With public interest in lead exposure high, communication around the revised rule will be very important. Delegated states and EPA will need to communicate with local governments, drinking water system owners and operators, and the public on the revisions and how they will provide protection of public health. To communicate effectively with the public, states and EPA will need to be transparent and provide informative and consistent information. To help ensure such messaging, EPA should work with states to develop national materials that can be used by states, water systems, and consumers to easily understand the rule and its impacts.

ECOS also believes that EPA should consider de-coupling lead and copper to address the contaminants in separate rules. Due to the difference in what constitutes a high-risk site for lead versus one for copper, states believe the two can be better addressed in individual rules that allow for appropriate focus on each pollutant. This de-coupling should also help make the rules less complicated.

Finally, as almost any revisions to the LCR will require an increased state work load, at least during the first few years of implementation, these costs need be considered. ASDWA has estimated that the cost of implementing LCR revisions to be between $73 million and $97 million annually. Consistent with ECOS' Cooperative Federalism 2.0 principles, states with delegated authority for the drinking water programs should receive an adequate increase in funding from the federal government, as well as, an appropriate investment of state resources to implement the revisions successfully.

On behalf of ECOS, the directors of the state and territorial environmental agencies, thank you for the opportunity to provide this early input on revisions to the LCR. If you have any questions about these comments, please feel free to contact ECOS Deputy Executive Director, Carolyn Hanson at chanson@ecos.org or Ex. 6

Sincerely,

Todd Parfitt
Director, Wyoming Department of Environmental Quality
ECOS President

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March 8, 2018

Ms. Iliriana Mushkolaj, PhD

Physical Scientist

Office of Standards and Risk Management

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue NW

Washington, DC 20460-0001

RE: Public comments - Lead and Copper Rules UMRA/Federalism Consultations, Docket No. EPA-HQ-OW-2018-0007

Dear Ms. Mushkolaj:

Thank you for the opportunity to offer comments to the U.S. Environmental Protection Agency as part of the Lead and Copper Rule (LCR) federalism consultation. The City of Ferndale Michigan's water system serves 10,000 homes and businesses with a population of 20,000. We purchase our water from GLWA / Detroit Water and Sewer Department.

First and foremost, addressing lead exposure is a collaborative responsibility between federal, state and local agencies. This responsibility extends across multiple state and local departments, not primarily water service providers. Without the coordinated actions across state and local health departments, water service providers and licensing agencies, the ability to identify and eliminate sources of lead exposure will continue in a haphazard manner. Investments must strategically address multiple sources of lead exposure, including paint and dust, soils, indoor plumbing, lead service lines and other household items. Furthermore, specific drinking water solutions at the local level must recognize the shared responsibility between consumers and water service providers.

With this background, we offer the following considerations as part of this federalism consultation:

- When a change in source water is proposed, a coordinated evaluation and technical analysis must occur to address potential corrosion control treatment requirements.
- A federal rule that requires all water systems to use the same corrosion control treatment does not address allow for flexibility for local water quality and operational considerations.
- Incorporate lead service line replacements as part of the community's asset management program. A community's asset management program facilitates strategic investments and collaborative approaches to implement infrastructure improvements across multiple jurisdictions within the same public road right-of-way areas. Lead service lines are part of older water main systems that are likely in need of replacement; thus these infrastructure improvements should be completed in a coordinated manner with the existing federal requirements as a backdrop to address priority areas.
- This asset management approach will allow state and local agencies to implement a lead and copper rule that is protective of public health and within available resources. It will also ensure that local governments have the ability to continue investing in needed drinking water, sanitary sewer, and stormwater infrastructure improvements so that a different set of public health problems does not arise from unintended consequences of newer, more stringent lead service line replacement requirements. We recommend you review the State of Michigan's 21st Century Infrastructure Report about the benefits of asset management programs in addition to the upcoming final report for the state's pilot asset management project.
- A multi-agency approach is critical to effectively reducing all lead exposure and identifying the exact source for each unique situation. A lead service line replacement requirement outside of the asset management approach fails to consider whether lead plumbing or fixtures within a house are sources of lead exposure. Likewise, state health agencies that respond to high blood level results in children primarily focus on lead exposure from paint, dust and soil. Aligning these agencies and programs will result in a targeted approach for all lead dangers.
- Within the SEMCOG region, there are various instances where state and local agencies coordinate to address individual cases of high lead blood level results. None of these cases have resulted in identifying water as a source of exposure. In fact, communications with our region's health departments have determined that lead paint and dust continue to be recognized as the primary source of lead exposure and resulting high lead blood levels. When those circumstances determine that a lead service line is a source of lead exposure, then water service providers should replace the public side of the lead service line; however, that must be complemented by coordination with the private property owner to pay for the private-side replacement.
- A multi-agency approach is also supported through the healthcare community. In 2016, the State of Michigan established the Child Lead Poisoning Elimination Board because "....there exists a need in state government for a coordinated effort to design and long term strategy for eliminating child lead poisoning in the State of Michigan."

Some key statements from their report, *Child Lead Poisoning Elimination Board, A Roadmap to Eliminating Child Lead Exposure*, include:

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- "A greater focus on primary prevention will also require the recognition and coordinated targeting of all lead dangers.
- Health equity must be the foundation of all policy and funding recommendations, with areas of disparate lead exposure given higher priority.
- By far the most common identified form of lead exposure for children is through lead paint and lead dust in older homes...
- The board proposes that its recommendations be prioritized so that known sources of ongoing exposure (those houses, apartments, and other structures and areas where child lead exposure has been identified and where families continue to live or visit) are addressed first.
- The board further proposes that prioritization of its recommendations to eliminate exposure risk be based on the likelihood that a particular type and level of exposure will result in child EBLs. The only way to truly eliminate child lead exposure is to test every child in Michigan and then target well-defined, high-risk areas to provide a comprehensive, targeted remediation approach."

- Finally, sound data and science need to be used in drafting these rules. We encourage the EPA to continue working on the nationally, peer-reviewed process for setting health-based standards for lead in drinking water.

Additional considerations for the Key Areas for Rule Revisions are provided as follows:

1) Lead Service Line Replacement

- The State of Michigan estimates that there are approximately 500,000 lead service lines within Michigan. At a conservative EPA estimate to replace each service line, this would represent a $2.35 billion investment. Michigan's 21st Century Infrastructure report conservatively estimates an annual infrastructure investment shortfall of $4 billion.
- A public-side lead service line material inventory can be developed over time, but as part of asset management programs. There is no single inventory of all lead service lines. The importance of creating this inventory through asset management programs will allow water service providers to refine inventory information in conjunction with other water system activities, and coordinate, when needed, during specific case management evaluations of lead exposure. The information about pipe material on private property is very limited and not part of any water service provider records.

  A physical inventory of lead service lines requiring exposure of underground infrastructure that is not performed in conjunction with any infrastructure improvements is not cost-effective. While looking at the incremental cost may appear manageable for discrete requirements, taken in total these costs will exacerbate affordability issues for many

Americans. Focusing on an ongoing records evaluation to develop a preliminary material inventory combined with lead service line replacement as part of asset management programs will incrementally work towards the ultimate goal of eliminating lead in these systems in the most cost-effective manner.

- Additionally, and as mentioned above, evaluating lead service line replacement as part of other collaborative lead exposure programs at the state and local levels will successfully integrate those critical timeframes to address the source of lead exposure.
- Furthermore, there are multiple opportunities to address lead service line replacement outside of the water rule. These include rental inspections, property transfers, licensing of facilities such as day care and retirement/senior centers, etc.
- Finally, the most critical consideration is related to the use of public funds on private property. While most recognize that partial lead service line replacement may increase lead levels within drinking water, the EPA must consider alternatives to successfully implementing full lead service line replacements. The private side of lead service lines must be funded outside of the water service provider rate base and likely in a manner that may require a private property to work in conjunction with the local water service provider.

2) Corrosion Control Treatment

- As noted previously, any changes in source water must be accompanied by an evaluation and verification for needed corrosion control treatment.
- Corrosion control evaluations should be in response to water quality parameter monitoring in conjunction with other distribution and water treatment process monitoring. Increased water quality parameter sampling should be a consideration.
- The details of corrosion control treatment programs should be developed by the local water service provider with review and coordination at the state level. When changes in water quality occur, then corrosion control re-evaluation should be a consideration. One overarching standard for corrosion control treatment and subsequent re-evaluation requirements does not take into consideration local water quality or operational conditions. Additionally, it may be more cost-effective for smaller water systems to focus on lead service line replacement and result in a greater benefit to public health.
- Providing in-home water filtration systems, faucet filters, etc. are not a function of a public water service provider. Any needed filters are the responsibility of the property owner. Water service providers do not have authority to access private property and especially within existing homes.
- Single samples that exceed the action level should not warrant an investigation of corrosion control treatment. A sample exceeding the action level should first trigger a review of the sampling techniques and procedures, followed by an investigation into the source of the elevated result and then actions to eliminate the source

3) Tap Sampling

- As local communities develop and implement asset management programs that include a lead service line component, the tap sampling should occur in those areas and facilities that are regularly occupied by those populations sensitive to lead exposure. Targeting these areas will also work in alignment with the suggested multi-agency approach described

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above and will lead to enhanced source determination and ultimate abatement and/or remediation/removal.

- This comprehensive approach may also lessen the challenges associated with homeowner sampling that consistently lacks QA/QC procedures. Through this multi-agency approach, coordinated efforts can address all potential lead sources and communicate similar messaging to the public in these target areas, perhaps resulting in increased cooperation for tap sampling and other lead evaluations.

- Public Education and Transparency There are already significant outreach materials regarding lead exposure from other sources. Those programs and materials could be enhanced with topics related to lead service line replacement. The EPA should lead the effort in developing these coordinated materials and making these materials available to states and local water service providers. Public Education efforts will be most successful with consistency in messaging that can be supplemented with local system specifics.
- The 24-hour notification timeframe regarding an action level exceedance is too short. A 3-day notification timeframe is suggested as more feasible timeframe.
- Finally, making water quality parameter monitoring data accessible to the public does not recognize privacy of property owners and may very well result in negatively affecting property values. Additionally, data results are often confusing for the public to understand.

Thank you for the continued opportunity to provide ideas for a solutions-based approach to modifying the lead and copper rule. As we have indicated, this is a much larger public health challenge and one in which water supplies are committed to doing our share. Addressing only the lead and copper rule ignores the opportunities to collaborate with other existing lead exposure programs. Implementing these programs must be completed through asset management approaches that ensure we are protective of public health, without hampering the feasibility of continuing other critical infrastructure improvements (drinking water, sanitary sewer, stormwater and roads).

Please feel free to contact me with any questions regarding our suggestions.

Sincerely,

Daniel Harper
City of Ferndale
Ex. 6

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WATER SYSTEM

CITY OF GRAND RAPIDS

March 8, 2018

Peter Grevatt
Director, Office of Ground Water and Drinking Water
1200 Pennsylvania Avenue, N.W.
Mail Code: 4601M
Washington, DC 20460

RE: Long-Term and Copper Rule Federalism Consultation (Docket ID No. EPA-HQ-OW-2018-0007)

Dear Mr. Grevatt:

The City of Grand Rapids, Michigan (City) provides water and sewer services to surrounding communities under the Urban Cooperation Act. The arrangement is overseen by the Utility Advisory Board which is comprised of the City and all of the municipalities served (Ada Township, Cascade Charter Township, City of East Grand Rapids, Grand Rapids Charter Township, City of Kentwood, Tallmadge Charter Township and the City of Walker). The City appreciates the opportunity to offer comments to the U.S. Environmental Agency as part of its federalism consultation on potential long-term revision to the Lead and Copper Rule (LCR). Our system is a member of the American Water Works Association, a participating association in this federalism consultation, hence our submittal.

The City is committed to protecting our drinking water from exposure to lead. Improving the LCR to further reduce exposure to lead requires community-specific solutions that recognize the shared responsibility between consumers and water systems for managing exposure to lead in drinking water. We also recognize the importance of federal, state, and community-wide investment in managing lead exposure from multiple sources: lead paint in housing, lead deposited in soils, sources of lead in schools, lead in other household items and lead in drinking water. Furthermore, all of the communities the City serves have consistently remained well below the Lead Action Level.

As the EPA contemplates improvements to the Long-Term Lead and Copper Rule, The City of Grand Rapids encourages a focus on actions that are feasible within current statues so that we can move forward without confusion and additional delay. It is also critical that any requirement to change water chemistry provides flexibility to address local water quality and operational considerations. A federal rule that requires all water systems to use the same corrosion control treatment would be problematic. We hope that our observations assists in developing a protective rule using available resources while avoiding unintended consequences.

Lead Service Line Replacement

Over the past several years, the City has been actively identifying all service line materials in our system and updating our database as those services are replaced. In March of 2017, the City implemented Administrative Policy 17-01, titled "Replacement of Residential Privately-owned Lead Water Service Lines". Under 17-01, the City is replacing all lead service lines (LSL) in the public right-of-way and on private property when there is the potential for lead to be released into the homes drinking water as a result of a disturbance to the existing lead water service. There are two scenarios where this can occur. One is when there is an emergency leak on a lead service line that requires a replacement and the other is when there is a capital water main replacement project that requires service replacement. Costs associated with these lead service line replacements are absorbed in the local communities rates. To date, we have successfully:

- Identified and reviewed 98 percent of potential lead service lines and our current totals indicate there that there are approximately 23,000 lead service lines in our system.
- Since implementation of policy 17-01, the city has replaced 101 lead service lines due to ongoing capital water main projects and 173 lead service lines caused by leaks resulting in an estimated cost of $1,700,000.
- For our Fiscal Year 2019, we have allocated $2,700,000 strictly for lead service line replacement. Over the last year water rates have increased approximately 2.4 percent to help finance these improvements.
- If a homeowner decides to voluntarily replace their lead service line without leak or city project the property owner has the option of applying for a 10 year pay program through the city at a low interest rate to finance the cost of the lead service line replacement.
- City staff has taken the initiative to provide residents with educational material on the flushing of water service line after the lead service line replacement.

If the EPA advances in its recommendation to change the current Lead and Copper Rule, we have identified the following challenges:

- Requiring municipalities to replace all lead service lines within a specific timeframe would be extremely costly to our system and ultimately increasing our water rates, affecting those within our communities with limited resources or fixed incomes. The City supports the replacement of full lead service lines in accordance with a responsible asset management plan.
- Gaining access to the homes to inspect for lead service lines has been a huge challenge and this also ties in with trying to get the property owner to sign a form allowing us access to replace the service line on private property.
- Any requirement that forces the municipality to perform follow up lead sampling of the drinking water in a home that has had a full or partial lead service line replacement is an issue. There are significant cost implications to the City for this requirement as well as risk to the City if lead is still found. At some point, there needs to be a clear delineation of where the responsibility stops for a community water system and where the property owner assumes it.

We are committed to establishing an inventory of lead service lines and improving its accuracy by gathering data during routine field work. Currently, we anticipate all lead service lines be replaced by 2050.

Optimized Corrosion Control

Even though the EPA appears to be seriously considering phosphate addition as the gold standard for corrosion control treatment, this will have limited impact on the City. At this time, the City already treats our water with an orthophosphate blend to limit the impacts of corrosion. The City initially studied this treatment method in the 1990's and we are now starting a new optimized corrosion control study. As our water source continues to change, we want to use this study to ensure we are treating our water with the correct chemical at the correct dosage rate.

Public Communications

The City of Grand Rapids recognizes the importance of regular and transparent communication that helps customers address risks from lead in drinking water. In addition to required language in the 2017 consumer confidence reports, our system:

- Will be addressing unregulated contaminants such as Chromium-6, Turbidity, Cyanotoxin, Cryptosporidium, and Giardia lamblia. Though our samples show low levels or no detection of these contaminants we continue to advocate for full transparency.
- Staff is currently developing a Spanish version of the 2017 consumer confidence report allowing us to reach districts were over half of the population is Hispanic/Latino.

We encourage the development of a national clearinghouse of information on lead to help water systems and other entities communicate effectively about lead risks across all media.

We hope that our comments help the EPA develop sound rule options that further reduce risk posed by lead, recognizing the realities of local budgets and infrastructure renewal needs. If the EPA has any questions regarding these comments, please contact me at dharran@grcity.us or Ex. 6

Best Regards,

Water System Manager

cc: David Ross, Assistant Administrator for Water

NLC NATIONAL LEAGUE OF CITIES

NATIONAL ASSOCIATION of COUNTIES NACo

THE UNITED STATES CONFERENCE OF MAYORS

March 8, 2018

The Honorable Scott Pruitt
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Administrator Pruitt,

On behalf of the nation's cities, counties and mayors, we appreciate the opportunity to provide input pursuant to Executive Order 13132: Federalism on the U.S. Environmental Protection Agency's (EPA) forthcoming proposed regulatory revisions to the Lead and Copper Rule (LCR). As key partners in the federal-state-local intergovernmental partnership, and as a co-regulators of drinking water, our members have a vested interest in this rulemaking. Our members care deeply about providing clean, safe and affordable drinking water for their communities. However, we have some concerns about the potential scope of the proposed LCR revisions. These are listed below, along with some general recommendations.

It should be noted that the United States has some of the safest drinking water in the world. Local elected officials do not want the issue of lead in drinking water to cause nationwide doubt among our citizens regarding the safety of their drinking water. We urge EPA to be comprehensive with its approach in dealing with lead in drinking water and to balance the solutions with all public health and environmental impacts.

In general, our organizations support provisions in the 1996 Amendments to the Safe Drinking Water Act, which require that drinking water standards be based on sound science, public health protection, occurrence of contaminants in drinking water supplies at levels of public health concern, to reduce risk while balancing costs. Moreover, where the contaminant is naturally occurring, monitoring should be required only if EPA can demonstrate that any proposed remedial treatment would ensure greater health protection. For introduced materials, a risk-based standards should be developed.

Additionally, in general, we believe the National Primary Drinking Water Regulation for lead, and any regulatory or legislative initiative addressing lead in drinking water, should balance these public health and environmental priorities. Any federal mandate on local governments should include additional federal financial resources, as well as offer municipal water systems flexibility in implementation and compliance options. Finally, our organizations support programs for public education regarding safe drinking water and innovative solutions that approach this problem beyond the traditional command and control.

Cities, counties and mayors fund the majority of water infrastructure investments at the local level.

Local governments fund 98 percent of all investment in water and sewer capital projects and maintenance primarily through user fees and bonds. The most recent U.S. Census data shows that, in 2015 alone, local governments spent $118 billion on water and wastewater, and over the past 15 years, have spent roughly $1.7 trillion. During this same time period, the federal government appropriated approximately $2 billion each year in total for the State Revolving Loan Fund programs, which provides grants to states who, in turn, provide local governments with loans that must be repaid. Even with this significant investment by local governments, many communities still struggle to upgrade their drinking water systems. The proposed potential revisions, unless done thoughtfully, will compound this problem.

Key Local Government Concerns Regarding Potential Lead and Copper Rule Revisions

As you move forward, we urge you to consider and address the following concerns from local governments on the potential revisions.

Potential revisions will create administrative challenges and unfunded mandates on local governments and residents.

As owners and operators of drinking water facilities, local governments carefully undertake long-range planning years in advance to ensure that costs remain affordable for ratepayers--residential and commercial customers. When additional costs are incurred, either from unexpected repairs or new federal mandates, the costs must be passed onto residents and businesses in the form of higher user rates. With many of our low- and fixed-income residents already paying a disproportionate share of their income toward their water bills, this has created a situation where water is becoming simply unaffordable for large segments of our population. This results in unpaid bills, which creates additional challenges at the municipal level to undertake needed improvements.

The potential revision to require water utilities to replace all lead and copper service lines in the system within a set period of time is likely to create a huge federal unfunded mandate for local governments. Based on a preliminary estimate by EPA, the average cost to replace a lead service line is $4,700 per line. However, replacement costs could range dramatically from $1,200 to $12,300 depending on the length and size of the pipeline. With an estimated six to ten million lead pipes in communities across the country, the total cost to replace these service lines is between $28 billion to $47 billion. This is unsustainable for our communities and our residents who pay for these upgrades.

Other potential revisions that may be problematic and expensive include creating an inventory of lead service lines, mandating corrosion control treatment techniques, and developing new standards for lead and copper sampling at the tap. Together, these new requirements will likely require municipal water agencies to further raise user rates, which could compound the financial burden on vulnerable populations in our communities.

Furthermore, we are concerned that the costs and impacts of a more prescriptive requirement will fall disproportionately on smaller communities, compounding the challenges of complying with the new federal mandates. These jurisdictions generally have small staff who work in a variety of capacities within the local government. Expanding requirements could require these smaller communities to hire additional staff, contractors or technical experts, plan for how the pipes would be removed, and coordinate with households throughout their community, to name a few. Larger communities would face similar administrative challenges, and also do not have the financial resources to absurd the additional costs.

Recommendations:

- **Evaluate all costs on local governments and water utilities for potential revisions.** Within the rulemaking process, we encourage EPA to thoroughly analyze, evaluate and consider all costs on local governments associated with the potential revisions to the LCR, which has not adequately been done to date.

- **Provide financial assistance in the form of grants, low-interest and zero-interest loans, and direct assistance to help local governments and residents undertake required upgrades in an affordable manner.** As the rulemaking process moves forward, we strongly recommend that the federal government provide financial resources to local governments to cover any costs associated with new LCR requirements.

- **Provide technical assistance to communities to help them identify best practices and cost-effective measures to replace lines in a holistic fashion.** We also encourage EPA to develop a federal program to assist with the inventory and replacement of lead service lines, including direct assistance to homeowners to replace their pipes.

Requiring water testing and replacement of pipes in homes opens local governments up to private property challenges and worker safety issues.

In most communities, water utilities are only legally responsible for pipes at the edge of the utility's main service line. Requiring water utilities to be responsible for full lead pipeline replacement, including those beyond the utility's main service line and on private property, opens up many legal questions for local governments. There may be Constitutional issues as it relates to private property rights and such action may trigger the Takings Clause in the 5th Amendment. Such action could open local governments up to lawsuits regarding destruction of private property, as well as raise potential ownership questions regarding maintenance and upgrades of privately-owned pipes in the future. In addition, many state laws provide clear protection for residents, businesses and private structures, and limit the types of public employees that can access the property. Moreover, a number of states prevent local and state government representatives (or their assigned agents) from entering private property without the express written permission of the owner or a legal warrant to do so. Otherwise, it is considered an invasion of private property rights.

Therefore, if water utilities are not given consent to access, enter, or replace a lead pipeline on private property, the local government could potentially be subject to citizen suits for non-compliance with a federal regulation, raising the question of who is ultimately held responsible for non-compliance. Given current state laws, mandating full lead pipe replacement would not only be a costly burden on local governments, but would also be an extremely onerous and potentially impossible task to implement. We've seen several cities and counties that have undertaken programs to educate their citizens regarding the risks associated with lead-tainted service lines, and some that have offered to replace residential pipes, at-cost or even for free. Many of these communities faced difficulties in securing the necessary approval from homeowners to do so.

Even if local governments and water utilities were granted permission to enter private property, some homes are not safe to enter due to structural issues or potential criminal elements that utility staff would not be trained to spot or cite. Essentially, our workers would be walking in blind, and could be held legally responsible or personally liable for any illegal activities that are seen in or around the property and in private residences and buildings.

Recommendations:

- **Undertake a review and comprehensive assessment of all federal and state laws for private property rights to assess where and when municipal and utility employees can legally set foot on and enter private property and infrastructure.**

- **Evaluate the legal responsibility and personal liabilities of local government and utility employees who witness crimes and/or suspicious activities in private homes or commercial properties.**

General Recommendations for Revisions to the Lead and Copper Rule

As you move forward, we urge you to consider the following general recommendations from local governments to ensure that any potential revisions to the LCR are effective, implementable, offer local flexibility, and avoid a "one-size-fits-all" approach.

Recommendations:

- **Give a reasonable amount of time to undertake an inventory of existing lead pipelines and replacement of those lines.** The longer the allowable time frame for replacement, the more flexibility that local governments will have in terms of planning for and financing pipeline replacements. We recommend a staggered timeline of at least 35 years after a community has undertaken an inventory.

- **Promote effective use of corrosive control.** Our organizations are in favor of corrosion control and recognize that some smaller systems may not always have the technical expertise to determine the proper chemical configuration for their drinking water systems. Creating a baseline, Corrosion Control Treatment, with federal technical assistance, may be a potential answer for these small systems.

- **Conduct targeted educational campaigns.** Studies have shown that bottle-fed babies and young children are the most vulnerable to lead in drinking water. We recommend that EPA undertake targeted campaigns geared toward families with children, daycare centers and schools to educate on the benefits of testing and how to add filters to their water systems. Additionally, EPA should consider providing no-cost filters to families with young children, as well as funding to replace lead pipes and fixtures in schools and daycare facilities.

- **Engage in general public education.** We encourage EPA to undertake a public education campaign geared toward homeowners on the importance of testing their drinking water and provide resources and options for how to address potential problems. This education campaign should properly outline the public health risks associated with lead exposure, potential sources of lead in the home (such as service lines or fixtures) and offer workable and affordable solutions.

Attached to this letter are comments from the National League of Cities and The U.S. Conference of Mayors (dated January 13, 2012) on the agency's previous federalism consultation regarding regulatory revisions to the Lead and Copper Rule, which provide additional comments and concerns.

On behalf of the nation's cities, counties and mayors, thank you for considering the local government perspective on this important issue. As you move forward with the rulemaking process, we urge you to continue to consult with local

governments to ensure that any rule is effective, implementable and cost-efficient. If you have any questions, please contact us: Carolyn Berndt (NLC) at Ex. 6 or Berndt@nlc.org; Julie Ufner (NACo) at Ex. 6 or jufner@naco.org; or Judy Sheahan (USCM) at Ex. 6 or jsheahan@usmayors.org.

Sincerely,

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National League of Cities

Matthew D. Chase
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National Association of Counties

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cc: EPA Office of Air and Radiation and Intergovernmental

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March 8, 2018

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RE: Long-Term Lead and Copper Rule Federalism Consultation (Docket ID No. EPA-HQ-OW-2018-0007)

Dear Mr. Grevatt:

The Michigan Section of the American Water Works Association (MI-AWWA) appreciates the opportunity to offer comments to the U.S. Environmental Protection Agency as part of its federalism consultation on potential long-term revisions to the Lead and Copper Rule (LCR). We are an affiliate of the American Water Works Association, a participating association in this federalism consultation.

MI-AWWA is committed to helping our members to protect consumers of drinking water from exposure to lead. Improving the LCR to further reduce exposure to lead requires community-specific solutions that recognize the shared responsibility between consumers and water systems for managing exposure to lead in drinking water. We also recognize the importance of federal, state and community-wide investment in managing lead exposure from multiple sources including lead paint in housing, lead deposited in soils, sources of lead in schools, lead in other household items and lead service lines.

As EPA contemplates improvements to the Long-Term Lead and Copper Rule, MI-AWWA encourages a focus on actions that are feasible within current statutes so that we can move forward without confusion and additional delay. It is also critical that any requirement to change water chemistry provides flexibility to address local water quality and operational considerations. A federal rule that requires all water systems to use the same corrosion control treatment would be problematic. We hope that our observations assist in developing a protective rule within available resources while avoiding unintended consequences.

Lead Service Line Replacement

Our members have been evaluating lead service line replacement strategies. The current estimate is that there are more than 500,000 lead service lines in Michigan. Some of the challenges our members have identified include the following:

- Limited information on the pipe material in use on each customer's property.
- Customers who are unwilling to replace lead service lines or unable to afford the cost of lead line replacement.
- State limitations on the use of public funds to benefit private property owners.
- Replacement projects require coordination in order to minimize disruption to our community.

Responses to the evaluation document

- A physical verification of lead service lines would place a strain on resources. However, we agree that the inventory should be completed over time as part of a larger asset management program.
- Proactive replacement of lead service lines needs to align with a water system's overall asset management program that integrates with all infrastructure updates. Other infrastructure issues may pose a greater risk to public health and thereby be a priority over lead service line replacement when the action level has not been exceeded. A change in LCR sampling or a change in the action level may impact the schedule for infrastructure updates and may pull resources away from other needed projects.
- Partial lead service line replacement increases the risk of elevated lead levels and creates a public health problem that didn't previously exist. Mitigation measures used in partial replacements are an alternative, but require homeowner cooperation, which is not guaranteed. Both water supplies and individual property owners have challenges to overcome to make full lead service line replacement feasible. If the risk of partial lead service line replacement is to be avoided, it is imperative that funding for the premise piping be funded outside of the utility rate base, along with legislative solutions that compel the private property owner to act in conjunction with the local water supply to effect full service line replacement.
- MI-AWWA agrees in concept that some remediation after lead service lines are replaced is needed. However, the details of the remediation should be left up to the local water supply as details of the replacement and detectable lead levels may allow a variety of approaches. If the rule includes a period of remediation, the language should be broad enough to allow for the local water supply to make the determination of what specific action is needed (filters, filtered-pitchers, etc.).

<u>Optimized Corrosion Control</u>

Because EPA appears to be seriously considering phosphate addition as the gold standard for corrosion control treatment, we ask that you give consideration to:

- Coordination between water and wastewater treatment plants and regulated municipal storm water systems about the impact on meeting NPDES permit limits.
- Potential implications for managing iron and manganese release and the potential for colored water.
- Adjusting pH, which in turn affects disinfection contact time, the maintenance of an effective secondary residual, and disinfection byproduct formation.
- The need to consider other metals like stainless steel as well as concrete pipes.
- Uncertainty that using theoretical solubility and pilot studies alone will necessarily lead to significant lead reductions.

Responses to the evaluation document

- It may actually protect public health best to leave the threshold as is since lead service line replacement for a system with less than 50,000 people served may be a better use of the water

supply's resources and offer a greater impact to public health. The best available science should be used in setting any thresholds for action.

- The water supply should not be responsible for installing or maintaining any equipment to mitigate lead levels on private property. Access to private property can never be guaranteed. Any in-home treatment systems, faucet filters, or pitcher filters should be the responsibility of the property owner.
- A default corrosion control treatment program (CCT) may produce unintended consequences. For example, widespread mandated phosphate addition could increase the phosphorous loading to the water resource recovery facilities and hence impact receiving waters. Water chemistry has many complexities and variables that make a default standard potentially problematic. The details of any CCT should be determined by the local water supply working together with the primacy agency.
- We support periodic evaluation of CCT, and increased water quality parameter sampling. Any re-evaluation of a CCT should be based on changes in water quality and the best available science. No predetermined re-evaluation parameters or frequency should be set.
- Requiring investigation of CCT based on a single tap sample exceeding the action level is not appropriate. A single sample is not enough data to determine that there is a problem with CCT. A single sample exceeding the action level should trigger an investigation and evaluation process to determine the source of the elevated level and then mitigation if necessary.

Sampling Responses to the evaluation document

- If the intent of the LCR remains to evaluate the CCT, then more samples may not be meaningful. Any increase in sample numbers should be based on the best available science. If the sampling intent is to address lead exposure, consideration must be given to all sources of lead exposure and should not focus solely on drinking water as that may actually lead the public to be misinformed about their exposure risk.
- Currently, water supplies have testing sites dictated by specific criteria. Most supplies also test upon customer request but that testing does get incorporated into compliance calculations. The protocols are currently based on getting the best overall picture of the corrosion control treatment program. Introducing new/different protocols into the sample may no longer provide a good indication of the CCT's effectiveness.
- MI-AWWA believes that locations such as schools, daycares, hospitals, and other facilities, which are regularly occupied by populations sensitive to lead exposure, should be evaluated separately from requirements in the LCR. The needs and risks of these locations are different and should be separate from the water supply's normal course of water monitoring. These are a mix of public and private entities and so testing of these facilities should be a licensing or public health department issue with support as needed from the local water supply.
- Taking samples during a regular water draw from drinking or cooking may actually introduce other influencers into the sample and skew the overall picture of CCT. This goes back to the intent of the Rule. If it remains evaluating the CCT, this approach should not be undertaken. If the intent is to evaluate lead exposure, a water sample must be only a part of a home's evaluation.
- A household action level is a good idea but that level must be set based on scientific data. Moving from a measure of the effectiveness of corrosion control treatment to determining the appropriate Health Action Level would provide focus for appropriate remedial actions and investments.
- A screen for determining if a supply's water is aggressive to copper and subsequent action by the water supply is a great idea if the screen is based on available science. Having separate sampling sites

appears at this stage to be premature and more data is needed to provide input. For example, is there something being done to impact the copper results with current sampling?

Public Communications

MI-AWWA recognizes the importance of regular and transparent communication that helps customers address risks from lead in drinking water. In addition to required language in consumer confidence reports, our members are taking other actions such as:

- Explaining what is known about the existence of lead service lines in the service area.
- Guidance on how to have water tested in the home, including free or low cost testing done by the local water supply.
- Discussion of how to identify and remove lead service lines, including financial assistance that may be available to them through the water supply.

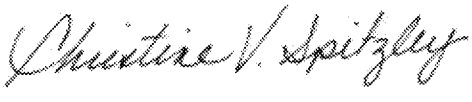
Responses to the evaluation document

- Ongoing outreach could have the potential to motivate property owners to replace their lead service lines if the water supply has the resources to develop or acquire clear and consistent education materials offered in multiple languages and media. EPA could assist in this regard by providing such materials.
- Water supplies should notify home owners of an action level exceedance but 24 hours is simply too short a timeframe. Although well intended, 24 hours may not be practical. There is also concern that a 24-hour notice timeframe may be perceived as a health emergency. MI-AWWA suggests that three days may be a more reasonable timeframe.
- Although not opposed, MI-AWWA doesn't see the benefit in making the results of the water quality parameter monitoring accessible to the public. Much of this information would not be understandable to the layperson and could be misinterpreted. Also, we have concerns about protecting a property owner's rights to privacy particularly with information they believe others may construe as devaluing their property.

We encourage the development of a national clearinghouse of information on lead to help water systems and other entities communicate effectively and consistently about lead risks across all media.

We hope that our comments help EPA develop sound rule options that further reduce risk posed by lead, recognizing the realities of local budgets and infrastructure renewal needs. If EPA has any questions regarding these comments, please contact me at christine.spitzley@ohm-advisors.com or our Executive Director Bonnifer Ballard at bballard@mi-water.org.

Sincerely,



Christine Spitzley
Chair, Board of Trustees

cc: David Ross, Assistant Administrator for Water, EPA

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March 8, 2018

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RE: Long-Term Lead and Copper Rule Federalism Consultation (Docket ID No. EPA-HQ-OW-2018-0007)

Dear Mr. Grevatt,

The Massachusetts Water Resources Authority (MWRA) appreciates the opportunity to comment on the U.S. Environmental Protection Agency's 2018 federalism consultation on potential long-term revisions to the Lead and Copper Rule (LT-LCR). The MWRA has been actively involved in various EPA consultation opportunities during the development of the revisions to the LCR since 2004, and is pleased to be able to provide additional comments at this stage of the process.

The MWRA is the regional water and wastewater wholesaler to 61 communities in eastern and central Massachusetts, providing service to approximately 2.5 million residents. With the implementation of modern corrosion control in 1996, MWRA has seen lead levels in those homes most at risk drop by around 90 percent. MWRA communities have been removing lead service lines since the 1960's, and in 2016 MWRA established a $100 million zero-interest loan program to accelerate full lead service replacement by our customer communities.

MWRA believes that managing potential risks associated with lead in drinking water is a shared responsibility. MWRA, our customer communities, their individual retail customers, our state and federal regulators, and local, state and federal health officials, all share a part of the responsibility for appropriate action. MWRA takes its role seriously, including efforts to assist our communities, and offers the following specific comments for your consideration:

Avoid one size fits all corrosion control mandates and exercise caution in pushing corrosion control changes

Treatment is a key part of that shared responsibility. The peer reviewed guidance and EPA guidance materials make it clear that there are two primary effective methods of corrosion control treatment to reduce lead levels – adjusting the pH and alkalinity of the water or adding a corrosion inhibitor such as orthophosphate. When properly selected for the local water system characteristics, properly implemented and properly maintained, both can provide effective and substantial reductions in lead levels at the tap. This fact is clear from EPA's own data, and hundreds of individual system's

experiences – when corrosion control treatment is implemented properly, lead levels can be substantially reduced[1].

It is also clear from the literature, and painfully clear from individual system experience, that changes in corrosion control treatment practices are fraught with the possibility of actually increasing lead levels and of interfering with the ability to meet competing Safe Drinking Water Act or Clean Water Act regulatory objectives. The MWRA urges EPA to be cautious in pushing water systems to modify stable corrosion control treatment practices, as we believe that the science and practice do not provide adequate tools to make incremental or substantial changes with full understanding of the implications.

Recent experience throughout the industry tell us that the available science of corrosion control treatment is adequate for choosing a corrosion control path for reducing soluble lead when a system is not currently practicing corrosion control. The science to understand particulate lead release is substantially less developed, and unfortunately current science and guidance offer little help in reducing particulate lead through corrosion control. Therefore, removal of lead service lines seems the most reliable way to reduce both dissolved and particulate lead.

Furthermore, the various tools (desk top studies, bench scale tests and pipe loop pilots) which are adequate to evaluate the first application of corrosion control in a particular water system, are not adequate for determining appropriate treatment adjustments for incremental progress. The inherent experimental variability and noise in pipe loop or coupon studies is frequently significantly greater than the hoped for incremental change, raising the risk of inadvertent backsliding.

There is little information available in the scientific literature about successful transitions from one corrosion control treatment to another, but there are an alarming number of anecdotes and examples of treatment changes which resulted in increased lead release. Whatever requirements for corrosion control EPA proposes, they must include evaluation of the risks to public health during the transition. Further, MWRA recommends that EPA make substantial investments in research and peer reviewed guidance on this topic, before chancing unintended consequences that could come from hasty regulatory changes.

For all these reasons, MWRA is opposed to a one-size-fits-all corrosion control treatment choice. Each system's infrastructure, each system's history of water quality and treatment, and each system's current water quality must be considered in making any treatment change. An assumption that a particular treatment option is best unless it can be proven otherwise will likely cause most state drinking water regulators to take an excessively rigid approach, forcing larger systems to spend on unnecessary studies, and forcing smaller systems to make changes without adequate evaluation.

Phosphate is not the silver bullet of corrosion control

While EPA's presentation at the initial session of the federalism review did not clearly state that EPA's assumed default corrosion control treatment would be orthophosphate, papers published by EPA staff, interactions with EPA researchers, and EPA's approach to several problematic water systems, indicate that that is likely.

[1] See MWRA's data at http://www.mwra.com/04water/html/qual6leadinfo.htm#mwratestresults.

Beyond our arguments against one-size-fits-all decision making stated above, MWRA would like emphasize that phosphate may not be the most appropriate choice given all the factors which must be considered. The addition of a nutrient to the distribution system increases the risks of increased biofilm at a time when research is beginning to focus on biofilm as it relates to opportunistic pathogens. The addition of a nutrient to finished water increases the risks of environmental degradation when treated water is discharged to local water bodies which communities have spent billions of dollars cleaning up. In MWRA's case, we have already spent almost $5 billion cleaning up Boston Harbor and managing Combined Sewer Overflows, and our member communities are spending substantial sums on storm water. Adding phosphorus to drinking water may jeopardize those investments.

In addition, MWRA (and many other communities) maintains emergency backup supplies within our service area, which must be periodically "topped off" with treated water from the distribution system. Adding a nutrient would increase the already real risk of harmful algae blooms in those backup supplies, potentially rendering them unusable in an emergency.

Focus on better OWQP monitoring and more systems doing corrosion control

MWRA supports the National Drinking Water Advisory Council's (NDWAC) recommendations on Optimum Water Quality Parameter (OWQP) monitoring. Corrosion control treatment works best when treatment is operated stably, so we support efforts such as process control monitoring, regular use of control charting, and the periodic review of that data during primacy agency sanitary reviews.

As EPA looks for opportunities to reduce lead exposure through corrosion control technology, it seems to MWRA that a focus on those systems which are not yet practicing corrosion control and those systems which are not currently monitoring and reporting on their treatment through use of OWQP would be more fruitful and less risky than forcing systems to tinker with treatment where it is currently stable and working.

Transparency on service lines and data

Inventories should be available to the public. Boston and several of our cities have already made maps and electronic databases available on line, others are moving in that direction, and some are responding to requests for information about a particular address. Any regulatory requirement about transparency and lead service line inventories should recognize the varying technical and IT capabilities of different water systems.

MWRA believes that the public should have access to the same data that we use to make our decisions and which gives us confidence in our water. In addition to the required annual water quality report, which we choose to mail to every household in our service area, thereby including the difficult to reach renter community, we publish a monthly water quality update, archived on our web site, and have posted every lead sample collected under the LCR on our web site for over a decade (maintaining customer privacy by only providing the community name)[2]. Again respecting that each community

[2] The individual lead results are here, including all historical LCR results and other more recent results as well: www.mwra.com/watertesting/lead/residentialresults.html. The data is also available elsewhere on www. MWRA.com in a variety of other graphical formats to assist in understanding changes over time.

will have different technical and IT capabilities, MWRA believes that data transparency is an appropriate regulatory requirement.

Allow a realistic lead service line replacement time line:

A successful program of full lead service replacement cannot begin without adequate consideration of the local financial, environmental justice and equity considerations, and an understanding of the current state of the community's asset management programs. How the burden of an action which may be five or ten times the cost of an annual water and sewer bill is handled at the local level will necessarily vary. Each community must respond to their own local circumstances, and the speed with which they can move toward full replacement of all lead services will vary. EPA must acknowledge this intrinsic local variability as it is crafting a nationwide regulatory approach.

Filters should not be mandated, but a local option

You asked stakeholders to comment on how to respond to customers who are "unwilling or unable" to participate in a full lead service line replacement. MWRA does not believe that a mandate to provide pitcher filters to such customers is appropriate. The recently released AWWA/ANSI standard on lead service line replacement (C810-17) acknowledges the risk of elevated lead release from partial replacements, and lays out options for consumer education, aggressive flushing, as well as the possibility of providing filters. MWRA believes the choice should be up to the local community. The AWWA comments lay out a number of practical issues associated with filter provision. In addition to those practical issues, MWRA believes that the provision of filters undercuts long standing professional and regulatory action to appropriately increase the public's confidence in their tap water, and may conflict with efforts to foster continued support for the funding necessary to protect public health and the environment.

MWRA strongly believes that a mandate to provide plumbed in water filters to all homes with a lead service line is unworkable and sends the wrong message about the need to replace their service line. The water system would be communicating the message, "with this filter, you can leave the lead service line in forever and still be safe". The experience in Flint that even with extraordinary outreach and publicity, and with a massive infusion of resources, they were able to only manage to get filters installed in a portion of the community points out how impractical this approach would be under more ordinary circumstances.

Example cost estimates are too low:

You provided some example costs for the addition of phosphate. Our engineering staff have taken a preliminary look at them, and believe they are low. The costs of designing and installing the chemical storage tanks alone would appear to be well above the example capital costs. The potential costs adding phosphate removal to our wastewater plants are not included nor are other changes necessary in water treatment to deal with simultaneous compliance issues or unintended consequences. For example, MWRA is just completing a project to add phosphorus removal at a 3 million gallons per day wastewater plant at a cost of approximately $9 million, and an expected operating cost of at least $100,000 per year.

The example costs for lead service line replacement also appear to be low. MWRA community experience with lead service line replacements clearly points to higher costs when full replacement is considered. We believe that some estimates available to EPA may have only been for partial replacements or a mixture of full and partial. In addition, there can be substantial costs beyond the construction "bid item". Upfront costs for engineering, legal services, outreach, collection letters allowing access to private property, and all of the other administrative costs must be included. The administrative costs of various cost sharing programs must be included. In particular, outreach costs are likely to increase over time as the "low hanging fruit" of those most interested in replacing their service line will participate early in the program. Recent information from two MWRA community lead service replacement programs showed construction costs of $5,900 and administrative and engineering support costs of at least $2,000 per service (community staff time not included) in one case, and $6,800 construction and $760 support costs in a second case.

Coordination of Federal agencies approach to lead

MWRA staff were heartened to hear that Administrator Pruitt was gathering key agency heads from across the government to look for cross cutting action on reducing lead risks. We believe in the need to better coordinate efforts between CDC, HUD, EPA and other agencies. A number of non-regulatory actions by EPA and other agencies would make substantial progress toward a lead-free future. Requirements for disclosure or removal upon sale of property; inclusion of lead service replacement in other agencies' Healthy Homes and Lead Safe Homes programs; including water testing and lead service line identification in community lead poisoning and prevention programs would all be effective and welcome additions.

Another important addition would be additional federal governmental resources available to water systems, including substantial increases in State Revolving Load Programs and opportunities for interest free loans or principle forgiveness. EPA should also be moving forward with implementation of a clearing house of information resources available to local water systems, local health boards and citizens. The clearing house should have information on lead risks, and examples of successful outreach and communication programs and brochures, service line replacement contracts, easements agreements, local ordinances, and funding mechanisms. Robust EPA technical assistance action is necessary to back up any regulatory requirements.

Thank you again for the opportunity to comment at this stage in the development of the revised Lead and Copper Rule. Please feel free to contact me at dave.coppes@mwra.com or our Director of Planning and Sustainability, Stephen Estes-Smargiassi at smargias@mwra.com with any questions or concerns.

Very Truly Yours,

David W. Coppes
Chief Operating Officer

Cc:

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Martin Suuberg, Commissioner, MassDEP
Yvette Depeiza and Doug Fine, MassDEP
Jane Downing, EPA R1

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March 7, 2018

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RE: Long-Term Lead and Copper Rule Federalism Consultation
(Docket ID No. EPA-HQ-OW-2018-0007)

Dear Dr. Grevatt:

The City of Newport News Waterworks Department appreciates the opportunity to offer comments to the U.S. Environmental Protection Agency (EPA) as part of its federalism consultation on potential long-term revisions to the Lead and Copper Rule (LCR). Our system is a member of the American Water Works Association, a participating association in this federalism consultation, hence our submittal.

Newport News Waterworks is committed to protecting consumers of drinking water from exposure to lead. Improving the LCR to further reduce exposure to lead requires community-specific solutions that recognize the shared responsibility between consumers and water systems for managing exposure to lead in drinking water. We also recognize the importance of federal, state, and community-wide investment in managing lead exposure from multiple sources: lead paint in housing, lead deposited in soils, sources of lead in schools, lead in other household items, and lead in drinking water.

As EPA contemplates improvements to the Long-Term Lead and Copper Rule, Newport News Waterworks encourages a focus on actions that are feasible within current statutes so that we can move forward without confusion and additional delay. It also is critical that any requirement to change water chemistry provides flexibility to address local water quality and operational considerations. A federal rule that requires all water systems to use the same corrosion control treatment would be problematic.

We hope that our observations assist in developing a protective rule within available resources while avoiding unintended consequences.

Lead Gooseneck Replacement

We are evaluating implementation of a full lead gooseneck replacement strategy in our service area. Our current estimate is that there are *3,000* lead goosenecks in our system, a reduction from *8,000* thirty years ago. We have identified the following challenges in our efforts to remove them:

- Limited information on the pipe material in use on each customer's property.
- Customers who are unwilling to replace service lines or unable to afford the cost of service line replacement.
- Replacement projects require coordination in order to minimize disruption to our community.

With these challenges in mind:

- Newport News Waterworks has funding in its capital improvements program to replace all lead goosenecks over a ten year period.
- We are committed to establishing an inventory of lead goosenecks. Waterworks has scrubbed its GIS data and pipe inventory in concert with empirical/observational data gathered from routine field work to improve our count and system-wide accuracy. Currently, through our capital project planning, we anticipate that all lead goosenecks will be replaced in 10 years or sooner provided no unanticipated issues arise.

Optimized Corrosion Control

The Newport News Waterworks Department has employed pH control and zinc orthophosphate treatment since 1992 and has never exceeded the lead or copper action level. This successful strategy has used a dose of approximately 0.2 mg/l as P or 0.6 mg/l as PO_4. Waterworks sees no advantage to a higher phosphate dose given its extremely low levels of lead detected and the negative impacts on the wastewater treatment process and the environment would exceed any benefits.

Public Communications

Newport News Waterworks recognizes the importance of regular and transparent communication that helps customers address risks from lead in drinking water.

In addition to required language in consumer confidence reports:

- Waterworks promptly notifies all customers of their lead testing results at their homes and/or businesses.
- Waterworks and the Virginia Department of Health provide steps customers can take to protect themselves from lead at the tap.
- Waterworks provides guidance on how to have water tested in the home.
- Results of testing for the lead and copper rule are available on the Waterworks web page.

The Newport News Waterworks Department encourages the development of a national clearinghouse of information on lead to help water systems and other entities communicate effectively about lead risks across all media.

We hope our comments help the EPA develop sound rule options that further reduce risk posed by lead, recognizing the realities of local budgets and infrastructure renewal needs.

Enclosed is a brief summary about the Newport News Waterworks system.

If the EPA has any questions regarding these comments, please contact me at Ex. 6 or via e-mail at lmartinez@nnva.gov.

Best regards,

Louis Martinez
Director

LM/MLH/sjth

Enclosure

sc: David Ross, Assistant Administrator for the Office of Water

Summary of
Newport News Waterworks System

General Description

The City of Newport News Waterworks Department serves approximately 420,000 customers and is predominately a surface water system. The median household income in our service area is somewhat below the national average.

Meeting the Current LCR

Currently, our system's average lead level is below the detection level, as is our 90th percentile reading. We achieve these low levels by pH control and zinc orthophosphate treatment.

Current Investments in Infrastructure

Revision of the LCR is coming at a time when our system has recently completed $100 million dollars in capital projects over the last five years and Waterworks expects to invest $100 million more in the next five years. These improvements are being funded through water rates and fees. Over the last five years water rates have increased *15* percent to finance these improvements.

NATIONAL
RURAL WATER
ASSOCIATION
America's Largest Utility Membership

TO: U.S. Environmental Protection Agency
Docket ID No. EPA-HQ-OW-2018-0007
FROM: National Rural Water Association (contact: Mike Keegan, Analyst)
DATE: March 8, 2018
RE: Long-Term Lead and Copper Rule Federalism Consultation

Thank you for the opportunity to comment on regulatory revisions to the drinking water Lead and Copper Rule (LCR) under the Agency's Executive Order 13132, "Federalism" consultation.

*Headquartered in Duncan (Oklahoma), the **National Rural Water Association** (NRWA) is the nonprofit association of the federated state rural water associations with a combined membership of over 30,000 small and rural communities. NRWA is the country's largest water utility association and the largest community-based environmental organization. State Rural Water Associations are non-profit associations governed by elected board members from the membership. Our member utilities have the very important public responsibility of complying with all applicable U.S. Environmental Protection Agency (EPA) regulations and for supplying the public with safe drinking water and sanitation every day.*

We appreciate the many opportunities the Agency has provided to all stakeholders to participate in the crafting of revisions to the LCR such as providing comments, numerous substantive discussions, and many formal public consultations. In addition to this latest opportunity for public input, NRWA participated in the November 2011, Federalism Consultation, the August 2015 Lead and Copper Working Group to the National Drinking Water Advisory Council (LCRWG), and the December 2015 deliberations of the National Drinking Water Advisory Council (NDWAC). The Agency's outreach effort for seeking public and stakeholder participation for crafting revisions to the LCR is likely the broadest and most transparent process conducted for any federal National Primary Drinking Water Regulation to date. NRWA supports the August 2015 recommendations supported by the majority of participants on LCRWG that were subsequently endorsed by the NDWC (December 15, 2015). We believe our comments today are consistent with the LCRWG recommendations.

NRWA shares the EPA's goal of eliminating all lead from the public's drinking water. Local governments and state governments exist solely to protect and assist their citizens. The provision of safe drinking water is perhaps the most elemental purpose of local government. Every one of the approximately 68,122 U.S. public drinking water supplies that are regulated under the LCR has a unique set of vulnerabilities and challenges. If you apply a uniform regulatory standard to mandate protection in all of them, you will not only fail to address the greatest risks in many communities, but you will force many other communities to implement unnecessary regulations that fail to address their threats. We believe the current LCR can be modified to result in enhanced public health protection and drinking water safety.

Rural and small communities support the Administration's two principled objectives in reforming federal regulations: (1) respecting the decisions of the people as reflected in their local governments (including when it is in conflict with federal unfunded mandates) under the concept of *"cooperative federalism,"* and (2) respecting the authority of Congress by administering enacted statutes within the authority granted by Congress.

> *"As the Administrator of the Environmental Protection Agency, I am a firm believer in EPA's mission to protect human health and the environment and am committed to helping provide future generations with a better and healthier environment. I also firmly believe that federal agencies exist to administer the law. Congress passes statutes, and those statutes outline the responsibilities and work that EPA must do. Any action by EPA that exceeds the authority granted to it by Congress, by definition, cannot be consistent with the Agency's mission… EPA can accomplish a lot when the Agency focuses on working cooperatively with the states and tribes to improve health and the environment. It is essential for the federal government, state governments, and tribal governments to work together to provide the environmental protection that our laws demand and that the American people deserve. I strongly support cooperative federalism, and make every effort to partner with EPA's counterparts in state, local, and tribal governments to further these goals."*
>
> **Administrator Scott Pruitt**
> **Before the Subcommittee on Interior, Environment, and Related Agencies, U.S. House of Representatives**
> **June 15, 2017**

The reason local governments support cooperative federalism is because federal regulations, while well-intentioned, may have an adverse effect on public health. Some federal regulations may include mandates that local communities and consumers pay the cost of federal compliance that they don't believe is resulting in the most beneficial public health or environmental policy. This dynamic is especially acute and problematic for economically disadvantaged populations. This is the case under the current LCR.

- Communities are conducting repeated and complicated samplings in local homes that have for decades tested negative for lead and where the local water utility has no lead service lines.
- Local residents find the current in-home sampling overly complicated and arbitrary which results in local resistance and unwillingness to participate in lead drinking water sampling. The success of any drinking water safety program is dependent on local support.
- Communities are mandated to pay for very costly replacement of portions of lead service lines that are resulting in increased exposure to lead in drinking water.
- Communities are required to introduce additional chemicals to their public's drinking water when they are not persuaded there is a correlating public health benefit and when they believe there were less costly and more protective options (that are not permitted under the LCR).

The National Rural Water Association is the country's largest public drinking water and sanitation supply organization with over 30,000 members. Safe drinking water and sanitation are generally recognized as the most essential public health, public welfare, and civic necessities.

- Communities are mandated into federal compliance schemes when the federal drinking water program can't tell the public the one thing it wants to know -- how much lead in drinking water is unsafe? Instead, federal agencies say the obvious, that no amount of lead in your water is good and impose a highly convoluted standard (action level) of 15 parts per billion on a certain percentage of the homes tested. Is the 15 parts per billion level measuring safety? That is what is implied. Is a 15.5 parts per billion level unsafe… for children… for a one-time drink of that water? Should a family feel safe with water tested at 14.9 parts per billion level?

NRWA supports the Agency's concept of *"shared responsibility"* among federal, state, and local governments - and the public. Any new LCR should be fundamentally modified to reflect this principle. Unfortunately, much of the local opposition to the current rule is based on its arbitrary and uniform mandates that result in many communities believing many of the rule's requirements are unnecessary or diverting the community from implementing the most effective policy from preventing lead in drinking water. To ensure the greatest possible future success and the greatest possible public health protection, any new rule should be a shared responsibility, meaning local governments and local populations should agree the resulting policies are necessary, tailored to local conditions, and result in a commensurate public health benefit. This intergovernmental collaborative should be incorporated into the details of the rule in: monitoring schemes, lead service line replacement plans, efficacy of corrosion control treatment, public education, remedies to high household tap samples, and the provision of pitcher filters to certain customers. In all of these key rule elements, provisions should be included to ensure any uniform federal remedy does not usurp any solution that is preferable by the local citizens and more protective of public health.

Specific Shared Responsibility Opportunities to Improve the LCR

- **Sampling**: Local governments should have the authority to develop locally supported and tailored in-home tap sampling schemes. Later in these comments, we argue that the current in-home tap sampling scheme exceeds the authority provided to the Agency under the Safe Drinking Water Act (SDWA). EPA's responsibility should be limited to sampling guidance, technical and education information. Local governments can better craft monitoring plans and schedules based on local preference including sampling during day-time hours, targeting schools for testing, varied aerator removal, targeting homes with children such as daycare centers, resistance of homeowner participation, sampling flushed water samples versus first draw, historically negative sampling results, findings of no potential lead sources (plastic pipe systems), etc.

- **Decouple Tap Sampling from Utility Compliance**: Allow utility compliance (primarily corrosion control treatment) to be tested through water quality parameter sampling within the public water system. Results from in-home tap sampling should be used for a catalogue of response options that target the causes of elevated sampling results at the specific site including the following: possible replacement of

lead service lines in the home, assessment of in-home plumbing fixtures, notification and assistance of additional governmental service agencies, etc.

- **Lead Service Line Replacement**: Any mandatory policy for the replacement of lead service lines should respect local ordinances and property rights; homeowners should not be mandated to modify their private property if they believe it is not affordable and community taxpayers should not be required to pay for an individual property owner's plumbing upgrades (transfer public funds to private use). Any mandatory replacement policy should have special affordability considerations for situations where the replacement is cost-prohibitive in economically disadvantaged communities without a finding of elevated lead in drinking water levels.

- **Public Education and Pitcher Filters**: Local governments should be granted authority to modify public notice and educational material to reflect local conditions and risk communications. Our concern is the current EPA information is unnecessarily alarming the public regarding the safety of their drinking water. Many violations of EPA standards are not necessarily an indication of unsafe drinking water (i.e. a temporary exceedance for a small fraction of a part per million that is causing the public to stop drinking their water and not trust their local government). The information provided to the public needs to be commensurate with any public health risk from the drinking water. Some states have been compelled to issue additional public notices to warn consumers of the significance of EPA mandated warnings. More and better tailoring of public information would make for a better educated public. Also, local governments should have the flexibility to decide when providing individual customers with a pitcher filter is necessary. EPA guidance on the use of pitcher filters would be helpful and welcome.

- **Intergovernmental Cooperation**: Create a new process or guidance to encourage multi-government contribution to crafting lead in drinking water prevention initiatives, locally supported monitoring schemes, educating vulnerable populations, and response actions when sampling detects elevated lead levels in drinking water. The LCRWG presented a number of recommendations to further "cooperation with state, county and local health departments to promote an integrated approach to childhood lead poisoning screening, prevention, and protection that emphasizes drinking water and its potential as a primary lead source (e.g. infants dependent on reconstituted formula)." We endorse this concept of a new intergovernmental cooperation.

Regarding principle of respecting the authority of Congress by administering enacted statutes within the authority granted by Congress, we respectfully urge the Agency to consider if the existing LCR's mandate that allows for the effects of a private homeowner's plumbing (i.e. a kitchen faucet) on the water passing through that fixture should result in very burdensome and possibly unrelated requirements on the utility (i.e. treatment installation or adjustments, removal of underground water lines, and alarming public notices) as authorized under the SDWA. We understand the Agency believes it has statutory authority to regulate utilities' water as it relates to the safety of the water that comes from a customer's tap. However, under the existing LCR, the Agency does not

make any finding of contamination or adverse effect on the health of persons before the reaction with homeowner's private public fixtures as required by the SDWA. Additionally, the SDWA limits EPA's authority to regulate the quality of drinking water *"in the water in public water systems."* We believe the current LCR regulatory nexus between the results of tap sampling (when EPA has made no finding of contamination or any adverse effect on the water leaving the public water systems) and correlating mandates on the greater community exceeds the authority provided under the SDWA.

We urge the Agency to craft a new rule that decouples the regulatory requirements on water utilities from results of tap sampling. The results of tap samples should be used for every community to implement a locally-tailored lead reduction plan that corresponds to the risk in that particular community. This will result in greater potential to reduce lead in drinking water by allowing for more community involvement and responsibility in sampling and remediation, better use of local limited resources, and remediation plans that are more targeted to local conditions.

We do believe that EPA has the authority to regulate the quality of the water within the public water systems as it relates to the potential for lead occurrence at the tap through water quality parameters, corrosion control treatment, and each community's historic tap sampling results.

Thank you for the opportunity to comment and participate. We are very appreciative of the Agency's many public outreach opportunities. We believe that our recommendations will result in a better federal lead rule and greater public health protection by recognizing the need for the public to support and participate in their local government and accept responsibility for its operation. We need to acknowledge that with respect to the crisis in Flint, Michigan, the current LCR was unable to prevent it, and unable to tell us whether Flint violated the federal lead standard while delivering alarming amounts of lead to citizens in their water. Additionally, it is a case where no one knows what level of government is to blame. We believe our recommendations will begin to correct the status quo by granting additional authority and responsibility to the people. Flint should serve as a wake-up call for the public as the guarantor of the safety of their public drinking water through their local governments. The public owns and operates their public drinking water supply and is ultimately responsible for its safety.

The National Rural Water Association is the country's largest public drinking water and sanitation supply organization with over 30,000 members. Safe drinking water and sanitation are generally recognized as the most essential public health, public welfare, and civic necessities.

Board of Water Works
of Pueblo, Colorado
319 W. 4th Street • P.O. Box 400 • Pueblo, Colorado 81002-0400 • 719/584-0250

March 1, 2018

Peter Grevatt
Director, Office of Ground Water and Drinking Water
1200 Pennsylvania Avenue, N. W.
Mail Code: 4601M
Washington, DC 20460

RE: Long-Term Lead and Copper Rule Federalism Consultation (Docket ID No. EPA-HQ-OW-2018-0007)

Dear Mr. Grevatt,

The Board of Water Works of Pueblo, Colorado (Pueblo Water) appreciates the opportunity to offer comments to the U.S. Environmental Protection Agency as part of its federalism consultation on potential long-term revisions to the Lead and Copper Rule (LCR). Our system is a member of the American Water Works Association, a participating association in this federalism consultation, hence our submittal.

Pueblo Water is committed to protecting consumers of drinking water from exposure to lead. Improving the LCR to further reduce exposure to lead requires community-specific solutions that recognize the shared responsibility between consumers and water systems for managing exposure to lead in drinking water. We also recognize the importance of federal, state and community-wide investment in managing lead exposure from multiple sources: lead paint in housing, lead deposited in soils, sources of lead in schools, lead in other household items and lead in drinking water.

As EPA contemplates improvements to the Long-Term Lead and Copper Rule, Pueblo Water encourages a focus on actions that are feasible within current statutes so that we can move forward without confusion and additional delay. It is also critical that any requirement to change water chemistry provides flexibility to address local water quality and operational considerations. A federal rule that requires all water systems to use the same corrosion control treatment would be problematic. We hope that our observations assist in developing a protective rule within available resources while avoiding unintended consequences.

Lead Service Line Replacement

Lead service lines were identified in our system in the early 1990's during routine main replacement activities and have been in the LCR compliance testing pool since. LCR and water quality parameter analyses indicated that our water system demonstrated optimal corrosion control for the water supplied to our customers as long as specified pH and alkalinity ranges are maintained and no action level exceedances for lead or copper were observed. The Flint, Michigan crisis in 2014 exposed several important weaknesses of the LCR and Pueblo Water began investigating how our system might be improved to limit lead exposure. In 2017 Pueblo Water began implementing a full lead service line replacement strategy in our service area. With this program, residential customers are offered full lead service line replacements at no cost to the property owner. Since very early records for our system are not detailed, even validating suspected lead service lines in our system is an on-going, labor intensive process and almost always requires excavation services.

We have identified, and tried to address where possible, the following challenges in removing lead from our system:

- Limited information on the pipe material in use on each customer's property.
- Customers who are unwilling to replace partial lead service lines or are unable to afford the cost of the partial service line replacement.
- As full or partial lead service lines are replaced, customers receive filter pitchers and monthly testing of their water to ensure lead levels are reduced after the replacement. This adds additional cost to an already costly replacement program.
- Replacement projects require coordination in order to minimize disruption to our community.

The following have been implemented to mitigate some of the challenges in removing lead from our system:

- Expanded our existing service line repair/replacement policy (that offers customers normal service line replacement or repair insurance for a $1.00 / month fee) to include the entire replacement cost of discovered full lead service lines.
- Offered analytical services to customers to determine levels of lead and copper in their drinking water before and after full or partial lead service line replacements.
- Offered analytical services to all customers to determine levels of lead and copper in their drinking water if they are worried or suspect lead plumbing or lead solder in the home's piping.
- Provided filter pitchers, additional filters and additional information to customers about lead in drinking water and explaining that even after a full lead service line replacement, lead level can increase for a short time before a reduction is observed.
- Providing information to customers explaining how to reduce lead content in their drinking water for daily use by flushing prior to consumptive use.

- Initiated a collaborative effort with Pueblo City Schools to test all fixtures and premise plumbing in all operating schools to determine and mitigate possible exposure routes for students.

We are committed to establishing an inventory of lead service lines and improving its accuracy by gathering data during routine field work. While we will continue to identify possible lead service line locations and remove them once found, we know that the validation process will take years to complete.

Optimized Corrosion Control

Because EPA appears to be seriously considering phosphate addition as the gold standard for corrosion control treatment, we are evaluating the potential impact of such a change on our system. Emerging considerations include:

- Coordinating with our wastewater treatment plants about the impact on meeting NPDES permit limits.
- Potential implications for managing iron and manganese release and the potential for colored water.
- Adjusting pH, which in turn affects disinfection CT, the maintenance of an effective secondary residual, and disinfection byproduct formation.
- The need to have a robust corrosion control program that considers other metals like stainless steel as well as concrete pipes.
- Given other systems' experiences, uncertainty that using theoretical solubility and pilot studies alone will necessarily lead to significant lead reductions.
- Since our system has always been a chloramine disinfection system, the possibility of disruption and migration of existing lead scales. Studies have shown that these specific scales can be destabilized, disrupted or dissolved by any type of phosphate addition and cause particulate and dissolved lead levels to increase.
- Public perceptions about our system and the drinking water we provide. Our system was deemed to have demonstrated optimized corrosion control (especially if pH and Alkalinity parameters were met) as early as 1998 based on years of Water Quality Parameter monitoring. If we are required to begin feeding additional chemicals in the drinking water to protect public safety, that sends an alarming message to consumers.

We continue to study the implications and possible effects of phosphate addition in our system but realize that the process we are contemplating (bench top and pipe loop-coupon studies) will take several years to complete. Additionally, even though it has been stated that no lead level is safe, target lead and copper action levels have not been established by a revised LCR regulation.

Regardless of additional information gathered in the laboratory or from published studies, the uncertainties described above will still remain and pose concerns for our system in real life conditions.

Public Communications

Pueblo Water recognizes the importance of regular and transparent communication that helps customers address risks from lead in drinking water. In addition to required language in consumer confidence reports, our system provides:

- Lead information via the Pueblo Water website, in billing inserts and letters to customers detailing upcoming replacement efforts or routine main work that discovers full or partial lead service lines;
- Information to customers detailing how lead can get into drinking water and what consumers can do to protect themselves and reduce lead exposure at the tap;
- Sample bottles, analytical services and guidance on how to have water tested in the home;
- Information and service personnel to assist homeowners about how to identify and remove lead service lines and lead solder piping; and
- Referral to the Pueblo City-County Health Department for free blood tests for lead for those customers concerned about possible lead exposure.

We encourage the development of a national clearinghouse of information on lead to help water systems and other entities communicate effectively about lead risks across all media.

We hope that our comments help EPA develop sound rule options that further reduce risk posed by lead, recognizing the realities of local budgets and infrastructure renewal needs. If EPA has any questions regarding these comments, please contact me at Ex. 6

Best regards,

Don A. Colalancia

Don A. Colalancia
WQT&P Division Manager
Board of Water Works of Pueblo, CO
Pueblo, CO 81003

Congress of the United States
Washington, DC 20515

March 8, 2018

The Honorable Scott Pruitt
Administrator
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue NW
Washington, DC 20460

Dear Administrator Pruitt;

We welcome the Environmental Protection Agency (EPA)'s reevaluation of the current Lead and Copper Rule (LCR) that is more than 25 years old. With more than 18 million Americans being served by water systems in violation of the current LCR and more than 5,300 communities with unsafe drinking water, we request the LCR be overhauled to require full replacement of all lead service lines and to enforce fair and unbiased testing methods that cannot be creatively circumvented.

Childhood lead exposure can have devastating long-term consequences. The current "acceptable" level of lead exposure is two micrograms of lead per deciliter, and anything over five micrograms is considered "unacceptable," but even small amounts of lead can cause serious health problems. The impact of lead poisoning ranges from reductions in cognitive function, developmental delays, behavior modification, learning disabilities, seizures, comas, and even death. Furthermore, as we've seen across the nation, lead poisoning continues to disproportionately impact low-income areas and communities of color, contributing to racial, health, and economic disparities across the country.

Hundreds of thousands of children aged one to five years old in the U.S. have blood lead levels above five micrograms per deciliter, 150 percent above acceptable levels. Water consumption is estimated to contribute 10-20 percent of a child's total lead intake. For formula-fed infants, it is estimated to be 40- 60 percent of a child's lead exposure[1] . The effects of lead poisoning on children are especially harmful, and the Centers for Disease Control and Prevention have determined that there is no "safe" level of lead for a child. The annual costs of lead poisoning are over $50 billion, and these costs are especially regrettable since lead poisoning is entirely preventable.

Across the country, local health departments are grappling with lead exposure in young children, but lack adequate resources to address the issue. In the last year, there have been reports from New York City to the Hawaiian Islands and from Waco to Chicago about local communities dealing with elevated lead levels in children. Nationwide, more than 5,300 water systems violate

[1] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2509614/ ~*The Lead Industry and Lead Water Pipers "A MODEST CAMPAIGN"*: September 2008.

the existing LCR, with several major cities including Philadelphia, Chicago, Milwaukee, Baltimore and Boston reporting water systems with lead concentrations well above the federal limit. Appallingly, testing of school water systems has led to many water fountains being deemed "off limits" and some 30 schools in Newark, New Jersey, have had to turn off their taps entirely.

The citizens of Flint, Michigan, became the poster children of what is actually a nation-wide crisis, and according to the current LCR, they weren't even in violation of the current rule. Many lead violations across the country have long-been covered up by intentional use of monitoring techniques that avoid detecting lead problems. The EPA has allowed these techniques to continue without consequence. EPA is not alone in culpability, state and local agencies that report to the EPA also have blame for failure to properly inspect water systems or to properly document violations, but the EPA must realize that each time they have turned a blind eye to lead violations; they have put millions of children at risk. We must implement strict testing procedures and discourage creative testing strategies that allow failing systems to persist.

Additionally, any changes to the rule must be accompanied by stronger EPA enforcement to ensure compliance with these critical federal protections. Communities will not realize the full benefit of changes to the LCR if they are not being properly implemented by local and state authorities. The EPA cannot know about how these changes are being implemented without a strong and effective monitoring and enforcement regime.

Crumbling infrastructure contributes to many of the lead and copper violations across the nation. A 2016 report from the Government Accountability Office (GAO)[2], illustrates the extent of the water infrastructure problem. In the older industrial cities, deemed "legacy cities" by GAO, there are declining populations, as well as, high poverty and unemployment rates. They also have crumbling water infrastructure that EPA estimates will take $655 billion over the next two decades to maintain, upgrade, or replace. Individual states and local municipalities cannot be expected to carry the burden of these costs alone. Federal investment in water infrastructure is needed to truly address this burgeoning problem. Unfortunately, the severe cuts to EPA's budget, called for in the President's Budget Request for both FY2018 and FY2019, will only exacerbate the problem. These budget requests not only ignore critical infrastructure needs, but will likely adversely affect monitoring and staffing as well.

Water is a human necessity. Access to safe, clean drinking water should not be defined by the zip code a child grows up in. We welcome EPA's effort to revise and improve this outdated rule to ensure our children grow up healthy and safe.

Sincerely,

Louise M. Slaughter
Member of Congress

Gwen Moore
Member of Congress

[2] United States Government Accountability Office. *Water Infrastructure: Information on Selected Midsize and Large Cities with Declining Populations*. 2016.

City of South Bend Pete Buttigieg, Mayor
Department of Public Works
Eric Horvath, Director

March 5, 2018

RE: Long-Term Lead and Copper Rule Federalism Consultation
(Docket ID No. EPA-HQ-OW-2018-0007)

To whom it may concern,

I am writing as the Director of Water Quality for South Bend Water Works. Our utility is dedicated to providing the best quality of water possible to our customers, which includes protecting them from exposure to lead from drinking water. We agree that the Lead and Copper Rule needs revisions, but would like to share our comments based on the January 8th Federalism Consultation Meeting. Please consider my utility's comments on the potential long-term revisions to the Lead and Copper Rule.

Key Areas for Rule Revisions

Lead Service Line Replacement

- *Require systems to create an inventory of lead service lines –*
  We have estimated that our system has 24,000 lead service lines (>50%) based on the age of the home. There are not adequate records to say the material of the pipe with certainty. We currently verify the service line material when repairs are done to the line through our insurance program, but will obviously not touch every line. Would an estimate fulfill this requirement or would we need to actually dig into everyone's yard to verify the material? Verification would be costly and would lead to unhappy customers.

- *Require proactive full lead service line replacement on a specified schedule (e.g., 10, 15, 25, 35 years from promulgation) –*
  In our community, the entire service line is the property of the homeowner. We do not have the funding to replace these lines, nor can we freely use public funds to benefit private property owners. Our community also has a large percentage of the population living near or below the poverty level, so they would not be able to afford the replacement. In fact, the cost of the line replacement would at times be more than the value of the home. In addition, most of our consumers are not concerned about lead in the drinking water since we have always been in compliance with the LCR. Their main priority has been dealing with lead paint issues.

- *Allow partial LSLR only for emergency repair or "unwilling or unable customers" when conducting infrastructure replacement (e.g., main replacement)*
  Where there are lead service lines in our community, only one portion of the line is lead. We have heard that galvanized pipe can cause issues as well after a LSLR and believe that the entire

line should be replaced in these cases if a partial is being done. We do wish that we could do a full line replacement when a LSL is in need of an emergency repair, but generally the customer would be unwilling or unable to pay for this. In addition, many of the actual homeowners do not live in our community. Some live in foreign countries. Protecting the actual residents may be another hurdle for this reason.

- *Require pitcher filters to be distributed and regularly maintained by the PWS for three months immediately following lead service replacement*
  This seems like a great idea, but where would the funding come from? Not only would the funding for the pitchers and the filters be needed, but additional staff would also be necessary to tackle this task.

Corrosion Control Treatment

- *Require systems with lead service lines (regardless of population served) to install and maintain CCT?*
  South Bend Water Works has very hard water with an average level of hardness as calcium carbonate of 364 ppm, an average alkalinity as calcium carbonate of 279 ppm, and an average pH of 7.5. These water quality parameters have been deemed adequate to prevent corrosion of pipes under normal circumstances. Should it be necessary to pay for this treatment for water that does not show signs of corrosivity? We currently use a polyphosphate at some of our treatment plants for iron and manganese sequestration. Would a change in treatment chemicals make it difficult to keep these metals in suspension? In addition, our wastewater treatment plant currently has to use a chemical to remove phosphorous and application of phosphorous to farm fields is likely to become an issue. If the chemical required is a phosphate and it must be used at all treatment plants, how would this affect our wastewater plant?

- *Require plumbed in point of use treatment devices to be provided to households with lead service lines and regularly maintained*
  As mentioned with the three month requirement after a LSLR, this would require even more funding and additional staff to keep this organized. Maintaining the devices would be particularly challenging.

- *Prescribe a default CCT that must be maintained unless a system can demonstrate equivalent CCT to the state, or require the system to conduct a periodic re-evaluation of CCT to be reviewed by the state?*
  We believe a periodic re-evaluation of corrosion control is a good idea.

- *Require system to find and fix problems in corrosion control treatment if a tap sample exceeds an action level?*
  We currently resample at locations that have tap results above the action level and provide some guidance, but we feel it is the homeowner's responsibility to manage their own plumbing. Often, when a tap sample exceeds an action level it is because the customer took a sample from a faucet that has not been used for months or the sample was taken after water softener treatment. We encourage our residents to not over-soften their water by setting their softener

on the low side of the scale and to increase only if they feel it is not doing an adequate job. However, as stated above, our water is very hard and we have not found a lot of guidance literature on how to use a softener to maintain a level of hardness that is acceptable to consumers but will not cause any corrosion to their plumbing. In addition, this may consume a lot of time trying to pinpoint an issue in someone's home.

Tap Sampling

- *Changing where water systems are required to collect tap samples - At sites based on customer request or at schools served by the system*
  We currently provide free lead testing to those requesting it, but only had 38 total requests in all of 2017. In fact, when we did our compliance sampling in 2016, we sent out 378 surveys to homes we believed had a LSL and/or lead plumbing. Only 95 of the surveys were returned by customers, of which only 65 qualified as a Tier 1 site or were interested in participating.
  We provided our schools with guidance on sampling, but if we followed the 3 Ts, it would be extremely costly for us. Our state is currently providing funding for public schools on a volunteer basis, but private schools are not included. Where do they fit in? There are at least 54 schools on our city water.

- *Change the way samples are collected to be more representative of exposure - Increase the number of samples required or instruct consumers to sample when they are drawing water for drinking or cooking.*
  We believe that having customers take samples when they are drawing water for drinking or cooking would give a more accurate portrayal of the exposure they are getting. We also believe that one sample is not necessarily indicative of the situation at all times. Although it would be more costly, we believe more than one sample taken at different times would likely be more representative.

- *Establish a household action level that if exceeded would trigger a report to the consumer and to the applicable health agency for follow up*
  This is an excellent idea. It is difficult to explain the current action level to residents. It is also difficult to answer their questions when lead is detected at their tap, but below the AL.

Public Education and Transparency

- *What do state and local governments think are the most effective ways for water systems to deliver educational information to consumers?*
  South Bend Water Works firmly believes in providing education to our residents on ways to minimize their exposure to lead in drinking water. In April of 2017, we sent all residential customers a "Homeowner Guide to Managing Lead in Drinking Water" in their water bills. It is also posted on our website. The guide explains the health effects of lead, lists potential sources of lead that may come into contact with their drinking water, and gives tips on how to reduce their exposure.

- *Water systems to provide on-going targeted outreach with a special emphasis on all customers with lead service lines*

We agree that this is a good idea as well. While all bill receiving residents received our homeowner guide, we also provide a door hanger to customers having emergency repair done on their service lines that we believe may possibly contain lead. The hang tag explains that a disruption to the service line could cause an increase of lead in their drinking water for six months. It gives tips on how to reduce exposure including flushing and purchasing a filter certified to remove lead. We do not provide the filters, but do provide the education.

- *Water systems to provide notification to consumers within 24 hours of exceeding an action level (as required by the 2016 WIIN Act)*
  We believe it is important to notify consumers at a higher risk of exposure within 24 hours of obtaining the results. In our last sampling event, we attempted to mail letters to the residents within 24 hours, even with low or non-detect results. In addition, we called the two residents that had results above the action level.

- *Water Systems to make information accessible to consumers on results of all tap sampling, results of water quality parameter (WQP) monitoring and the number and locations of LSLs*
  This requirement is acceptable as long as the location of the sample taken remains confidential for the resident.

Copper Requirements

- *Establish a screen to determine if water systems have water aggressive to copper – If water is aggressive, require: – monitoring and/or – public education and/or – CCT.*
  South Bend Water Works agrees that the current LCR is geared toward lead and may not adequately measure exposure to copper. An established screen would be great guidance and monitoring, education, and/or CCT should be required if the water is aggressive to copper.

- *Modify tap sampling to require separate sampling sites for copper*
  As mentioned above, we believe the current LCR is not necessarily measuring exposure to copper and that different sampling sites would be required to do this adequately.

South Bend Water Works appreciates the opportunity to provide comments on the proposed changes to the Lead and Copper Rule. Please take our comments into consideration when determining the final rule language.

Regards,

Michelle Smith
Director of Water Quality
South Bend Water Works, PWSID IN 5271014
830 N Michigan St.
South Bend, IN 46601

Message

From: Smith, Wil [wsmith@epri.com]
Sent: 5/10/2018 1:03:11 PM
To: Washington Seminars [WashingtonSeminars@epri.com]
CC: Hunter, David [DHUNTER@epri.com]; Smith, Wil [wsmith@epri.com]
Subject: Final Agenda: EPRI's 21st Energy and Climate Research Seminar, May 17, Washington DC
Attachments: Energy and Climate Seminar Agenda final.pdf

Dear Colleague,

Please find attached the final agenda for EPRI's 21st Annual Energy and Climate Research Seminar, taking place next Thursday, May 17th, at the Washington Marriott Georgetown, 1221 22nd St NW. It will begin with a networking breakfast at 8:00 am and conclude with a reception from 5:15 to 7:30 pm. Should you be unable to attend the seminar, please consider joining us for the evening reception. If you haven't already, **please rsvp name, title, company, email and phone number to** WashingtonSeminars@epri.com**.** There is no charge to attend, but space is limited. Additional information, including accommodations, can be found here.

The seminar will include sessions on the following:

- Understanding Company Climate Scenarios and Emissions Goals
- Scientific Understanding of Extreme Events and Climate Impact
- Electrification and the Future of Transport
- Policy and Market Trends for Energy Storage and Renewables
- Puerto Rico and the U.S. Department of Energy's Approach to Resiliency

See below for select additional upcoming EPRI events.

Upcoming EPRI events:

July 19: EPRI Washington Seminar: The Fuels of the Future

Co-hosted by the International Energy Agency (IEA)
EPRI Washington DC office, 1325 G ST NW Suite 1080, Washington DC
11:30 am to 2:30 pm. Lunch will be provided.

EPRI is pleased to be joined by the International Energy Agency (IEA) as a cohost for this EPRI Washington Seminar. Please rsvp to WashingtonSeminars@epri.com . There is no charge to attend, but space is limited. Additional details TBA.

August 20: EPRI/ IEA Workshop on Cross-Border Energy and Capacity Trading

Long Beach, CA

EPRI is pleased to join the IEA in hosting this day-long workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing relevant IEA member countries and other stakeholders to learn from the CAISO-Mexico example and bring their own experiences to bear. This workshop will be co-located with Electrification 2018. For additional details and to register please click here.

August 20-23: Electrification 2018
International Conference and Exposition

Long Beach Convention Center, Long Beach, CA

EPRI's biggest event of the year, Electrification 2018, will be a 3 day international conference and exposition taking place in Long Beach, CA, Aug 20-23. Electrification will explore the critical issues, benefits, and opportunities of electrification with an unparalleled collection of industry experts:

- Learn about the capabilities and potential of today's electric technologies
- Understand the disruptive benefits and impacts of emerging electric technologies
- Discuss key policy, regulatory, and environmental issues
- Participate in expert training sessions and other professional development opportunities
- Experience a diverse array of technologies in our exposition hall
- Network with industry, government, and academic leaders to form collaborations and help build the future of electrification

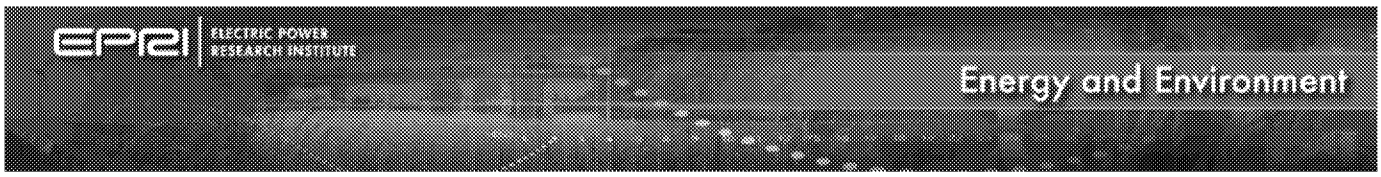
Be sure to register early to get discounted rates!

Save the Date: November 6-8: EPRI-IEA Challenges in Electricity Decarbonization Expert Workshops
Paris, France

The 5th Annual EPRI-IEA Challenges in Electricity Decarbonization Expert Workshop will again focus on electrification and its implications for the electricity sector. The workshop will be held jointly with the 18th EPRI-IEA-IETA GHG Emissions Trading Workshop. Details TBA. Space is limited. Please email WashingtonSeminars@epri.com with expressions of interest.

Hope to see you there!

Best,
Wil
Wil Smith
Government & External Relations Associate
Electric Power Research Institute
1325 G ST NW Suite 1080
Washington, DC 20005
Tel: Ex. 6
Email: wsmith@epri.com



21st Energy and Climate Research Seminar

In conjunction with EPRI's Washington Seminar Series

Washington Marriott Georgetown, 1221 22nd St NW, Washington, D.C.

THURSDAY MAY 17, 2018		
TIME	**TOPIC**	**PRESENTER**
8:00 a.m.	Registration and breakfast	
8:45 a.m.	Welcome and Introductions	David Hunter, *EPRI*
8:55 a.m.	Opening Remarks	Rob Chapman, *Vice President, EPRI*
Session 1: Understanding Company Climate Scenarios and Emissions Goals Chair: Morgan Scott, *EPRI*		
9:10 a.m.	Grounding Good Intentions: A Technical Foundation for Considering Global Climate Scenarios and Greenhouse Gas Goals	Steve Rose, *EPRI*
	Panel Discussion: • American Electric Power • JP Morgan Chase	Scott Weaver, *Director Air Quality Services, AEP* Marisa Buchanan, *Executive Director, Sustainable Finance, JPM*
10:25 a.m.	Break	
Session 2: Science Research Frontier Chair: Delavane Diaz, *EPRI*		
10:55 a.m.	The Fourth National Climate Assessment – Climate Science Special Report	Benjamin DeAngelo, *Deputy Director, Climate Program Office, NOAA*
11:20 a.m.	Understanding Extreme Events from a Climate Perspective	Stephanie Herring, *Senior Advisor and Climate Scientist, NOAA*
11:45 a.m.	Making Sense of Equilibrium Climate Sensitivity and Other Climate Responses	Chris Forest, *Associate Professor of Climate Dynamics, Penn State University*
12:10 p.m.	Lunch	
Session 3: Electrification and the Future of Transport Chair: David Hunter, *EPRI*		

1:10 p.m.	EPRI's National Electrification Assessment and Its Outlook for Transportation	Geoff Blanford, *EPRI*
	Panel Discussion: • U.S. Department of Energy • Advanced Energy Economy • Natural Resources Defense Council	Rachael Nealer, *Program Manager, Vehicle Technologies Office, DOE* Matt Stanberry, *Vice President, AEE* Pamela MacDougall, *Fellow, Climate and Clean Energy Program, NRDC*
2:25 p.m.	Break	

Session 4: Policy and Market Trends for Energy Storage and Renewables
Chair: John Bistline, *EPRI*

2:55 p.m.	Panel Discussion: • Bloomberg New Energy Finance • Federal Energy Regulatory Commission • Rochester Institute of Technology • Energy Information Administration	Ethan Zindler, *Head of Americas, BNEF* Mary Wierzbicki, *Group Manager, Energy Policy and Innovation, FERC* Eric Hittinger, *Associate Professor, RIT* Cara Marcy, *Renewable Electricity Analyst, EIA*
4:10 p.m.	Keynote: Puerto Rico and the U.S. Department of Energy's Approach to Resiliency	Katie Jereza, *Deputy Assistant Secretary, Office of Electricity Delivery and Energy Reliability, DOE*
4:45 p.m.	Summary	Tom Wilson, *EPRI*
5:15-7:30 p.m.	Reception	

In order to encourage open discussion, please observe Chatham House rules.

Message

From: Colleen Newman [colleen@nawc.com]
Sent: 6/14/2018 6:57:53 PM
To: Pruitt, Scott [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=757bedfd70ca4219b6d8046f5ce5681e-Pruitt, Sco]
CC: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Nagle.deborah@epa.gvo
Subject: [SPAM-Sender] NAWC letter re steam electric power plant limitation guidelines rulemakings and safe drinking water
Attachments: NAWC letter on power plant effluent limitations guidelines 6142018.pdf

Attached please find a letter from NAWC regarding EPA's ELG for Steam Electric Power Plants. Thank you.

Colleen Newman
Director, Government Relations
National Association of Water Companies
Ex. 6 Personal

June 14, 2018

The Honorable Scott Pruitt
U.S. Environmental Protection Agency Headquarters
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

RE: Steam Electric Power Plant Effluent Limitations Guidelines Rulemaking and Safe Drinking Water

Administrator Pruitt,

On behalf of the National Association of Water Companies (NAWC), I am writing to express support for the Office of Water's rulemaking to reconsider the Effluent Limitations Guidelines (ELG) for Steam-Electric Power Plants published in the Federal Register on November 3, 2015. (80 Fed. Reg. 67838). By revising certain aspects of the ELG as discussed below, EPA can improve public health protections in a cost-effective way for many communities and assist state agencies in fulfilling their missions under the Safe Drinking Water Act and Clean Water Act.

It is critical that the revised ELG provide adequate protections for drinking water supplies. Such measures are essential to EPA's fundamental goal of protecting public health. Further, consideration of impacts of bromide discharges from steam electric power plants on water systems downstream of power plants is required by the agreement between EPA and the American Water Works Association (AWWA) in response to AWWA's Petition for Review of the previous Administration's final ELG.[1]

[1] Counsel for AWWA sent a letter to counsel for EPA and DOJ dated October 26, 2017, confirming the understanding that AWWA agreed to forgo its rights to continue pending litigation in exchange for EPA's "commitment to consider appropriate technology options to control bromide in FGD wastewater discharged from steam electric power plants in the new rulemaking EPA has committed to conducting." Counsel for DOJ confirmed that understanding in an e-mail reply on that same day.

There are currently 407 coal-fired power plants with the potential to impact at least 573 drinking water treatment facilities downstream from them. Half of these water treatment facilities are within 20 river miles of power plant discharges, and 85% of them are within 60 river miles. These discharges have a direct impact on the brominated disinfection byproduct levels reaching more than 20 million people, potentially increasing bladder cancer risks.

Your administration is properly focused on EPA actions that provide efficient regulatory actions and meaningful protection of public health. Revising the ELG to limit steam power plant outfall impacts on downstream drinking water providers through the Clean Water Act would achieve these important goals. Allowing the state agencies administering these programs to mitigate the impacts on the downstream community water systems prevents saddling these community drinking water systems with costly treatment requirements.

NAWC urges EPA to take the following facts and considerations into account when reconsidering the ELG:

- The contribution of bromide from steam power plants to the waters of the United States (WOTUS) results in elevated brominated disinfection byproducts at downstream water systems. Research published since EPA's 2015 rulemaking process confirms that the bromide loading from coal-fired power plant flue gas desulfurization (FGD) wastewater increases in-stream bromide levels. Excess bromide in source waters can lead to public health risks for customers of downstream drinking water utilities.

- Absent CWA controls, bromide loadings to WOTUS from steam-power plant effluent will continue and increase. Bromide is naturally present in coal, added to coal to reduce mercury air emissions, and added to coal in response to federal tax incentives. Where wet scrubbers are used, much of this bromide is discharged in wastewater. It is reduced in concentration only through dilution.

- Managing a few, relatively low-volume wastewater streams internal to steam power plants will substantially reduce bromide release from steam-power plants. FGD wastewater is typically less than half a million gallons per day, approximately 7% of the ELG-regulated wastewater discharged from a typical coal-fired steam-power plant. Consequently, zero-liquid discharge (ZLD) is a viable management strategy, as demonstrated by more than 50 planned installations. These installations are described in the ELG docket for the 2015 final rule and the technologies and growing market of these solutions are noted in numerous industry articles.

- Failing to control power plant discharges only pushes the cost of treatment on to downstream water systems and the communities they serve. By failing to control the FGD wastewater to prevent the introduction of excess bromide into source waters, the costs of addressing the issue will fall to water systems. AWWA's

estimates are that the annual cost of compliance for water systems could be $470 million to $1.2 billion per year if all impacted water systems need to install additional treatment. It is much less costly to prevent bromide discharges from reaching water systems in the first place and will eliminate these costs from being imposed on community drinking water systems. This approach is equitable because it places the cost of control on the source of the discharge – the power plants.

- Management of FGD wastewater is a key opportunity in advancing cooperative federalism. State drinking water and clean water agencies do exceptional work on limited resources. By addressing FGD wastewater through straightforward treatment requirements on the steam electric power plants producing the discharges, these agencies will be able to better focus their attention on the many other critical needs impacting WOTUS and drinking water. This maximizes the combined federal and state benefit to public health while making the best available use of resources.

- Steam power plants represent a significant risk to downstream community drinking water systems. There is sufficient data available to support requiring the following control options:

  1. ZLD solutions for FDG wastewater

  2. Should ZLD not be chosen for FGD wastewater, then:
     a. Treatment to remove bromide (such as reverse osmosis) is needed.
     b. Precautions should be taken to prevent facilities from treating coal with iodide-based additives, which like bromide, will increase the toxicity of disinfection byproducts formed during drinking water treatment.
     c. Require on-line monitoring for bromide in FGD wastewater prior to blending with other wastewaters if that wastewater is discharged to WOTUS. This monitoring will support evaluation of additional facility-appropriate NPDES permit requirements.

  Note: These additional measures would not be needed in ZLD discharge solutions.

  3. All facilities subject to the effluent guidelines should submit data to state primacy agencies to allow calculation of bromide loadings and dilution upstream of drinking water intakes. This monitoring will support evaluation of additional facility-appropriate NPDES permit requirements.

NAWC has a substantial interest in clean, safe drinking water and public health and safety and urges EPA to protect drinking water sources in the ELG proposal. NAWC stands ready and willing to assist you in this important work.

Sincerely,

Christopher H. Franklin
Chairman, CEO and President, Aqua America
President, National Association of Water Companies

cc: David Ross
Deborah Nagle
Andrew Sawyers
Peter Grevatt

Message

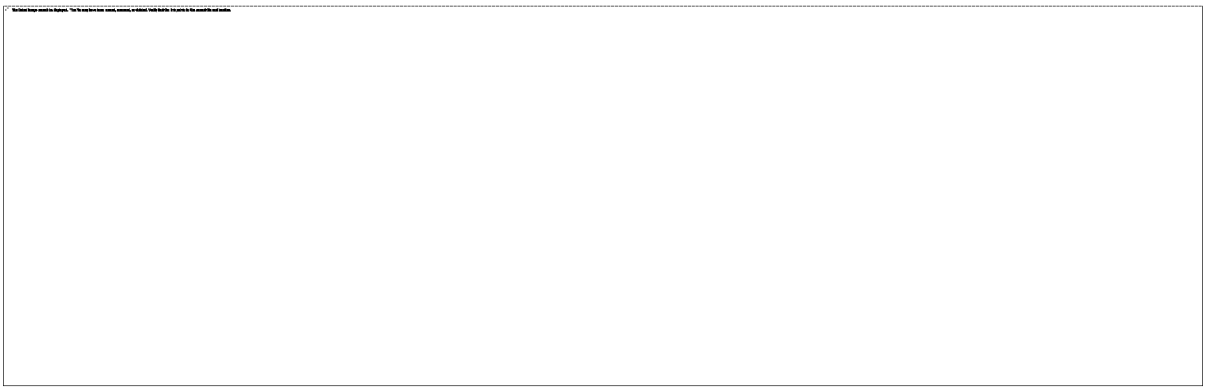
From: Tracy Mehan [tmehan@awwa.org]
Sent: 4/13/2018 6:16:46 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: FW: AWWA Connections

From: AWWA [mailto:connections@awwa.org]
Sent: Friday, April 13, 2018 9:04 AM
To: Tracy Mehan <tmehan@awwa.org>
Subject: AWWA Connections

Having trouble viewing the email below? Please click here.
Note: To ensure delivery to your inbox please add connections@awwa.org to your address book.

American Water Works Association

AWWA CONNECTIONS®



AWWA cheers drinking water protection measures in Farm Bill

AWWA's efforts to protect drinking water sources through the upcoming Farm Bill reauthorization paid off yesterday when the first version of the Agriculture and Nutrition Act of 2018 included all of the Association's key recommendations.

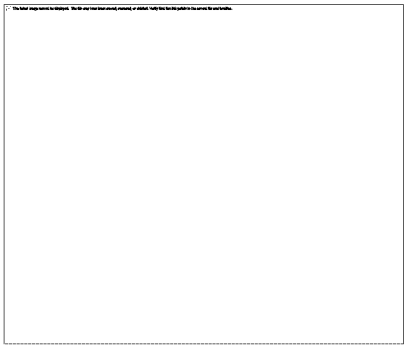
Committee leaders plan to begin "markup" sessions, or hearings in which the committee accepts or rejects amendments, the middle of next week.

In a letter delivered to the U.S. House Agriculture Committee yesterday, AWWA thanked Chairman K. Michael Conaway, R-TX, and Ranking Member Collin Peterson, D-MN, as well as Conservation and Forestry Subcommittee Chairman Frank Lucas, R-OK, and Subcommittee Ranking Member Marcia Fudge, D-OH, for their commitment to protecting source water.

"Farm Bill conservation programs, along with partnerships between [the U.S. Department of Agriculture], water utilities and farmers, can be key to protecting drinking water sources," the letter noted. "AWWA believes the 'downstream benefits' and public health benefits of these conservation programs make the conservation title of the Farm Bill extremely important to all Americans who depend on clean drinking water."....Read More...

Next week in D.C.

Fly-In delegates ready to engage with Congress



Whether from small states or large, delegates to next week's AWWA Water Matters! Fly-In are planning appointments with lawmakers, reviewing issue packets, checking out the Fly-In smartphone app, and selecting a good pair of walking shoes.

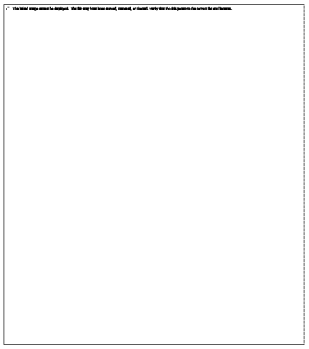
"We are sometimes running between meetings," said Rick Callender, chief of external affairs for Santa Clara Valley Water District in California, who is attending his 11th Fly-In. "We try to meet with every member of Congress from our state as well as their staff responsible for

water issues. This is really a grassroots effort to influence policy."

On Wednesday and Thursday, about 150 water leaders from 48 states will be in Washington, where they'll meet face-to-face with lawmakers to promote support of the conservation title of the 2018 Farm Bill and reinvestment in water infrastructure.

It's all part of the annual two-day event that AWWA first held in 2002 with a few dozen utility leaders to educate senators and representatives on issues affecting drinking water and clean water utilities. AWWA is partnering again this year with other water associations to present a more unified voice on Capitol Hill. Read More...

'Science Friday' star Ira Flatow to speak at ACE18



Ira Flatow's interest in things scientific began in boyhood – he almost burned down his mother's bathroom trying to recreate a biology class experiment.

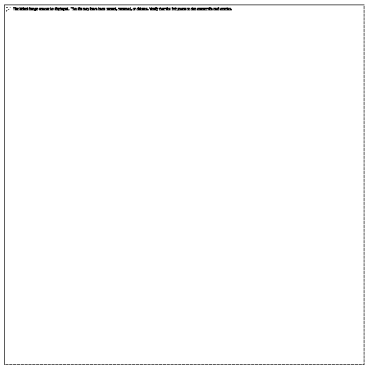
"I was the proverbial kid who spent hours in the basement experimenting with electronic gizmos, and then entering them in high school science fairs," Flatow says.

Flatow has shared his enthusiasm for science with public radio listeners for more than 35 years as the host of National Public Radio's 'Science Friday,' a call-in program and podcast heard by 2 million people each week. Read More...

Member Spotlight

Wastewater treatment director raises public health awareness

Katie Karow



Job and Employer: Director of wastewater treatment at the Kenosha Water Utility, Kenosha, Wisconsin. I am also the designated operator-in-charge and oversee laboratory services, the industrial pretreatment program, and hazardous waste programs.

Age: 48

What is something unexpected you learned on the job? Maybe it's not unexpected, but I am grateful every day to work in water and wastewater services. I love working in public service and people may find it unexpected how much I love wastewater treatment. My dad was a plumber and plumbing inspector. Ever since I was little, I learned the value of sanitation to society. It's not something that many talk about, but I like to raise awareness of public health and environmental protection that wastewater treatment makes in our country. As

a society, we cannot take that for granted or be complacent.

How do you raise awareness of the role wastewater treatment plays in public health and environmental protection? We conduct several tours of the wastewater treatment plant for students ranging from fourth grade to college. Also, the Kenosha Water Utility hosted an open house of the wastewater plant in June 2017.

What are your daily duties? In addition to overseeing the 20-mgd wastewater treatment plant, as well as my other previously mentioned duties, I administer requirements of the state-issued discharge permit and report to regulatory agencies. I'm also part of the capital improvements management team. Read More...

Upcoming Events

Optimizing Internal Corrosion Control in Distribution Systems Webinar / April 18

Water Treatment Operator Level 3 / April 23 - May 25 / Online

FREE Webinar: Extend the Edge and Get More Value from Your AMI Network / April 25 / Online

High-Tech Operator Course 3 / May 7 - 25 / Online

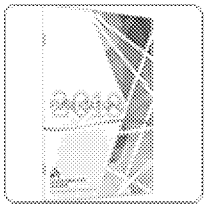
Effective Utility Management Seminar / May 7 - 8 / Kansas City, Kansas

Customer Service Seminar / May 9 - 10 / Kansas City, Kansas

Online Monitoring to Control Chloramination Challenges Webinar / May 9

Take a look at the AWWA Publications Catalog

The 2018 AWWA Publications Catalog is available online. It showcases all manuals, standards, handbooks and more. Search the catalog for new and revised publications to make sure that you have all of the current resources. Additionally, if you would like to be regularly updated when new publications are available, sign-up for email updates. Look Inside...



New AWWA standards effective this month

These AWWA standards are now available:

B130-18 Membrane Bioreactor Systems

B301-18 Liquid Chlorine

C205-18 Cement-Mortar Protective Lining and Coating for Steel Water Pipe -- 4 In. (100 mm) and Larger -- Shop Applied

C207-18 Steel Pipe Flanges for Waterworks Service -- Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm)

Interested in always having the new and current AWWA Standards? Call at 800.926.7337 and learn about our Standards subscription. Learn More...

AWWA Connections is published every other Friday for members. It features water community news and colleague profiles, opportunities to engage and network, career development tips and more. If you have a comment or story idea for *Connections*, please contact us at connections@awwa.org.

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 2/1/2018 11:02:18 AM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
Subject: EPA wants new safeguards when Flint crews replace lead service lines

http://www.mlive.com/news/flint/index.ssf/2018/01/epa_recommends_new_safeguards.html

Get Outlook for Android

Message

From: Chris Hornback [CHornback@nacwa.org]
Sent: 2/21/2018 7:43:09 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Best-Wong, Benita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6ee79b3d0fc0429b99f2c05481b0b957-bbestwon]; Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: Meeting Request and Invitation for Water Week Fly-In
Attachments: Ross_Invite.pdf

David –

I oversee NACWA's regulatory work and we would like to set up a meeting with you in the next couple of weeks to introduce our key staff and start talking about a few top priority issues where we hope to maintain our strong engagement with EPA. Our CEO Adam Krantz reached out a few days ago and hopefully we can find a time to meet soon.

In addition to setting up a meeting, attached is an invitation for your participation in the water sector's National Water Policy Fly-In on the afternoon of Tuesday, April 17, during Water Week 2018. The event is co-organized by NACWA, the Water Environment Federation, the Water Research Foundation and the WateReuse Association. We hope you can participate.

I look forward to meeting you soon.

-Chris

Chris Hornback | Chief Technical Officer | National Association of Clean Water Agencies (NACWA)
(O) Ex. 6 (M) Ex. 6 | chornback@nacwa.org

Your voice has impact! Register now for the *National Water Policy Fly-In* (April 17-18) in DC, during *Water Week 2018*!

NATIONAL WATER POLICY FLY-IN

NACWA | Water Environment Federation | The Water Research Foundation | WateReuse

February 21, 2018

David Ross
Assistant Administrator
Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N. W.
Washington, DC 20460

Dear Assistant Administrator Ross:

On behalf of the National Association of Clean Water Agencies (NACWA), the Water Environment Federation (WEF), the Water Research Foundation (WRF), and the WateReuse Association, I would like to invite you to address hundreds of water professionals from across the country during the *National Water Policy Fly-In*, April 17-18, here in Washington, DC. The *National Water Policy Fly-In* is the anchor event of *Water Week* 2018, April 15-21. We expect broad-based participation from the water sector throughout Water Week and are planning an agenda that features the latest legislative, regulatory, and legal clean water developments.

We hope you will accept this invitation to be our featured speaker at the *Policy Fly-In* on the afternoon of Tuesday, April 17, at approximately 2:30 PM Eastern. We have invited Administrator Pruitt to provide the keynote address to kick off the *Fly-In* just prior to your remarks. The session we would like your participation in is dedicated to hearing from EPA and other key federal agency representatives. We plan to invite the office directors from the Office of Water to address the group as well, and hope you will join them for a roundtable discussion following your remarks. We are certain that your thoughts and perspectives will contribute significantly to the *Policy Fly-In*, and hope you will be able to join us.

We look forward to hearing from your office soon regarding your availability. Should you have any questions regarding the agenda or your role, please contact NACWA's Chris Hornback via *chornback@nacwa.org* or at Ex. 6

I hope you will be able to participate and look forward to seeing you in April.

Sincerely,

Adam Krantz
NACWA Chief Executive Officer

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/22/2017 9:26:54 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: "Have yourself a Merry little Christmas"

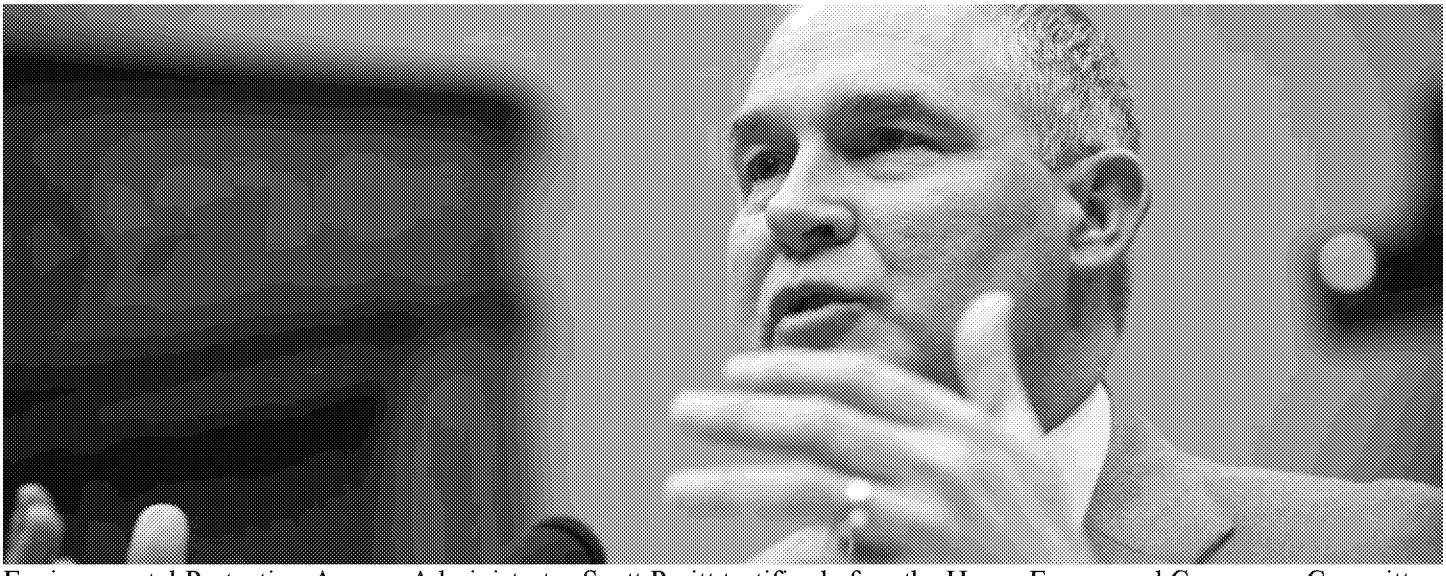
http://www.nationalreview.com/article/216354/if-fates-allow-g-tracy-mehan-iii

Each and every one of you!

Tracy Mehan

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 1/24/2018 10:03:30 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Major concerns re some, not all, new WIFIA applications



Environmental Protection Agency Administrator Scott Pruitt testifies before the House Energy and Commerce Committee about the mission of the U.S. Environmental Protection Agency on Dec. 7, 2017 in Washington, DC.
Photographer: Pete Marovich/Getty Images
News

Water Utilities Fear EPA Loan Program Growing Too Big, Too Fast

Posted Jan. 24, 2018, 2:02 PMUpdated Jan. 24, 2018, 4:16 PM
By David Schultz

- Leaked White House documents call for dramatic expansion of EPA low-interest water loans
- Under proposal, loans could now go toward Superfund cleanup, flood control, others
- Utilities say EPA should focus on core mission of drinking water, wastewater

A fledgling water infrastructure loan program at the EPA is experiencing an unusual problem in Washington: It may enjoy too much political support.

Lawmakers from both parties enthusiastically back the program, which subsidizes loans for wastewater and drinking water projects. In fact, they support the program so much that the White House may soon call for it to be expanded to cover not only water projects but also Superfund site cleanups, flood control, shipping and navigation efforts, and other purposes.

This is making the water utility industry nervous.

The loan program began in 2014 when Congress passed the Water Infrastructure Finance and Innovation Act, also known as WIFIA. Officials at the Environmental Protection Agency just selected the program's first round of loan recipients last year and haven't actually granted any loans through the program yet.

"Before WIFIA is looked to as the answer to a wider range of questions, we need to get through a [loan] cycle or two and evaluate how it's worked," Dan Hartnett, a lobbyist with the Association of Metropolitan Water Agencies, told Bloomberg Environment. He said the industry "would urge some caution there and make sure WIFIA is succeeding where it was meant to succeed first."

Leaked Plan

The Trump administration has big plans for WIFIA, according to a portion of its upcoming infrastructure proposal that leaked to the press earlier this week.

It's not just proposing changes for which types of projects would be eligible for these ultra-low cost loans. It also wants to allow the loans to go to private water systems—for example, a hospital or a factory with its own water supply.

Additionally, the White House wants to allow WIFIA loans to be used to help one utility acquire another one.

Most, if not all, of these measures could not be implemented without Congress granting the EPA more leeway in how it administers the WIFIA program, according to Mike Keegan, a legislative analyst at the National Rural Water Association.

Keegan said it would be a mistake to take a program meant to finance new sewer systems or water filtration plants and expand it this much. The water utility industry just can't be lumped in with Superfund cleanup, flood control, or other projects tangentially related to water, he told Bloomberg Environment.

"They're not similar in the way they're funded, not similar in the way they're regulated, and not similar in how they interact with the public," he said. "I don't think that's well understood by people crafting this document."

The EPA deferred to the White House, which did not respond to a request for comment.

Political Support

A rarity in the current political climate, WIFIA is one of the few environmental programs that both Republicans and Democrats have enthusiastically embraced.

Separate spending bills in both the House and the Senate for the current fiscal year would allocate $30 million to the program, $10 million more than the administration had asked for.

Additionally, bills have been introduced in both the House and Senate that would reauthorize the program for five more years beyond its expiration date in September 2019. Both bills, H.R. 4492 and S. 2329 , have bipartisan backing.

Hartnett said he thinks the program has been embraced so strongly because it has a huge bang for a relatively small buck. For every taxpayer dollar Congress allocates to WIFIA, the EPA can help municipalities get cheap loans that will kickstart between $100 and $200 in infrastructure construction nationwide.

"I think a big part of why WIFIA is so popular is its leveraging ability," Hartnett said. "If you're at the White House, you look at that and say 'I want to do an infrastructure initiative, but I don't want to spend a lot of money doing it.' The WIFIA model would be very attractive."

Superfund Disagreement

But the White House's proposal to expand who's eligible for WIFIA loans raises the question: would the other sectors in its proposal even benefit from WIFIA's low-cost financing?

That's unclear when it comes to speeding up the pace of Superfund cleanups—a goal that EPA Administrator Scott Pruitt has said ranks at or near the top of his priority list.

Dan French, CEO of Brownfield Listing, a real estate company that works with formerly contaminated sites, said being able to obtain a WIFIA loan would "make all the difference in the world" for stalled cleanup projects.

"Cheaper public capital won't solve every problem at every Superfund site," he told Bloomberg Environment, but some projects "would come alive again, whereas they were unfinanceable and dead before."

However, a lack of loans isn't the main obstacle blocking cleanup projects from moving forward, according to Steve Jawetz, an attorney at Beveridge & Diamond PC in Washington who works on Superfund issues.

"If this is just about temporary financing that needs to be paid back, then it's of less use," he told Bloomberg Environment. "The money has to come from somewhere. . . . It would be best to have federal funding as opposed to federal loans."

(Updates throughout with additional reporting)

(Updated to add more reporting throughout.)

American Water Works Association
Dedicated to the World's Most Important Resource ®

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/22/2017 8:54:47 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Stein, Raffael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=280af9f00275496d96dc7587ab473480-Rstein]; Klasen, Matthew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9d5ba7959ebd4929ab5ab57fba80b21d-MKlasen]; Dorfman, Jordan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b2443612937410b87c6a0a816a216eb-Dorfman, Jordan]; Jernberg, Jorianne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=Jernberg, Jorianne]
Subject: FW: From Inside EPA - WIFIA - SRF

From: Steve Via
Sent: Friday, December 22, 2017 3:04 PM
To: Tracy Mehan <tmehan@awwa.org>; Tommy Holmes <THolmes@awwa.org>; Nate Norris <NNorris@awwa.org>
Subject: From Inside EPA - WIFIA - SRF

Steve Via
Director Federal Relations, AWWA Ex. 6

Groups Split Over Boozman's Plan For New EPA Water Funding Mechanism

December 22, 2017

Sen. John Boozman (R-AR), chairman of the Senate clean water panel, is floating draft legislation that would create a new $1 billion water infrastructure loan mechanism for states at EPA, but the bill is splitting water groups, with supporters saying it would increase funds, especially for small and rural communities, while opponents say it could cap existing funds.

The fight over the legislation comes as the Trump administration prepares to unveil its broader infrastructure financing package in early 2018, signaling that the dispute over the water legislation is likely to be part of the broader infrastructure debate Congress is likely to face next year.

The draft bill, a copy of which was obtained by *Inside* EPA along with a section-by-section summary, would amend the 2014 Water Infrastructure Financing and Innovation Act (WIFIA) to provide $200 million per year that EPA would provide to state revolving loan fund (SRF) authorities to use as security for Treasury loans.

Those loans would be provided at preferential interest rates, with one cohort having interest rates set at between 50 and 100 percent of treasury rates and the other set at a fixed 80 percent of treasury rates.

The bill, referred to as the Securing Required Funding for Water Infrastructure Now (SRF WIN) Act, establishes a $5 billion project cap per state for fiscal years 2018 through 2022, and includes a sense of Congress statement that the loan security funds will leverage almost $11 billion in treasury financing per year.

Availability of the new funding would be contingent on an annual appropriation equal to fiscal year 2017 SRF and WIFIA funding levels, which supporters say will help guarantee both SRF and WIFIA funding, neither of which is currently appropriated at authorized levels.

Supporters also say the legislation would allow state SRF authorities to be able to apply for 100 percent of federal funding rather than the 49/51 split in WIFIA.

Repayment of SRF WIN Act funding would be from the state finance authorities, and with 35 years to pay the loan back, communities can plan ahead to invest in their infrastructure without citizens seeing their water utility bills skyrocket, supporters' talking points say.

State financing authorities would also have their applications reviewed within 180 days, according to the talking points. And it would also extend authorization of WIFIA through 2022 and remove WIFIA's pilot designation.

Supporters of the bill include the Council of Infrastructure Financing Authorities, National Rural Water Association, National Association of Clean Water Agencies, Ducks Unlimited, American Public Works Association, American Society of Civil Engineers and Associated General Contractors of America, among others.

Supporters say the draft legislation builds on the leveraging concepts of WIFIA to provide a minimum of $50 billion in new funds for the existing drinking water and clean water SRFs over five years.

Supporters say the legislation is needed to significantly increase available water infrastructure funds, leverage SRF funds, which policymakers are expected to hold level even as other EPA programs are cut, reduce the agency's administrative burdens and a host of other benefits.

Unnecessary Legislation

But opponents of the legislation, including the American Water Works Association, Association of Metropolitan Water Agencies and the Water Environment Federation, say the legislation is unnecessary because WIFIA, while aimed primarily at large infrastructure projects over $20 million, already allows small communities to seek funding for smaller projects and allows states to aggregate projects to meet WIFIA funding thresholds.

"Every one of the SRF projects eligible under that proposal is already eligible to seek financing under WIFIA, given that SRFs can bundle smaller projects to meet the project size thresholds, as the State of Indiana has done," opponents write in a Dec. 13 letter to Boozman and Sen. Cory Booker (D-NJ), the panel's ranking Democrat.

"We believe we at least ought to see how the Indiana project plays out, and the level of SRF interest in WIFIA generally, before creating and dedicating outsized funding to another SRF program within WIFIA."

The opponents also raise other concerns in their letter, including calling the "enormous interest rate subsidy" of allowing the EPA administrator to fund some loans at 50 percent of the treasury rate "a significant step backward from our collective effort under WIFIA to leverage limited federal funds to support much-needed water infrastructure investment."

EPA has estimated it will leverage WIFIA capitalization funds at a ratio of 92:1, but opponents say they estimate the leveraging ratio under the proposed bill would be only 6:1.

"Additionally, the draft bill appears to give the EPA Administrator complete discretion in making loans at half the Treasury rate, so this interest rate subsidy is apparently not targeted to rural or under-resourced systems. There also appears to be no provision for the rate savings to be passed along to the borrowers from the SRF," the opponents say in their letter.

They also take issue with the idea that the bill would protect the SRFs and WIFIA by tying funding for the new program to the requirement that SRFs and WIFIA get the same amount of money as they did the previous year.

"We believe that once [the Congressional Budget Office] scores this bill, that provision will likely be removed to help reduce the deficit the new program would cause. In addition, this language would create a de facto cap on SRF and WIFIA appropriations at FY 2017 levels, where the WIFIA authorizing legislation provided for increased funding each year for WIFIA," the letter says.

And while WIFIA's funding authorization is currently scheduled to expire in 2019, the statute carries no sunset clause that would force the program to cease operations in the absence of additional congressional action, as the SRF WIN provision would do, the opponents note.

An EPA technical analysis of the draft bill from Sept. 25 also questions the sliding scale provision for loans, saying, "the language as written is not clear and may be interpreted to allow EPA to provide any SRF borrower an interest rate as low as 50% of treasury rates. We recommend amending the language to state that SRFs may borrow from WIFIA at no less than 100% of treasury rates (same as base program), except for certain states that may borrow at interest rates between 50% and 80% of treasury rates." -- *Lara Beaven* (lbeaven@iwpnews.com)

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/19/2017 11:09:07 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: AWWA whiteboard animation on Farm Bill Reauthorization

https://www.youtube.com/watch?v=kPEdoWgc4Gg&feature=em-share_video_user

Feel free to post this as appropriate. Thank you.

GTM

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/21/2017 9:51:40 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: News from Bloomberg BNA: Environment & Energy Report: Pa. Town Gets OK to Use Trees, Vegetation to Curb Sewer Overflow

Here is a story that I thought would interest you.

https://bnanews.bna.com/environment-and-energy/pa-town-gets-ok-to-use-trees-vegetation-to-curb-sewer-overflow/?utm_source=Email_Share

Like.

GTM

Message

From: Tracy Mehan Ex. 6
Sent: 2/13/2018 1:07:33 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: from the Wall Street Journal

The Deficit Problem in a Chart

'Payments for individuals' gobble up 69% of federal outlays.

New copies of President Donald Trump's Budget for the U.S. Government for the Fiscal Year 2019 lay on a display table at the U.S. Government Publishing Office in Washington, Feb. 12. PHOTO: LEAH MILLIS/REUTERS

By

The Editorial Board

Feb. 12, 2018 7:17 p.m. ET

82 COMMENTS

The White House released the President's $4.4 trillion budget request for fiscal 2019 on Monday, and talk about an afterthought. Congress just passed a two-year budget outline that supersedes nearly everything Mr. Trump is proposing.

Congress still must work out the details in spending bills, and perhaps appropriators will grab a Trump request or two, which include everything from a border wall to cuts to food stamps to a plan for spinning off air-traffic control. The President also wants $200 billion in infrastructure spending (see nearby) over 10 years, though this seems politically unlikely now that the GOP has shoveled $20 billion on public works for two years and annual deficits may exceed $1 trillion.

Entitlements vs. DefensePayments for defense and to individuals as apercentage of federal outlays, 1989-2023Source: Office of Management and BudgetNote: 2018-2023 estimates
%National defensePayments for individuals19902000'10'20020406080

The most important thing to understand about the U.S. budget, Donald Trump or no, is illustrated by the nearby chart. Even with Mr. Trump's modest increases, defense barely rises as a share of federal outlays. In 1989 when the Berlin Wall fell, defense was 26.5% of outlays. In 2019 it will be 15.6%.

Meantime, look at "payments for individuals," which encompass such income transfers as Medicare, Medicaid, Social Security and food stamps, among other things. This category was 47.7% of outlays in 1989 and has steadily climbed to reach an estimated 69.2% in 2019.

Net interest on the federal debt soaks up another 7.4% of outlays for 2018, and that will rise with interest rates. But as long as Donald Trump and Democrats refuse to reform entitlements, whining about debt and deficits is phony. Defense hawks like John McCain have a compelling case that troops have been denied adequate resources to defend the country, and the giant sucking sound in the federal fisc isn't defense. It's the relentless rise of income transfers.

Appeared in the February 13, 2018, print edition.

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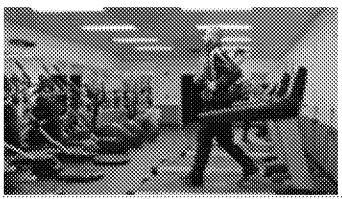
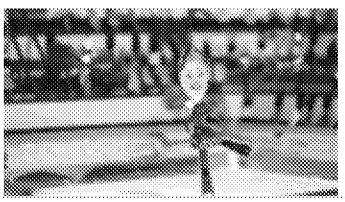
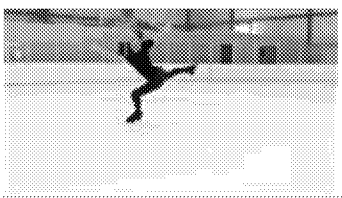


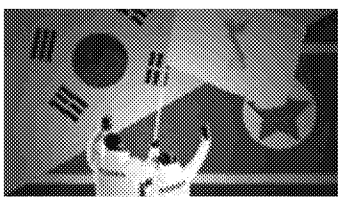
When Going Forward Is Running Backward



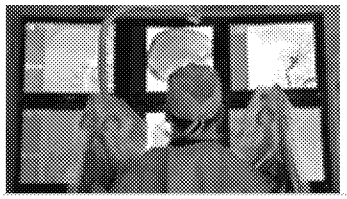
Homemade Highlights: Team Figure Skating



Olympian Jason Brown Breaks Down Figure Skating's Six Jumps



How North and South Korea Came to March Under One Flag



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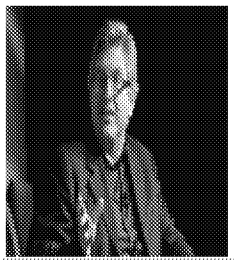

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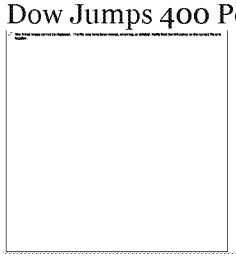

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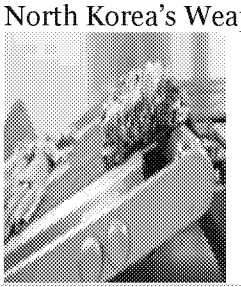

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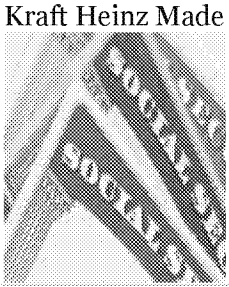

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- WSJ Pro Central Banking
- WSJ Video
- WSJ Wine

Message

From: Tracy Mehan Ex. 6
Sent: 2/13/2018 12:47:08 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: from The Wall Street Journal

POLITICS

Infrastructure Plan Puts Onus on Local Governments

Plan would shift responsibility for funding major new public works from the federal government to cities and states.

President Donald Trump speaking during an infrastructure-initiative meeting at the State Dining Room of the White House in Washington on Monday. PHOTO: T.J. KIRKPATRICK/BLOOMBERG NEWS

By
Ted Mann
Feb. 12, 2018 7:06 p.m. ET
88 COMMENTS

The Trump administration released a long-awaited infrastructure plan on Monday that seeks to replace traditional federal publics-works programs with a new system of incentives intended to prod state and local governments to raise their own funds for physical improvements.

The administration says $100 billion in incentives over 10 years could yield more than $1 trillion in total investment in roads, bridges, rails and water systems, adding that Washington should provide assistance of no more than 20% of a new project's cost. The plan would shift the responsibility for funding major new public works from the federal government to cities and states. Still, it wasn't clear where the government would find the $200 billion in direct federal spending outlined in the plan.

The administration has challenged Congress to find the federal share of the money—a $200 billion challenge made all the more difficult when President Donald Trump signed a two-year budget agreement last week. Mr. Trump could face resistance from Republicans leery of adding to the deficit, as well as moderate Republicans and

Democrats who successfully blocked his proposals for deep cuts in transportation and infrastructure grant programs when he introduced in his first budget proposal last year.

Higher deficits resulting from tax cuts and last week's spending bill make Mr. Trump's infrastructure-funding push an "absolute long shot," said Andy Laperriere, a policy analyst at the research firm Cornerstone Macro.

"House Republicans will not go along with an infrastructure bill that adds to the deficit. This will meet fierce resistance," he said.

White House officials have said that their budget proposal includes sufficient cuts to free up the $20 billion a year needed to fund the program. And advisers have consistently stayed neutral on calls—including from business groups like the U.S. Chamber of Commerce—to raise the federal gas tax for the first time since the early 1990s to fund a major infrastructure program.

Tax increases are viewed skeptically on Capitol Hill, especially in the wake of a $1.5 trillion tax-cut package and entering an election year. And Mr. Trump may struggle to get members of Congress to approve deep cuts in existing spending.

Mr. Trump's budget, if enacted, would slash existing infrastructure programs, potentially imperiling major projects whose sponsors intended to tap them for construction funds in the coming months. For instance, the administration proposes to save more than $1.4 billion by eliminating the Federal Transit Administration's New Starts program, though it would permit projects that already have signed agreements to be funded through those grants to proceed.

Eliminating New Starts would complicate efforts to develop funding plans for major projects like a proposed new tunnel under the Hudson River between New Jersey and New York City, one of the biggest priorities of political leaders in both states.

In Los Angeles, city officials warn that they soon must finalize a $1.3 billion New Starts grant to begin construction on the third phase of the expansion of the Metro's Purple Line—an expansion that is needed to be in place before the city hosts the 2028 Summer Olympics.

Leaving a meeting with the president and his advisers at the White House, Tennessee Gov. Bill Haslam, a Republican, praised the administration's efforts but said states also

need the administration and Congress to find a way to replenish the Highway Trust Fund, which provides the majority of federal transportation funding to the states.

"We're concerned with the Highway Trust Fund balance where it is now," said Mr. Haslam. That account is funded by the 18.4-cent-per-gallon federal gas tax, which hasn't been raised since 1993 and is headed for insolvency by 2021 without infusions of additional funding or a tax increase.

"People need to understand that trust fund's out of balance and if not now, at some point in time we're going to pay the price for that," Mr. Haslam said. "We still need that to happen."

Mr. Trump will also face headway on other cuts, like a proposal to slash by half the annual subsidy for Amtrak, with a focus on making states pick up more of the cost of the national railroad's long-distance routes. The proposed cut of $757 million is similar to the cut proposed by the administration for fiscal 2018.

But that cut was quickly rejected in the Republican-controlled Senate last summer, along with a number of other reductions to transportation and housing and urban grants.

A senior White House official said this week that the administration believes it has strong support from local elected officials, who will support having to raise a greater share of funding for infrastructure improvements but will have greater control over individual projects.

Mr. Haslam, the Tennessee governor, said Monday he was reassured that his state would be given credit for a transportation-funding package it passed last year if the administration succeeds in switching to an incentive-based federal grant system.

But Los Angeles Mayor Eric Garcetti, a Democrat the White House has often cited as an official who has already embraced the model of raising local funds for major transit projects, was less impressed.

"Any federal plan must expand real dollars and not increase the burden on local government to pick up the slack when Washington won't lead," Mr. Garcetti said, saying the administration needed to provide the "fair share" of funding from Washington. "They can't count on our dollars if they aren't matching them."

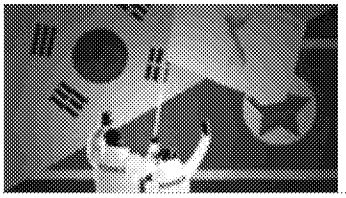
Rep. John Yarmuth of Kentucky, the top Democrat on the House Budget Committee, told reporters Monday that getting the proposal through Congress will be "very difficult. While Democrats are "certainly willing to discuss any proposal, we think this one's totally inadequate and relies too much on speculative private investment," he said.

Mr. Yarmuth said he wanted to see more than $200 billion invested in infrastructure over 10 years and that even if that could leverage additional private funds, it would be insufficient. "There's not going to be much Democratic support for this one," he said of Mr. Trump's proposal.

—Nick Timiraos, Kristina Peterson and David Harrison contributed to this article.

Write to Ted Mann at ted.mann@wsj.com

Appeared in the February 13, 2018, print edition as 'Infrastructure Proposal Puts the Onus on States.'



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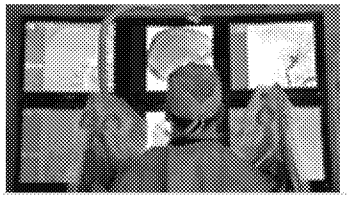

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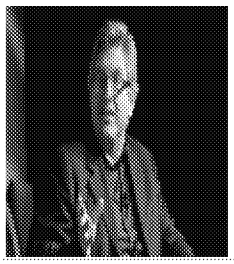

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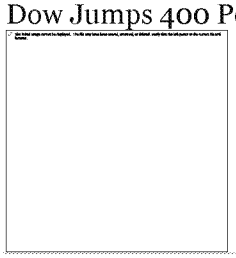
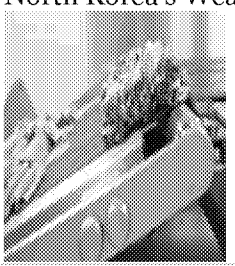
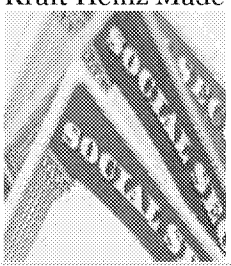


North Korea's Weapons of Mass Distraction



Kraft Heinz Made Its Factories Really Efficient. Now It Has to Sell Bologna



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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 3/6/2018 5:53:48 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Associations' letter re SRF WIN
Attachments: SRF WIFIA letter-AWWA-AMWA-WEF-Energy.pdf; SRF WIFIA letter-AWWA-AMWA-WEF-House.pdf

FYI.

GTM

American Water Works Association

ASSOCIATION OF METROPOLITAN WATER AGENCIES

Water Environment Federation
the water quality people®

March 6, 2018

The Honorable Greg Walden
Chair
The Honorable Frank Pallone, Jr.
Ranking Member
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Chairman Walden and Ranking Member Pallone,

We are aware of legislation introduced in the House and Senate that would create preferential borrowing terms and exclusive, dedicated budget authority within the Water Infrastructure Finance and Innovation Act (WIFIA) program for state revolving loan funds (SRFs), H.R. 4902 and S. 2364. We urge you to oppose this idea. It does not make sense, particularly from an economic standpoint.

The Drinking Water and Clean Water SRF programs have been important finance tools, primarily, but not exclusively, for small to medium-sized projects. WIFIA was created to provide low-cost financing for drinking water, wastewater and stormwater projects costing at least $20 million, larger than the SRF programs typically address. That said, WIFIA also offers financing opportunities for smaller projects. There is provision in the statute allowing communities serving fewer than 25,000 people to apply for WIFIA loans for projects costing at least $5 million. In addition, states may aggregate multiple small-scale projects into one WIFIA application to meet either the $5 million or $20 million threshold.

Given these existing, ample funding opportunities for a wide range of communities, a new WIFIA just for SRFs is unnecessary. Every one of the SRF projects eligible under that proposal is already eligible to seek financing under WIFIA, given that SRFs can bundle smaller projects to meet the project size thresholds, as the State of Indiana has done. We believe that Congress should see how the Indiana project plays out, and the level of SRF interest in WIFIA generally, before creating and dedicating outsized funding to another SRF program within WIFIA.

We have additional concerns. We believe the large interest rate subsidy in H.R. 4902/S 2364 is a significant step backward from our collective effort under WIFIA to leverage limited federal funds to support much-needed water infrastructure investment. With the 12 letters of interest for WIFIA loans EPA is processing now, the agency has estimated it will leverage WIFIA

capitalization funds at a **ratio of 92:1**. We estimate that loans under the proposed SRF preference would consume a large amount of budget authority with the interest rate subsidy, resulting in a dramatically lower leveraging ratio of about **6:1**.

At 6:1, these SRF preference loans could support about $1.2 billion in loans, which, in turn, would support about **$2.4 billion** in total water infrastructure investment with a **$200 million proposed annual authorization.**

In contrast, at 92:1, EPA has estimated that the agency can support twice that level of loans -- $2.3 billion -- and twice the level of total infrastructure investment -- **$5 billion** in projects -- with **just $25 million in WIFIA annual authorizations**.

Clearly, the original WIFIA program offers much greater leveraging capabilities than the new proposal, thus allowing appropriations to stretch further and provide taxpayers with the greatest return on their investment.

Additionally, the legislation appears to give the EPA Administrator complete discretion in making loans at less than the Treasury rate, so this interest rate subsidy is apparently not targeted to rural or under-resourced systems. There also appears to be no provision for the rate savings to be passed along to the borrowers from the SRF.

Finally, there is a provision in the SRF WIN bills that would theoretically protect the SRF programs and WIFIA by saying that this new program could not be funded unless the SRFs and WIFIA received appropriations at not less than the levels they received during the 2018 fiscal year. We believe this provision will raise significant scoring concerns and would also create a de facto cap on SRF and WIFIA appropriations at FY2018 levels, where the original WIFIA authorizing legislation provided for increased funding each year for WIFIA.

We believe that there are better legislative vehicles for reinvesting in our nation's water infrastructure, namely H.R. 4492 and S. 2329, the Water Infrastructure Finance and Innovation Reauthorization Act. These bills would not only reauthorize WIFIA for five years while boosting authorized appropriations, but they would also help jump-start that part of WIFIA authorized for the Corps of Engineers. Providing more appropriations for WIFIA would make more loan money available for all interested parties, including state agencies.

The WIFIA program is set to expire at the end of FY2019, but EPA is expected to make the first loans in the second quarter of 2018. This could mean Congress will only have a sample size of three fiscal years to judge the budgetary and infrastructure benefits of the program. Reauthorization of the program for an additional five years, as proposed in H.R. 4492 and S. 2329, would enable the EPA and Corps to further stand up the program and Congress time to further consider the benefits and functionality of WIFIA before considering drastic changes to the program, as proposed in H.R. 4902 and S. 2364.

Again, we urge your committee not to take up the SRF WIN legislation, but instead consider H.R. 4492 as the best mechanism to leverage federal funding into effective water infrastructure investment. We would be happy to continue conversations on the SRFs, WIFIA, the Safe Drinking Water Act, the Clean Water Act and water infrastructure finance. Please do not hesitate to contact us or our staffs.

Sincerely,

G. Tracy Mehan III
Executive Director, Government Affairs
American Water Works Association
Ex. 6

Diane VanDe Hei
Chief Executive Officer
Association of Metropolitan Water Agencies
Ex. 6

Tim Williams
Deputy Executive Director
Water Environment Federation
Ex. 6

Cc/ Members, House Committee on Energy and Commerce

Members, House Appropriations Subcommittee Interior, Environment and Related Agencies

American Water Works Association

ASSOCIATION OF METROPOLITAN WATER AGENCIES

Water Environment Federation
the water quality people®

March 6, 2018

The Honorable Bill Shuster
Chair
The Honorable Peter A. DeFazio
Ranking Member
Committee on Transportation and Infrastructure
United States House of Representatives
Washington, DC 20515

Dear Chairman Shuster and Ranking Member DeFazio,

We are aware of legislation introduced in the House and Senate that would create preferential borrowing terms and exclusive, dedicated budget authority within the Water Infrastructure Finance and Innovation Act (WIFIA) program for state revolving loan funds (SRFs), H.R. 4902 and S. 2364. We urge you to oppose this idea. It does not make sense, particularly from an economic standpoint.

The Drinking Water and Clean Water SRF programs have been important finance tools, primarily, but not exclusively, for small to medium-sized projects. WIFIA was created to provide low-cost financing for drinking water, wastewater and stormwater projects costing at least $20 million, larger than the SRF programs typically address. That said, WIFIA also offers financing opportunities for smaller projects. There is provision in the statute allowing communities serving fewer than 25,000 people to apply for WIFIA loans for projects costing at least $5 million. In addition, states may aggregate multiple small-scale projects into one WIFIA application to meet either the $5 million or $20 million threshold.

Given these existing, ample funding opportunities for a wide range of communities, a new WIFIA just for SRFs is unnecessary. Every one of the SRF projects eligible under that proposal is already eligible to seek financing under WIFIA, given that SRFs can bundle smaller projects to meet the project size thresholds, as the State of Indiana has done. We believe that Congress should see how the Indiana project plays out, and the level of SRF interest in WIFIA generally, before creating and dedicating outsized funding to another SRF program within WIFIA.

We have additional concerns. We believe the large interest rate subsidy in H.R. 4902/S 2364 is a significant step backward from our collective effort under WIFIA to leverage limited federal funds to support much-needed water infrastructure investment. With the 12 letters of interest for WIFIA loans EPA is processing now, the agency has estimated it will leverage WIFIA

capitalization funds at a **ratio of 92:1**. We estimate that loans under the proposed SRF preference would consume a large amount of budget authority with the interest rate subsidy, resulting in a dramatically lower leveraging ratio of about **6:1**.

At 6:1, these SRF preference loans could support about $1.2 billion in loans, which, in turn, would support about **$2.4 billion** in total water infrastructure investment with a **$200 million proposed annual authorization.**

In contrast, at 92:1, EPA has estimated that the agency can support twice that level of loans -- $2.3 billion -- and twice the level of total infrastructure investment -- **$5 billion** in projects -- with **just $25 million in WIFIA annual authorizations**.

Clearly, the original WIFIA program offers much greater leveraging capabilities than the new proposal, thus allowing appropriations to stretch further and provide taxpayers with the greatest return on their investment.

Additionally, the legislation appears to give the EPA Administrator complete discretion in making loans at less than the Treasury rate, so this interest rate subsidy is apparently not targeted to rural or under-resourced systems. There also appears to be no provision for the rate savings to be passed along to the borrowers from the SRF.

Finally, there is a provision in the SRF WIN bills that would theoretically protect the SRF programs and WIFIA by saying that this new program could not be funded unless the SRFs and WIFIA received appropriations at not less than the levels they received during the 2018 fiscal year. We believe this provision will raise significant scoring concerns and would also create a de facto cap on SRF and WIFIA appropriations at FY2018 levels, where the original WIFIA authorizing legislation provided for increased funding each year for WIFIA.

We believe that there are better legislative vehicles for reinvesting in our nation's water infrastructure, namely H.R. 4492 and S. 2329, the Water Infrastructure Finance and Innovation Reauthorization Act. These bills would not only reauthorize WIFIA for five years while boosting authorized appropriations, but they would also help jump-start that part of WIFIA authorized for the Corps of Engineers. Providing more appropriations for WIFIA would make more loan money available for all interested parties, including state agencies.

The WIFIA program is set to expire at the end of FY2019, but EPA is expected to make the first loans in the second quarter of 2018. This could mean Congress will only have a sample size of three fiscal years to judge the budgetary and infrastructure benefits of the program. Reauthorization of the program for an additional five years, as proposed in H.R. 4492 and S. 2329, would enable the EPA and Corps to further stand up the program and Congress time to further consider the benefits and functionality of WIFIA before considering drastic changes to the program, as proposed in H.R. 4902 and S. 2364.

Again, we urge your committee not to take up the SRF WIN legislation, but instead consider H.R. 4492 as the best mechanism to leverage federal funding into effective water infrastructure investment. We would be happy to continue conversations on the SRFs, WIFIA, the Safe Drinking Water Act, the Clean Water Act and water infrastructure finance. Please do not hesitate to contact us or our staffs.

Sincerely,

G. Tracy Mehan III
Executive Director, Government Affairs
American Water Works Association
Ex. 6

Diane VanDe Hei
Chief Executive Officer
Association of Metropolitan Water Agencies
Ex. 6

Tim Williams
Deputy Executive Director
Water Environment Federation
Ex. 6

Cc/ Members, House Committee on Transportation and Infrastructure

Members, House Appropriations Subcommittee Interior, Environment and Related Agencies

Message

From: Grevatt, Peter [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D3CAA0C39EBE44CB9D3AE44DA7543733-GREVATT, PETER]
Sent: 12/28/2017 6:26:32 PM
To: Howard Neukrug [Ex. 6]
CC: David LaFrance [dlafrance@awwa.org]; rogers, rick [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bce033a9ede7409d944d8ae868394548-Rroger04]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Best-Wong, Benita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6ee79b3d0fc0429b99f2c05481b0b957-bbestwon]; Mclain, Jennifer [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2bc5b268184348bbb383a56b0042b603-Jennifer Mclain]; Wadlington, Christina [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5fb7cd0baa5e4a6fb1df7e471e2133b6-Wadlington, Christina]; Dennis, Allison [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9bf7959058b241fab18e564e9c957b56-ADennis]
Subject: Re: Pittsburgh Blue Ribbon Panel REPORT

Thanks Howard. Excellent news!

Sent from my iPhone

On Dec 28, 2017, at 12:14 PM, Howard Neukrug <[Ex. 6]> wrote:

> Good things continue to happen in Pittsburgh. This is hot off of the presses. Happy Holidays.
>
> Howard
>
> http://apps.pittsburghpa.gov/redtail/images/1279_PWSAfinal.pdf

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/13/2017 9:46:44 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Joint Letter re SRF WIN
Attachments: SRF WIFIA letter-AWWA-AMWA-WEF.pdf

FYI.

GTM

December 13, 2017

The Honorable John Boozman
Chair
The Honorable Cory A. Booker
Member
Subcommittee on Fisheries, Water and Wildlife
United States Senate
Washington, DC 20510

Dear Senators Boozman and Booker,

We are aware of draft legislation circulating on Capitol Hill that would create preferential borrowing terms and exclusive, dedicated budget authority within the Water Infrastructure Finance and Innovation Act (WIFIA) program for state revolving loan funds (SRFs). We urge you to oppose this idea. It does not make sense particularly from an economic standpoint.

The SRF programs have been an important finance tool, primarily, but not exclusively, for small to medium-sized projects. WIFIA was created to provide low-cost financing for projects costing at least $20 million, larger than typical SRF projects. That said, there is provision in WIFIA allowing communities serving less than 25,000 to apply for WIFIA loans if their projects cost at least $5 million. In addition, states may aggregate projects to meet either the $5 million or $20 million threshold.

A new WIFIA just for SRFs is therefore unnecessary. Every one of the SRF projects eligible under that proposal is already eligible to seek financing under WIFIA, given that SRFs can bundle smaller projects to meet the project size thresholds, as the State of Indiana has done. We believe we at least ought to see how the Indiana project plays out, and the level of SRF interest in WIFIA generally, before creating and dedicating outsized funding to another SRF program within WIFIA.

We have additional concerns. We believe the enormous interest rate subsidy in this new draft proposal – funding loans at one-half of Treasury rates – is a significant step backward from our collective effort under WIFIA to leverage limited federal funds to support much-needed water infrastructure investment. With the 12 WIFIA loan applications EPA is processing now, the agency has estimated it will leverage WIFIA capitalization funds at a **ratio of 92:1**. We estimate that loans under the proposed SRF preference would consume an enormous amount of budget authority with the interest rate subsidy, resulting in a dramatically lower leveraging ratio of **just 6:1**.

At 6:1, these SRF preference loans could support about $1.2 billion in loans, which, in turn, would support about **$2.4 billion** in total water infrastructure investment with their **$200 million proposed authorization.**

In contrast, at 92:1, EPA has informally estimated that the agency can support twice that level of loans -- $2.3 billion -- and twice the level of total infrastructure investment -- **$5 billion** in projects -- with **just $25 million in WIFIA authorizations**.

Would not Congress want to see its appropriations stretch further, as the original WIFIA would do? Also, why shouldn't states compete on their merits for WIFIA dollars just like the other entities?

Additionally, the draft bill appears to give the EPA Administrator complete discretion in making loans at half the Treasury rate, so this interest rate subsidy is apparently not targeted to rural or under-resourced systems. There also appears to be no provision for the rate savings to be passed along to the borrowers from the SRF.

Another concern is that the draft SRF WIN proposal would newly impose a sunset on the WIFIA program at the end of the 2022 fiscal year, thereby forcing Congress to act to keep the program functional beyond that date. This introduces an unnecessary threat to the future of WIFIA.

Finally, there is a provision in the draft SRF WIN bill that would theoretically protect the SRF programs and WIFIA by saying that this new program could not be funded unless the SRFs and WIFIA got the same amount of money as they did the previous year. We believe that once CBO scores this bill, that provision will likely be removed to help reduce the deficit the new program would cause. In addition, this language would create a de facto cap on SRF and WIFIA appropriations at FY 2017 levels, where the WIFIA authorizing legislation provided for increased funding each year for WIFIA.

Because of these concerns, we are unable to offer our support to the draft SRF WIN proposal. However, we would be happy to continue conversations on the SRFs, WIFIA, the Safe Drinking Water Act, the Clean Water Act and water infrastructure finance. Please do not hesitate to contact us or our staffs.

Sincerely,

G. Tracy Mehan III
Executive Director, Government Affairs
American Water Works Association
Ex. 6

Diane VanDe Hei
Chief Executive Officer
Association of Metropolitan Water Agencies
Ex. 6

Tim Williams
Deputy Executive Director
Water Environment Federation
Ex. 6

Cc/ Members, Senate Committee on Environment and Public Works

Members, Senate Appropriations Subcommittee Interior, Environment and Related Agencies

Message

From: Sam Wade [sam@nrwa.org]
Sent: 12/13/2017 8:51:03 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Invitation

Good afternoon Less:

I hope all is well and you get to enjoy some time off for the Christmas season. I wanted to invite you be a water taste judge at the 20th Annual Great American Water Taste Test to be held on Wednesday February 7 at the Hyatt Regency on Capitol Hill.

This is a non-political event where submissions from most of or states are pre-judged down to the top 5 entries. Also on the judging panel is Kevin Baily, Senate Agriculture Staff, Claudette Fernandez, Assistant Administrator of USDA Water Programs and Sarah Tyree, VP of Government Affairs for Co-Bank.

If you schedule will allow we would ask you arrive at noon for lunch and the event will conclude NLT 12:45. In attendance will be representatives of our associating from all states. There is no formal presentations, just commentary during the judging, a good time for all. Past winners have gone on to promote their community and have acquired additional business and in one case a major bottling company from the publicity. It is a great opportunity to promote the value and safety of or water supplies in an informal manner. We anticipate there will be press present.

Just let me know if you can make it, and have a Merry Christmas. We look forward to working with you in the New Year.

Sam Wade
National Rural Water

Ex. 6

Message

From: Adam Krantz [AKrantz@nacwa.org]
Sent: 1/12/2018 7:32:11 PM
To: Pruitt, Scott [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=757bedfd70ca4219b6d8046f5ce5681e-Pruitt, Sco]
CC: scheduling [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a09df6a2e7dd4552a8d6ecd14f44506b-scheduling]; Bodine, Susan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8c2cc6086fcc44c3be6b5d32b262d983-Bodine, Sus]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Greenwalt, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6c13775b8f424e90802669b87b135024-Greenwalt,]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Best-Wong, Benita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6ee79b3d0fc0429b99f2c05481b0b957-bbestwon]
Subject: Request for a Meeting with Administrator Pruitt and NACWA's Leadership
Attachments: 2018-1-4pruitt_mtgrequest.pdf; ATT00001.txt

Dear Administrator Pruitt: The National Association of Clean Water Agencies (NACWA) would very much appreciate a meeting of our utility executive leaders with you and your water and enforcement office leaders to discuss issues of priority concern to the regulated clean water utility sector. The attached letter contains additional information and we would be happy to meet at your convenience - there are many areas where I believe we can work together to advance water quality/quantity goals, improve the economy and create jobs. I looking forward to setting up a meeting with you as soon as possible. Hard copies have also been sent to the appropriate offices and thank you for your attention to this matter, Adam Krantz.

Adam Krantz/CEO/The National Association of Clean Water Agencies (NACWA)/[Ex. 6]/akrantz@nacwa.org

NACWA
A Clear Commitment to America's Waters

January 4, 2018

Dear Administrator Pruitt,

The National Association of Clean Water Agencies (NACWA) would welcome the opportunity for the Association's Executive Committee – made up of senior leaders of public clean water utilities from across the country – to meet with you and discuss several critical issues currently impacting the regulated public clean water utility sector.

NACWA advocates on behalf of public wastewater treatment and stormwater management agencies, with nearly 300 public utility members nationwide representing a wide diversity of geographic location and utility size. NACWA members are on the front lines of implementing the Clean Water Act (CWA) and are among the most heavily regulated dischargers under the CWA. The primary mission of our utility members is protecting public health and the environment, which we do by collecting and treating the majority of wastewater generated each day in the United States.

NACWA applauds your commitment to meeting with entities regulated by EPA, and agrees with your position that it is important for EPA to listen to the stakeholders that must implement the regulations developed by the Agency. As you complete you first year as Administrator, we believe a direct meeting with our leadership – highly regulated municipal utilities whose work is critical for both environmental protection and economic development – would provide you with a valuable and necessary stakeholder perspective. As outlined in our previous letter to you from September 27, NACWA very much appreciates the meetings we have had thus far with your career and political staff but it is critical at this point for a meeting directly with you.

Key topics we wish to discuss with you are infrastructure funding and regulatory reform. NACWA greatly appreciates your efforts as Administrator to protect federal funding for municipal clean water utilities, especially the Clean Water State Revolving Loan Fund. This is a critical source of funding for many of NACWA's members to meet their CWA obligations. As President Trump prepares to roll out his infrastructure proposal, we look forward to continued work with EPA to preserve and increase funding mechanisms for clean water infrastructure.

We also appreciate your focus on smart regulatory reform of existing CWA regulations. As NACWA previously mentioned in our comments to EPA's regulatory reform docket, there are opportunities to improve CWA implementation that would reduce the burden on our public member utilities, as well as the ratepayers they serve, while ensuring maximum flexibility at the local level to prioritize competing compliance requirements and improve environmental and public health protections.

Additionally, we would like to share with you how many clean water agencies are now innovating beyond just achieving CWA compliance to become Water Resources Utilities of the Future, endeavoring to become agents of innovation, economic growth, and technological advancements. We believe you would benefit from meeting with some of our utility leaders directly and hearing first-hand about this important progress being made by

National Association of
Clean Water Agencies
1816 Jefferson Place, NW
Washington DC 20036-2505
p 202.833.2672 F 202.833.4657
www.nacwa.org · info@nacwa.org

the municipal clean water utility sector, as well as some of the areas where EPA action could further enhance these efforts.

We look forward to meeting with you as soon as possible to discuss these issues further. Please don't hesitate to contact Adam Krantz at 202-833-4651 or *akrantz@nacwa.org* to schedule a meeting.

Thank you for your consideration and we look forward to working with you to improve our nation's water resources and continuing the productive history of collaboration between EPA and NACWA.

Sincerely,

David St. Pierre
NACWA President
Executive Director, Metropolitan Water Reclamation District of Greater Chicago

Adam Krantz
NACWA Chief Executive Officer

CC: David Ross
Susan Bodine
Sarah Greenwalt
Lee Forsgren
Andrews Sawyers

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/13/2017 2:37:21 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
CC: svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Patricia Chism [pchism@awwa.org]
Subject: RE: Federalism consultation on LCR

Thanks!

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Wednesday, December 13, 2017 9:31 AM
To: Tracy Mehan <tmehan@awwa.org>; Grevatt, Peter <Grevatt.Peter@epa.gov>
Cc: Steve Via <SVia@awwa.org>; Patricia Chism <pchism@awwa.org>
Subject: RE: Federalism consultation on LCR

Tracy,

Let me see what the art of the possible might be under the requirements of the Federalism EO.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Wednesday, December 13, 2017 9:15 AM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Grevatt, Peter <Grevatt.Peter@epa.gov>
Cc: svia@awwa.org; Patricia Chism <pchism@awwa.org>
Subject: Federalism consultation on LCR

Dear Lee and Peter,

Would it be OK if I audited any consultation sessions you schedule re federalism and LCR? I would not be making any statements or asking questions. Just listening to the dialogue.

If that is OK, could you let me know the day, time and place of the session.

Thanks so much.

Tracy

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American Water Works Association
Dedicated to the World's Most Important Resource ®

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/13/2017 2:15:01 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
CC: svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Patricia Chism [pchism@awwa.org]
Subject: Federalism consultation on LCR

Dear Lee and Peter,

Would it be OK if I audited any consultation sessions you schedule re federalism and LCR? I would not be making any statements or asking questions. Just listening to the dialogue.

If that is OK, could you let me know the day, time and place of the session.

Thanks so much.

Tracy

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/18/2017 5:05:59 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
Subject: RE: Senate meeting on SRF WIN on Wednesday

Very good. We will reach out if we get to something useful. Thanks, Lee.

Tracy

Get Outlook for Android

From: Forsgren, Lee <Forsgren.Lee@epa.gov>
Sent: Monday, December 18, 2017 11:58:49 AM
To: Tracy Mehan
Cc: Sawyers, Andrew; Grevatt, Peter
Subject: RE: Senate meeting on SRF WIN on Wednesday

Tracy,

Since we do not have an official "Administration Position" the Office of Water will be attending Wednesday's meeting only to provide "technical assistance" and to answe technical questions as to the proposed legislation's potential and technical feasibility. As with any infrastructure proposal we would be happy to meet with you at any time to find ways to improve the Waste Water and Drinking Water infrastructure of the nation.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Monday, December 18, 2017 11:36 AM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Cc: Sawyers, Andrew <Sawyers.Andrew@epa.gov>; Grevatt, Peter <Grevatt.Peter@epa.gov>
Subject: Senate meeting on SRF WIN on Wednesday

Lee,

Who will be representing EPA at the meeting on Wednesday. We would love to talk in advance. We have some thoughts on alternatives to SRF WIN.

Thanks.

Tracy

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American Water Works Association
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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/18/2017 4:36:18 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
Subject: Senate meeting on SRF WIN on Wednesday

Lee,

Who will be representing EPA at the meeting on Wednesday. We would love to talk in advance. We have some thoughts on alternatives to SRF WIN.

Thanks.

Tracy

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/18/2017 3:35:08 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Nagle, Deborah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33888a2bbe8f48aeb4ad9cc54259fb4e-dnagle]; Ames, George [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=23fe9bb4f8ed4843ae2ec8398703514c-games]; Shanaghan, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=63bb2a6ab300454dbd58e2d3b9084cca-pshanagh]; Anderer, Kirsten [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=065ed70f5f8e4c49803b16363d4d0e00-Anderer, Kirsten]; Chamberlain, Nick [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b499d62de3c84c1eb010a14a477e7ade-Chamberlain, Nick]; Bodine, Susan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8c2cc6086fcc44c3be6b5d32b262d983-Bodine, Sus]
Subject: As Baltimore Council weighs tackling high water bills, study shows how much customers are squeezed - The Baltimore Sun

http://www.baltimoresun.com/news/maryland/baltimore-city/bs-md-ci-water-cost-study-20171215-story.html#share=email~story

FYI.

GTM

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 1/4/2018 9:31:41 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: On Cooperation between Utilities and Agriculture for Source Water Protection
Attachments: AWWA CEO LAFRANCE ON COOPERATION WITH FARMERS ON SOURCE WATER PROTECTION.pdf

Attached please find an upcoming column by AWWA CEO David LaFrance on cooperation between utilities and farmers for source water protection.

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (direct)
(cell)

Attachment

DAVID B. LaFRANCE, CHIEF EXECUTIVE OFFICER

Collaboration With Farmers Key to Source Water Protection

When we sit down for dinner each night, there are two essential items on the table: a glass of water and a plate of food. We can't live long without either one.

It follows that we need at least two kinds of essential people in the world: people who provide the water and people who provide the food. I don't have to remind *Journal AWWA* readers about the importance of the water people, and it doesn't take much reflection to also understand the critical role farmers and ranchers play. You might say water workers and agricultural producers are two sides of the same indispensable coin.

So it's opportune that the key to solving the most confounding source water challenge of our day hinges on partnerships between water providers and farmers. The challenge, of course, is nutrient runoff—often from agricultural operations—that washes into waterways and ultimately threatens community drinking water supplies. Nutrient runoff was one of the primary causes of the 2014 Lake Erie harmful algal bloom, which shut down water service to 400,000 people in Toledo, Ohio, for three days.

The time is right for a new era of voluntary collaboration and cooperation between the agricultural and water sectors. The coming reauthorization of the Farm Bill provides the perfect opportunity to encourage partnerships among everyone interested in productive farming practices and safe water.

AWWA is asking the US Congress to emphasize source water protection in the Farm Bill's conservation title. Many existing conservation measures address a host of environmental issues, but the direct connection between these practices and drinking water quality has not been made explicit in previous farm bills. AWWA would like to see that change by

- providing strong funding for conservation programs;
- adding a specific goal of protecting sources of drinking water as a priority for all Natural Resources Conservation Service (NRCS) conservation programs;
- encouraging NRCS state conservationists, state technical committees, and working groups to work with water utilities in identifying priority areas in each state;
- increasing the NRCS cost-share for measures that provide considerable downstream water quality benefits; and
- dedicating 10% of conservation funding to protection of sources of drinking water through existing programs.

While many water utilities have developed monitoring, treatment, and response strategies to protect their source waters, ultimately it's critical that we reduce the nutrient loads that reach water system intakes. Agricultural production often runs on thin margins, and farmers and ranchers who strongly desire to implement practices to protect source water often lack the resources to do so. But there are already examples of how NRCS programs can help agricultural producers and utilities collaborate to get the job done.

In recent years, several water utilities have committed to working cooperatively with agriculture through programs such as the Environmental Quality Incentives Program, Conservation Stewardship Program, Agricultural Conservation Easement Program, and the Regional Conservation Partnership Program. In Beaver Water District, Ark., over $8.5 million in combined federal and local funds is being applied to protect sources of drinking water, and in Cedar Rapids, Iowa, over $4 million in combined federal and local funds is going to source water protection. Both projects are being done in cooperation with agriculture. (You can read more about these partnerships in the Sept. 29, 2017, issue of *AWWA Connections*, which you will find at awwa.org).

If you work at a utility with nutrient runoff concerns, I urge you to take a closer look at how these kinds of programs might help encourage dialogue and partnerships with farmers and other stakeholders. And if you're already using this smart approach to addressing water quality before it reaches the treatment plant, please share your story with Adam Carpenter in AWWA's government affairs office at (202) 326-6126 or acarpenter@awwa.org so we can elevate your example in ongoing discussions.

At AWWA, protecting sources of drinking water is part of what we call a Total Water Solutions approach to managing water, recognizing that water serves many important purposes. Working in partnership with other stakeholders in water management, we are always looking for innovative ways to protect drinking water supplies while recognizing the interests of large and small businesses and the wider economy.

Congress would do well to preserve and enhance funding for conservation programs while increasing the focus on protecting sources of drinking water. We look forward to working closely with our friends in the agricultural community to encourage a farm bill that recognizes the critical nature of both agricultural production and safe and affordable water.

https://doi.org/10.5942/jawwa.2018.110.0026

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 7/18/2018 2:03:00 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: from Water Finance and Management

JULY 17, 2018 BY ANDREW FARR

Senate hearing avoids SRF WIN details, AMWA says

According to the Association of Metropolitan Water Agencies (AMWA) in its Monday Morning Briefing for July 16, things got heated on Capitol Hill last week when supporters of the proposed SRF WIN Act clashed with committee members over the bill during a Senate Environment and Public Works (EPW) Committee hearing.

According to AMWA, proponents of the SRF WIN Act argued the new bill is necessary to allow rural states to bundle multiple small water infrastructure projects together into a single application for Water Infrastructure Finance and Innovation Act (WIFIA) program funding.

However, no participants in the hearing acknowledged that small project bundling is already possible through the existing WIFIA program. Critics of the bill were not invited to testify.

Related — AMWA: The Time Is Now for Congress to Recommit to WIFIA

The discussion about SRF WIN came during a hearing called to examine "the long-term value to U.S. taxpayers of low-cost federal infrastructure loans," AMWA said. During the meeting, committee members pushed back against a Congressional Budget Office (CBO) estimate released last month which found that changes to the WIFIA program in a version of the SRF WIN Act included in a EPW-approved water resources bill would cost the federal government approximately $2.6 billion over the next 10 years. Committee members said that bill would be revised to lower the budget score before it goes before the full Senate, possibly as soon as this week.

AMWA said the hearing was also used as an opportunity for supporters to advocate in favor of adding SRF WIN as "another tool in the water infrastructure financing toolbox."

AMWA, the American Water Works Association (AWWA) and the Water Environment Federation (WEF) are three of the more prominent water sector organizations that have been critical of the SRF WIN proposal. According to AMWA's update Monday, the association was not invited to testify, but said it did submit a letter to the EPW Committee that highlighted several problems with the bill that otherwise went unmentioned at the hearing. These include the fact that the current WIFIA already allows states to bundle multiple projects together into a single application, that SRF WIN would charge California, New York and 13 other states higher interest rates for water infrastructure loans than would be paid by smaller and more rural states and that this additional subsidization for rural states would reduce the overall amount of funding available through WIFIA.

The water resources bill that includes the SRF WIN Act could go to the Senate floor as early as this week, though the funding authorization for the SRF WIN provision may be dramatically reduced to address the budget scoring issue. AMWA said it plans to continue to oppose the measure, noting it wants to "make members of Congress aware of the numerous problems" with the legislation.

Source: AMWA

Tags: AMWA, AWWA, EPA, SRF WIN, WEF, WIFIA
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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 1/16/2018 2:35:47 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: New AWWA Standard on LSLR
Attachments: C810-17.pdf

FYI.

GTM

From: Steve Via
Sent: Monday, January 15, 2018 3:08 PM
To: Tracy Mehan <tmehan@awwa.org>; Tommy Holmes <THolmes@awwa.org>; Adam Carpenter <acarpenter@awwa.org>; Kevin Morley <KMorley@awwa.org>; Wendi Wilkes <WWilkes@awwa.org>; Nate Norris <NNorris@awwa.org>; David Cornwell <dcornwell@eetinc.com>; Gary Lynch <Ex. 6>; Michael Hotaling <MHotaling@nnva.gov>; Jennifer Heymann <Jennifer.Heymann@amwater.com>; John Albert <jalbert@waterrf.org>; Kenel, Pam <PKenel@loudounwater.org>; Kevin Dixon <Kevin.Dixon@ch2m.com>; Nancy Quirk <nancyqu@greenbaywi.gov>; Steve Estes-Smargiassi - MWRA <stephen.estes-smargiassi@mwra.com>; Steve Hubbs <Ex. 6>; Tarrah Henrie <thenrie@coronaenv.com>; 'jackb@fpud.com'; Patricia Chism <pchism@awwa.org>; Ex. 6
Subject: RE: AWWA Monthly TAG Conference Call <UPDATED Call In System>

You may find the attached AWWA Standard helpful when discussing the LCR agenda item.

Steve

Steve Via
Director Federal Relations, AWWA Ex. 6

From: Steve Via
Sent: Friday, January 12, 2018 4:46 PM
To: 'Corson, Matt' <Matthew.Corson@amwater.com>; Tracy Mehan <tmehan@awwa.org>; Tommy Holmes <tholmes@awwa.org>; Adam Carpenter <acarpenter@awwa.org>; Kevin Morley <kmorley@awwa.org>; Wendi Wilkes <WWilkes@awwa.org>; Nate Norris <NNorris@awwa.org>; 'David Cornwell' <dcornwell@eetinc.com>; 'Gary Lynch' <Ex. 6>; 'Hotaling, Mike' <MHotaling@nnva.gov>; 'Jennifer Heymann' <Jennifer.Heymann@amwater.com>; 'John Albert' <jalbert@waterrf.org>; 'Kenel, Pam' <PKenel@loudounwater.org>; 'Kevin Dixon' <Kevin.Dixon@ch2m.com>; 'Nancy Quirk' <nancyqu@greenbaywi.gov>; 'Steve Estes-Smargiassi - MWRA' <stephen.estes-smargiassi@mwra.com>; 'Steve Hubbs' <Ex. 6>; 'Tarrah Henrie' <thenrie@coronaenv.com>; 'jackb@fpud.com'; Patricia Chism <pchism@awwa.org>; 'keith.cartnick@gmail.com' <Ex. 6>
Subject: RE: AWWA Monthly TAG Conference Call <UPDATED Call In System>

Good Afternoon,

On Tuesday next week we have a TAG Conference Call scheduled. Attached are three items outlining ongoing activities:

1. Plan to date for outreach to Sections in 2018
2. Status of comment development to-date in 2018.
3. Reality-checking an initial brainstorm for positive statements we might propose to WUC and reflect in our LT-LCR federalism comments.

Have an excellent 3-day weekend.
Steve

Steve Via
Director Federal Relations, AWWA | Ex. 6

-----Original Appointment-----
From: Steve Via
Sent: Wednesday, November 08, 2017 3:40 PM
To: Steve Via; Corson, Matt; Tracy Mehan; Tommy Holmes; Adam Carpenter; Kevin Morley; Wendi Wilkes; Nate Norris; Cartnick, Keith; David Cornwell; Gary Lynch; Hotaling, Mike; Jennifer Heymann; John Albert; Kenel, Pam; Kevin Dixon; Nancy Quirk; Steve Estes-Smargiassi - MWRA; Steve Hubbs; Tarrah Henrie; 'jackb@fpud.com'; Patricia Chism
Cc: Jack Bebee; Walczyk, Carol
Subject: AWWA Monthly TAG Conference Call <UPDATED Call In System>
When: Tuesday, January 16, 2018 12:00 PM-1:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Skype Meeting

Just a quick reminder of our TAG conference call on November 21 at 12 PM Eastern and an updated calendar invitation that includes our new conference call system – AWWA has transitioned to Skype for group calls. Please delete the previous recurring invitation to avoid confusion.

Please join using instructions below.

Best regards,
Steve

→ Join Skype Meeting

Trouble Joining? Try Skype Web App

Join by phone

Toll number: Ex. 6, access code: Ex. 6 (Dial-in Number) English (United States)
Find a local number

Conference ID: Ex. 6 ccess code above)
Forgot your dial-in PIN? | Help

If you are using a telephone to join the meeting audio, choose the option to have Skype call you after you click the "Join Skype Meeting" link above.

ANSI/AWWA C810-17
(First Edition)

American Water Works Association

Dedicated to the World's Most Important Resource®

AWWA Standard

Replacement and Flushing of Lead Service Lines

Effective date: Nov. 1, 2017.
First edition approved by AWWA Board of Directors June 11, 2017.
This edition approved by AWWA Board of Directors June 11, 2017.
Approved by American National Standards Institute Sept. 1, 2017.

American Water Works Association | STANDARD | *Since 1881*

Approved American National Standard ANSI

AWWA Standard

This document is an American Water Works Association (AWWA) standard. It is not a specification. AWWA standards describe minimum requirements and do not contain all of the engineering and administrative information normally contained in specifications. The AWWA standards usually contain options that must be evaluated by the user of the standard. Until each optional feature is specified by the user, the product or service is not fully defined. AWWA publication of a standard does not constitute endorsement of any product or product type, nor does AWWA test, certify, or approve any product. The use of AWWA standards is entirely voluntary. This standard does not supersede or take precedence over or displace any applicable law, regulation, or code of any governmental authority. AWWA standards are intended to represent a consensus of the water industry that the product described will provide satisfactory service. When AWWA revises or withdraws this standard, an official notice of action will be placed on the first page of the Official Notice section of *Journal – American Water Works Association*. The action becomes effective on the first day of the month following the month of *Journal – American Water Works Association* publication of the official notice.

American National Standard

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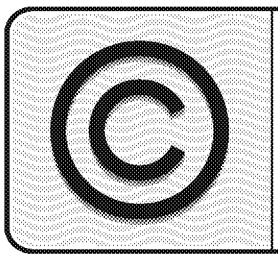
CAUTION NOTICE: The American National Standards Institute (ANSI) approval date on the front cover of this standard indicates completion of the ANSI approval process. This American National Standard may be revised or withdrawn at any time. ANSI procedures require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036; 212.642.4900; or emailing info@ansi.org.



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ISBN-13, print: 978-1-62576-269-6 eISBN-13, electronic: 978-1-61300-453-1
DOI:http://dx.doi.org/10.12999/AWWA.C810.17

Committee Personnel

The AWWA Standards Subcommittee on Lead Service Lines, which developed this standard, had the following personnel at the time of approval:

J. Eisnor, Halifax Water, Halifax, N.S., Canada (AWWA)
J.A. Fleming,* Standards Council Liaison, Greater Cincinnati Water Works, Cincinnati, Ohio (AWWA)
T.C. Gilbert, Onondaga County Water Authority, Syracuse, N.Y. (AWWA)
S. Gould, Atkins, Austin, Texas (AWWA)
M.E. Grahek, Los Angeles Department of Water and Power, Mojave, Calif. (AWWA)
K.C. Morgan, KCM Consulting Services LLC, Phoenix, Ariz. (AWWA)
K. Oberoi, Charleston Water System, Charleston, S.C. (AWWA)
P.J. Olson,* Staff Advisor, American Water Works Association, Denver, Colo. (AWWA)
S.D. Osborne, OSD LLC, Lexington, Mass. (AWWA)
R.W. Roost, Lansing Board of Water and Light, Lansing, Mich. (AWWA)
M.K. Schmelling, DC Water, Washington, D.C. (AWWA)
R. Slabaugh, Arcadis, Indianapolis, Ind. (AWWA)
F. Trinchini, City of Toronto–Toronto Water, Toronto, Ont., Canada (AWWA)
C. Van Der Kolk, Zeeland Board of Public Works, Zeeland, Mich. (AWWA)
S.H. Via, American Water Works Association, Washington, D.C. (AWWA)
A.J. Weiss, Onondaga County Water Authority, Syracuse, N.Y. (AWWA)

The AWWA Standards Committee on Distribution System Operations and Management, which reviewed and approved this standard, had the following personnel at the time of approval:

Kanwal Oberoi, *Chair*

General Interest Members

M.N. Agbodo, URS Corporation, Temecula, Calif. (AWWA)
M.L. Altland, Hatch Mott MacDonald, Iselin, N.J. (AWWA)
D.M. Flancher,* Standards Engineer Liaison, AWWA, Denver, Colo. (AWWA)
S. Gould, Atkins, Austin, Texas (AWWA)

* Liaison, nonvoting

H. Huddle, NAVFAC—Washington Public Works Department, Washington Navy Yard, D.C. (AWWA)
S.R. Mason, Kimley-Horn and Associates Inc., Fort Worth, Texas (AWWA)
B. McDonald, HDR Engineering, Phoenix, Ariz. (AWWA)
K.C. Morgan, KCM Consulting Services LLC, Phoenix, Ariz. (AWWA)
S.D. Osborne, OSD LLC, Lexington, Mass. (AWWA)
P. Rogers, Georgia Southern University, Statesboro, Ga. (AWWA)
D.S. Schwartz,* Standards Council Liaison, City of Waynesboro, Waynesboro, Va. (AWWA)
A.J. Weiss, GHD Inc., Cazenovia, N.Y. (AWWA)

Producer Members

D.A. Feuer, Woolpert Inc., Englewood, Colo. (AWWA)

User Members

J.S. Czarnecki, Greenville Water, Travelers Rest, S.C. (AWWA)
J.E. Dyksen, Suez Water, North Haledon, N.J. (AWWA)
W.C. Gedney, Golden State Water Company, Ontario, Calif. (AWWA)
M.E. Grahek, Los Angeles Department of Water, Los Angeles, Calif. (AWWA)
C. Morissette, Ville de Montreal, Montreal, Que., Canada (AWWA)
K. Oberoi, Charleston Water System, Charleston, S.C. (AWWA)
G. Ramon, Little Rock Wastewater, Little Rock, Ark. (AWWA)
D. Spencer, Powdersville Water District, Powdersville, S.C. (AWWA)
J.W. Swertfeger, Cincinnati Water Works, Cincinnati, Ohio (AWWA)

* Liaison, nonvoting

Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C810.*

I. Introduction.

I.A. *Background.* Replacement of lead service lines and subsequent flushing are important processes for ensuring the delivery of safe drinking water. The AWWA Policy Statement on Lead Service Line Management supports protecting public health through the reduction of exposure to lead in drinking water and encourages communities to develop a lead reduction strategy that includes identifying and removing all lead service lines over time. This standard is intended to describe essential procedures for the replacement of lead service lines, including the following elements: appropriate tools and techniques; flushing a service line after replacement; factors to consider in optimizing flushing; instructions to inform customers affected by the replacement, including additional risk reduction measures; and verification of lead level management prior to return to service. Although partial replacements should be discouraged, this standard also describes procedures for partial replacement and repair situations where full service line replacement is not possible or practical.

This is the first edition of this standard and will likely result in valuable feedback from first users of the standard. As such, it is anticipated that a second edition with additional information and guidance will be necessary and issued well before AWWA's regular five-year revision schedule for standards.

I.B. *History.* Development of this standard was authorized by the AWWA Standards Council in 2015 and was assigned to the AWWA Standards Committee on Distribution Systems Operations and Management. A Subcommittee on Lead Service Lines was formed to draft the standard. This first edition of the standard was approved by the AWWA Board of Directors on June 11, 2017.

I.C. *Acceptance.* In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the Water Research Foundation (formerly AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). The

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.* Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. Specific policies of the state or local agency.
2. Two standards developed under the direction of NSF†: NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.
3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,‡ and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 60 and 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI 60 and 61 do not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA C810 does not address additives requirements. Thus, users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

---

* Persons outside the United States should contact the appropriate authority having jurisdiction.

† NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

‡ Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

II. Special Issues.

II.A. *Prioritizing Lead Service Line Replacement.* Suggested items to consider when prioritizing lead service line replacement follow (not in order of priority):

- Any lead service line that is physically disturbed by dig-ins, excavations, repairs, or similar activities.
- Existing partial lead service line replacements.
- Lead service lines supplying schools, day care centers, or other identified sensitive populations as defined by the USEPA.
- Lead service lines where sample results are more than 15 ppb or other established health levels.
- Lead service lines located in scheduled underground infrastructure work or street restoration work zones that could be replaced concurrently, minimizing any negative impact to customers.
- Multiple lead services within a compact area (cost containment).
- Length of lead pipe present in a particular service line.
- Consideration of presence of lead goosenecks and galvanized service lines.

II.B. *Optimizing Corrosion Control Treatment.* Corrosion of piping and solder can be a primary source of lead contamination in drinking water. Optimizing corrosion control treatment may help a utility to minimize this source of lead contamination. Utilities may consider appropriate corrosion control treatments that include pH adjustment, alkalinity adjustment, addition of corrosion inhibitors, and other corrosion control treatments. Additional guidance on applying corrosion control treatments can be found in the AWWA Manual of Water Supply Practice M58—*Internal Corrosion Control in Water Distribution Systems*, the AWWA "Optimized Corrosion Control Treatment Primer," and the 2015 *Journal - AWWA* article "Strategies for Assessing Optimized Corrosion Control Treatment of Lead and Copper" (these documents are available through the AWWA Lead Resource page: www.awwa.org/lead).

II.C. *Reuse or Replacement of Service Line Fittings, Valves, and Water Meters.* The scope of this standard covers replacement of lead service lines. Utilities may choose to reuse or replace the related fittings, valves (corporation stops and curb stops), and water meters, based on the site-specific age and condition of those components and based on the utility-specific replacement schedules and practices. The Reduction of Lead in Drinking Water Act requires that all newly installed pipes, fittings, and fixtures meet the current definition of "lead free." The reuse of existing fittings (that may or may not meet the current definition of "lead free") is allowed by the Reduction of Lead in Drinking Water Act if reused in their original locations.

II.D. *Utility Communication Planning for Lead in Drinking Water.* Water utilities are facing a new communications challenge related to lead in drinking water. Currently, utilities are required under the Safe Drinking Water Act to communicate lead risks when there is an exceedance of the lead action level as defined in the Lead and Copper Rule and annually as part of their consumer confidence reports. Utilities conducting mandatory lead service line replacements must meet specific outreach requirements targeting affected households. Beyond these requirements, many utilities also communicate lead exposure risks proactively in consumer confidence reports, on websites, and through other means.

Water utilities should be planning to communicate lead exposure risks in a proactive and targeted manner not only when lead service lines are repaired or replaced but also when routine maintenance work on water mains may disturb lead service lines. This change may dramatically alter the frequency of direct-to-customer lead communications and requires a new level of planning by utility managers and communicators.

Although the water utility and public health communities have made significant strides in reducing lead exposure, public health advocates and regulatory agencies are looking closely at the contribution of lead at the tap from lead service lines—particularly lead service lines that have been disturbed. Three typical scenarios raise concerns about elevated lead levels: lead service line replacement when required by the Lead and Copper Rule or proactively performed by the utility; infrastructure replacement when full or partial lead service line replacement occurs when other utility work is under way, such as during water main rehabilitation; and repairs to lead service lines.

Water providers should consider building on current communication plans to provide additional information to customers regarding lead and lead service line replacement. AWWA has assembled *Communicating About Lead Service Lines: A Guide for Water Systems Addressing Service Line Repair and Replacement* as a tool for preparing and expanding these communications (http://www.awwa.org/Portals/0/files/resources/publicaffairs/pdfs/FINALeadServiceLineCommGuide.pdf).

This guide is designed to help water utilities build on current communication strategies to address these new areas of concern and manage the increased frequency of communication with customers. It provides utilities with customizable messages and templates to communicate with customers in a variety of ways to better protect public health. For brevity, the content of the guide will not be repeated here.

Additional guidance on utility communications can be found on the Lead Service Line Replacement Collaborative website: http://www.lslr-collaborative.org/.

II.E. *Grounding of Electrical Circuits on Piping.* If the lead service line is replaced with a nonmetallic pipe or if a nonconductive plastic coupling (dielectric coupling) is used within a few feet of the home, the home owner may need to take additional measures to ensure the structure has sufficient grounding. Historically, connection to the home piping system was used for grounding the home's electrical system. By removing the underground metal piping, an alternative grounding strategy may be needed.

All metal water systems should be "bonded." Failure to adequately bond the potable water piping systems to the electrical system increases the potential for both fire and electrocution should the piping system become energized (see National Electric Code).

III. Use of This Standard. It is the responsibility of the user of an AWWA standard to determine that the products and/or processes described in that standard are suitable for use in the particular application being considered.

III.A. *Purchaser Options and Alternatives.* This standard is written as though the replacement and flushing work will be performed by the purchaser's (generally the utility's) personnel. Where the work is to be performed using a separate contract or as part of a contract for replacing service lines,* appropriate provisions should be included in the purchase documents to ensure the constructor is specifically instructed as to its responsibilities. The following information should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C810, Replacement and Flushing of Lead Service Lines, of latest revision.
2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required.
3. Details of other federal, state or provincial, and local requirements (Section 4).
4. Method of replacement to be used—open cut, trenchless on new route, or trenchless using existing route (Sec. 4.1).

III.B. *Modification to Standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. Major Revisions. This is the first edition of this standard.

V. Comments. If you have any comments or questions about this standard, please call the AWWA Engineering and Technical Services at 303.794.7711; write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email at standards@awwa.org.

* Refer to other AWWA standards and manuals for design criteria for various service line materials.

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ANSI/AWWA C810-17
(First Edition)

American Water Works Association
Dedicated to the World's Most Important Resource®

AWWA Standard

Replacement and Flushing of Lead Service Lines

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes essential procedures for the replacement of lead water service lines and flushing following replacement. Essential procedures include the following: appropriate tools and techniques; flushing a service line after replacement; factors to consider in optimizing flushing; and instructions to provide customers affected by the replacement, including additional risk reduction measures. This standard also describes procedures for partial replacement and repair situations where complete lead service line replacement is not possible or practical.

Sec. 1.2 Purpose

The purpose of this standard is to define the minimum process requirements for the replacement of lead service lines and for flushing following replacement.

Sec. 1.3 Application

This standard can be referenced in the purchase documents for the replacement of lead service lines and can be used as a guide for the appropriate replacement tools and techniques, flushing practices and procedures, communications with customers, and verification of successful completion. The stipulations of this standard apply when this document has been referenced and only to the extent referenced.

SECTION 2: REFERENCES

This standard references the following documents. In their latest editions, they form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.

AWWA—*Communicating About Lead Service Lines: A Guide for Water Systems Addressing Service Line Repair and Replacement.*

Safe Drinking Water Act (SDWA), 42 USC* 300.

USEPA†—Lead and Copper Rule (LCR), 40 CFR 141.

SECTION 3: DEFINITIONS

The following definitions shall apply in this standard:

1. *Constructor:* The party who provides the work and materials for placement or installation.

2. *Corporation stop:* A valve attached to the water main to which a service line is connected. It is used to interrupt flow during installation or maintenance of the service line (see Figure 1).

3. *Curb stop:* A valve installed in the service line, generally at the property line, and accessible for operation from the surface of the ground for routinely interrupting flow through the service line (see Figure 1).

4. *Customer:* The person, company, or organization receiving potable water service from the utility to a specific premise.

5. *Gooseneck:* A sweeping bend in a service line where it connects to the water main, resembling the shape of a goose's neck, that will allow soil movement without damaging the service line (see Figure 1).

6. *Manufacturer:* The party that manufactures, fabricates, or produces materials or products.

7. *Potable water:* Water that is safe and satisfactory for drinking and cooking.

8. *Purchaser:* The person, company, or organization that purchases any materials or work to be performed.

* United States Code, 732 North Capitol Street, NW, Washington, DC 20401-0001.

† US Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

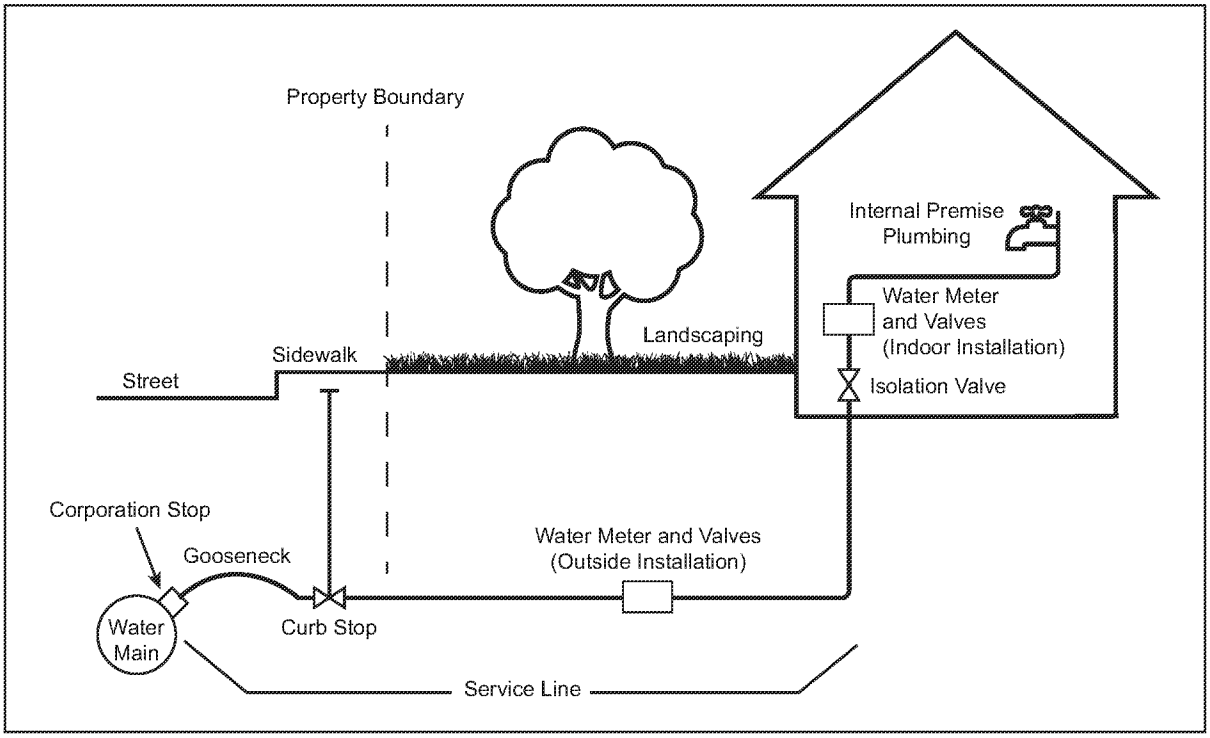

Figure 1 Typical water service line components

9. *Service line:* The pipe that runs between the utility's water main and the specific premises' plumbing, including both the portion owned by the utility, if any, and the private service line owned by the property owner (see Figure 1).

10. *Utility:* The organization or entity with the primary purpose of providing a designated area with potable water service.

11. *Water main:* The water pipe from which the domestic water supply is delivered by the utility to the service pipe leading to specific premises (see Figure 1).

12. *Water meter:* An instrument used for recording the quantity of water passing through the service line to specific premises. Water meters are typically installed with valves on inlet and outlet sides of the meter (see Figure 1).

SECTION 4: REQUIREMENTS

Materials shall comply with the requirements of the Safe Drinking Water Act and other federal regulations for potable water systems as applicable.

Water can be naturally corrosive and often dissolves lead as a result of water's contact with the service line as well as other plumbing components. A number of sampling and analytical techniques are available for customers to determine the

level of lead in their drinking water. Some of these tests are collected and/or analyzed by the local water provider. Other tests may be conducted by the customers themselves but should be in compliance with sampling and analytical techniques accepted by the local utility. The data captured from the various tests can be used to assist the utility in adjusting the water chemistry by modifying the application of corrosion control chemicals.

Utility personnel should consider that the level of dissolved and particulate lead within the homes and/or businesses of their customers may be greater than the levels within their system based on the potential leaching from service lines and internal premise plumbing components. Lead service lines potentially represent the largest mass of lead in regular contact with potable water, hence the interest in removing lead service lines in their entirety. Utilities should also consider that lead levels may vary based on chemical and physical conditions, level of disturbance to the piping, sampling technique, and other factors when determining the number of samples to be collected. A single sample may not be adequate in determining how much lead is being released.

For planned lead service line replacements, the utility shall establish replacement agreements to be reviewed with and accepted by the customer before any work being accomplished. These agreements should detail the responsibilities of the customer as well as those of the utility and should be intended to reduce any ambiguity about what is to be accomplished and by whom. Any financial requirements essential to the completion of the project should also be identified.

Sec. 4.1 Location and Replacement of Lead Service Lines

The replacement of lead service lines can be generally accomplished by one of the following ways:

- Open cut full replacement—traditional technology with excavation on the full length of service line to be replaced.
- Trenchless replacement on new routes—methods such as directional drilling or pneumatic or hydraulic ramming tools (boring tools) to pull in the new service line on a new route (cutting and leaving the existing lead service in place and replacing it using a new service line).
- Trenchless replacement on existing routes—methods such as pipe splitting and/or pulling the existing lead service that is being replaced with a new pipe using the existing service line route (pipe splitting leaves the existing lead service in the ground, pulling removes the existing lead service line).

4.1.1 *Locating lead service lines.* In order to replace the existing lead service line, the line must be appropriately identified and located. Some agencies have a database detailing the locations of their lead service lines. Such a record simplifies that portion of the replacement process. Other water providers do not have accurate records reflecting the locations of the lead assets. In this case, other means of identification shall be employed. It is highly recommended that utilities use more than one method of confirming the actual locations of the lead service lines. Utilities should record the service line material when observed during repairs, inspections, or other quality reports. Utilities should be aware that it is at times difficult to verify that a service line contains no portions made of lead, and that some degree of uncertainty may exist in a utility's inventory of lead service lines.

4.1.1.1 Identifying lead service lines at the meter, corporation stop, curb stop, or service box. Lead service lines can sometimes be identified at the main, curb stop, or meter box outside the house or adjacent to the meter inside the house. Typically, lead service lines have a distinctive "bulb-looking" section near the end at a brass, galvanized, compression, or other fitting that connects the service. The absence of the "bulb" section does not confirm the absence of lead. The observation of lead pipe in one location does not confirm the entire service line is lead. It is possible a portion of the lead service was previously replaced during repair or maintenance activity.

4.1.1.2 Using the scrape test to confirm the lead service line. Lead is a gray, nonmagnetic (a magnet will not stick to lead pipe), and relatively soft material compared with other pipe products. A coin scraped along the exterior of a lead pipe will create an indent and reveal a shiny-silver color. Care must be taken not to go too deep to avoid puncturing the pipe. Workers should use appropriate personal protective equipment, such as gloves and eye protection, to prevent exposure to lead. The scrape test identifies solid lead service lines. It will not identify lead-lined iron pipe.

4.1.1.3 Identifying lead service lines by water quality sampling. The concentration of lead found in the water sample can indicate if a lead service line is likely. A sample of the water from the service line should be taken to determine the level of lead. The line should be allowed to sit with no flow for at least 6 hours before sampling. Whether the water meter is inside the building, outside the building, or in an area that is unmetered, it is critical to flush a specific amount of water and then take a sample to be tested. The amount flushed prior to sampling should flush at least the volume of premise plumbing between the service line and the sampling tap. A single test may not be the most effective indicator of the existence of a lead service. The

minimum lead concentration will be system specific, and multiple samples may be required to ensure the lead is not from lead solder or other internal plumbing sources. A low or nondetect lead sample cannot be used to verify the absence of a lead service line. Utilities should use care in interpreting water samples collected at one point in time because of the variability of lead occurrence in samples.

4.1.1.4 Utilizing hydro-excavation to determine the presence of lead. The hydro-excavation process creates a small boring hole to expose the service line at a depth at the water main, the curb box, and/or the meter box, allowing visual observation to identify whether the service line (or a portion) is lead or not. Care should be taken to minimize any physical disturbances to the pipe.

4.1.1.5 Full test-pit excavation. Dig or excavate a large pit down to the service line to expose the pipe. This method could physically disturb the pipe.

4.1.1.6 Other lead service identification techniques. A number of other techniques are used or offered for consideration to locate the presence of lead service lines. When considering other techniques, the utility should make sure such techniques minimize any physical disturbances to the pipe.

4.1.2 *Preparation.* Before the replacement of the lead service line, a number of related preparatory activities shall take place.

4.1.2.1 Customer notification. The impacted customers shall be notified to identify the process established for replacement, whether full or partial. Most agencies have agreements to be signed by both parties reflecting the responsibilities relative to the replacement effort. The type of replacement, the schedule, and other pertinent items shall be covered appropriately with the customer before the replacement activity. The customer notification should include any postreplacement responsibilities, such as flushing or the use of filters, and should include directions to the customer to make the workspace ready and safe prior to the replacement activity. Customers should also be made aware of the risks of a partial replacement, where applicable (see Sec. 4.2).

4.1.2.2 Underground utility locates. The location of other underground utilities shall be done prior to the work to avoid utility strikes and is critical to the success of the lead service line replacement. Locates shall be scheduled in a timely manner without disruption to the established work plan.

4.1.2.3 Lead service replacement plan. A replacement plan shall be established for the work crews to reflect the schedule of the effort, the typical amount of time the customers will be impacted, and so on. This information shall be used to inform the customer of the coming replacement activity and communicated to the customer in a timely manner.

4.1.2.4 Water shutoff and service line isolation. Prior to beginning the replacement work, the water supply to the service line and the customer shall be shut off to avoid release of particulate lead into the customer's premises caused by vibration of the service during any excavation. The service line to be removed shall be isolated by shutting off appropriate valves at each end of the area to be removed.

4.1.3 *Open-cut full replacement of lead service lines.* The open-cut full replacement approach to lead service line removal involves the extraction of all the surface treatment and earth material above the level of the pipe. Care must be taken because other underground utilities, including the water main, may have not been properly located.

4.1.3.1 Proper equipment and material usage for open-cut full replacement. The excavation equipment used for the open-cut full replacement approach shall be sized to accommodate the full depth of the hole. Safety precautions shall be taken in consideration of the customer's property as well as any local pedestrian and/or vehicular traffic.

4.1.3.2 Use of adequate trench safety. Based on the depth of the excavation, an adequate level of trench safety shall be used to guarantee compliance with applicable requirements.

4.1.3.3 Lead service line removal. Once properly exposed and identified, the existing lead service line shall be disconnected from the main as well as the customer's side of the connection. When a utility elects to remove the lead pipe from the ground, the discarded lead line shall be carefully cut or bent into manageable sections and taken for processing for ultimate disposal. The amount of lead removed and the location of the removal along with any other pertinent information shall be documented. If the existing lead pipe is left in the ground, the impacted customer(s) should be made aware of the abandoned pipe.

4.1.3.4 Connecting the new service line. The new pipe shall be measured and placed with enough material to properly connect to the main as well as to the customer's side. The new pipe material shall comply with the requirements of the Safe Drinking Water Act and other federal regulations for potable water systems as applicable. When dissimilar metals are to be connected, a dielectric fitting shall be used to prevent galvanic corrosion (see Sec. II.E regarding grounding of electrical circuits on piping).

4.1.3.5 Backfill and surface restoration. Select bedding and/or a specified fill material, in conjunction with the identified surface treatment, shall be placed in a manner consistent with all applicable requirements to reduce or eliminate the possibility of settling beyond the allowable amount along the course of the excavation.

4.1.4 *Trenchless replacement on new routes.* The directional drilling or pneumatic/hydraulic installation methods of replacing lead service lines make use of a pilot hole that is created by drilling or pneumatically or hydraulically pushing a rod into the soil from an open access pit at the main to an access pit at the meter box or at an area adjacent to the wall where the new service will be connected on the customer's side. In a number of these installation scenarios, the existing lead pipe is disconnected on either end and left in place. When the existing lead pipe is left in the ground, the impacted customer(s) should be made aware of the abandoned pipe.

4.1.4.1 Required access pits. Based on the length of the service to be replaced, access pits shall be excavated down to the depth of the main on one side and to the depth of the service connection on the customer's side. As with any excavation, utility locates shall be requested and received prior to the work being performed, and all applicable trench safety devices shall be used. If the distance between the access pits is great or other underground utilities that are a cause for concern exist, an intermediate access pit may be required.

4.1.4.2 Proper use of boring tools. The boring tool shall be placed in the launching access pit level and pointed in the direction of the receiving pit. The horizontal and vertical directions of the tool shall be monitored until it reaches the receiving pit. Proper service line installation depth is critical and must be maintained in accordance with local requirements.

4.1.4.3 Connecting the new service line. Once the boring tool reaches the receiving pit, the new service line shall be connected to the boring tool and pulled through the bore hole with enough length of the new service pipe material to add fittings to connect to the main as well as on the customer's side. When dissimilar metals are to be connected, a dielectric fitting shall be used to prevent galvanic corrosion (see Sec. II.E regarding grounding of electrical circuits on piping).

4.1.4.4 Backfill and surface restoration. Select bedding and/or a specified fill material, in conjunction with the identified surface treatment, shall be placed in the access pits in a manner consistent with all applicable requirements to reduce or eliminate the possibility of settling beyond the allowable amount along the extent of the excavation.

4.1.5 *Trenchless replacement on existing routes.* The pipe-splitting method employs the use of a tool pulled through the existing lead service line that splits the pipe. The existing lead service line remains in the ground and a new service line is pulled into place. Another related method is to disconnect the lead service on each end and to connect a fitting to one side with an extraction device and to connect

the new pipe material on the other end in order to pull the new service into place, while removing the existing lead service line.

4.1.5.1 Required pipe- splitting and -pulling access pits. As in the directional drilling and pneumatic/hydraulic installation approaches, access pits shall be excavated to the depth of the main on one side and to the depth of the service connection on the customer's side. Other underground utility locates shall be obtained prior to the work, and all applicable trench safety devices shall be used.

4.1.5.2 Use of the splitting tool. Care must be taken to disconnect the existing lead service line and to cut it in a manner that facilitates pushing a cable through it with the splitting tool attached. The splitting tool is then used to displace the existing lead pipe and draws the new pipe material through it to the other end of the project. When the existing lead pipe is left in the ground, the impacted customer(s) should be made aware of the abandoned pipe.

4.1.5.3 Connecting the new service line. Once the splitting tool reaches the receiving access pit, the new service line shall be pulled through to allow enough material to adequately connect to both sides. When dissimilar metals are to be connected, a dielectric fitting shall be used to prevent galvanic corrosion (see Sec. II.E regarding grounding of electrical circuits on piping).

4.1.5.4 Backfill and surface restoration. Select bedding and/or a specified fill material, in conjunction with the identified surface treatment, shall be placed in the access pits in a manner consistent with all applicable requirements to reduce or eliminate the possibility of settling beyond the allowable amount along the extent of the excavation.

Sec. 4.2 Partial Replacements

4.2.1 *General.* It may not always be practical or possible to replace all of a lead service line at the same time. Coordination among the utility, the property owner, and constructor could result in situations in which partial replacement may be unavoidable. Although every effort shall be made to avoid partial replacements, it may be necessary to accommodate partial replacement situations as an interim measure. Partial replacement is not desirable because of the potential for increased release of lead into the water. This section describes additional requirements and recommendations for partial lead service line replacements.

4.2.2 *Existing conditions.* For services where partial replacements have previously occurred and a portion of the service still contains lead pipe, it is recommended that these locations be identified and re-evaluated for removal of the remaining material. For example, some utilities, property owners, or constructors,

through the course of routine maintenance and repairs, may have replaced portions of lead services with alternative materials without having replaced the remainder of the service either to the main or into the property.

4.2.3 *Delayed replacement.* Situations will occur in which a lead service line might not be fully replaced and a portion is left for later replacement. Coordination among all stakeholders during a lead service line replacement is critical. When it is necessary to complete a total lead service line replacement where both the utility and the property owner are responsible for portions of the work (i.e., up to the property line and beyond the property line), all parties should perform the work in close succession to minimize the potential for utilization of the service before completion of the total replacement. However, there may be instances in which one party completes its portion of the work in advance of the other party being available or willing. The scope of replacement may be large for some communities, and thus the time required to complete all the work may be long. In either of the delay cases presented below, the utility shall record that all portions of the service have successfully been replaced after notification of successful completion of full replacement. Communications regarding the effect of partial service line replacement should occur as covered in Sec. 4.3.

4.2.3.1 Property owner delay. On completion of the utility-owned portion of a lead service line replacement, the property owner should complete replacement of their portion as well. However, given the logistics of this work and the likely need for the property owner to hire an independent contractor, there may be a period during which the old and new portions of the service will be connected to allow for the continued supply of water but the lead replacement is only partially complete. During the interim period, the property owner shall be provided clear guidance regarding the increased risk of lead entering the water associated with the partial-replacement condition. Refer to Sec. 4.3 with respect to communication during this period.

4.2.3.2 Utility delay. If a property owner replaces a portion or all of the service line from the home to the property line, the utility should make every effort to obtain documentation of the replacement for its inventory. In most cases the utility will learn of the work after it is completed. If the property owner notifies the utility in advance, the utility should try to schedule a mutually convenient time to perform its portion. When this is not achievable, the property owner shall be provided with clear guidance regarding the increased risk of lead entering the water associated with the partial-replacement condition. Refer to Sec. 4.3 with respect to communication during this period.

4.2.4 *Partial replacement.* It is possible that a portion of the service may contain lead, be out of the utility's responsibility, and subsequently not be replaced. This circumstance may exist for a variety of reasons including cost, miscommunication, misunderstanding of the issues, ambivalence, or social defiance.

4.2.4.1 Property owner refusal. Given the potentially high cost associated with service line replacement and the challenges that may arise with performing the work, it is conceivable to anticipate that some property owners may elect to do nothing. When this condition occurs, the utility shall follow the recommendations presented herein for dielectric connection of dissimilar metals, flushing, and testing. Documentation of the refusal, or at a minimum documentation that a portion of lead material remains (including its location and quantity), will be important for the utility to maintain complete records of the lead service line replacement progress/program. The customer should receive all necessary information regarding future risk.

4.2.4.2 Incentive program verification. If financing or incentive programs are available to property owners, utilities will need to be cautious about validating that property owner portions of lead services have been replaced, in their entirety or at all. A method for verifying work performed and recording completed work will be necessary.

4.2.4.3 Cutting of lead service lines. After customer notifications and utility locates have been accomplished, the specific location of the lead pipe to be cut shall be identified. The proper cutting tools shall be identified to reduce the amount of lead displaced from the cut. A cutting tool such as a pipe cutter or pipe shearing device that reduces lead particles and disturbance is preferred to other tools that use a sawing or other abrasive action. The necessary safety equipment shall be used, including safety glasses and/or goggles and safety gloves. Care shall be taken while cutting the lead pipe to reduce the amount of lead shards from traveling and/or accumulating in the remaining service line sections. The lead service line sections remaining shall be connected and secured to reduce or eliminate the possibility of water leakage. When dissimilar metals are to be connected, a dielectric fitting shall be used to prevent galvanic corrosion. The discarded lead service line shall be carefully cut or bent into manageable sections for processing for ultimate disposal. The replacement section should be a pipe material in compliance with all federal, state, and local requirements. The amount removed as well as specific locations of the remaining sections should be documented. The replaced service line shall be turned on and checked for leaks

in a manner that does not expose the customer's side to potential lead fragments. Flushing shall be accomplished in a manner consistent with Sec. 4.4.

Sec. 4.3 Communications and Instructions to Customers

4.3.1 *General.* It is important to inform all customers that may be affected by lead service line activities. The utility shall provide communication to customers regarding the following items:

1. Advanced notice of planned lead service line replacement projects (45 days prior is recommended).
2. Informational point-of-contact for the project.
3. Additional notice prior to actual planned work affecting service line (day prior).
4. On-site utility point-of-contact during construction.
5. Postconstruction instructions regarding customer flushing, use of a point-of-use (POU) filter or bottled water, water sampling, and testing to be completed.
6. Clear guidance regarding the increased risk of lead entering the water associated with a partial lead service line replacement condition (if a full-service line replacement was not completed). Customers with partial replacements should avoid consuming their water unless they are using a filter certified for lead removal or they should consume bottled water until sample results show that their lead levels are less than the regulatory guideline.

In addition to water shutoff and service-line-isolation actions (Sec. 4.1.2.4), customers should be advised not to use water during excavation and construction activities.

Additional guidance to utilities for completing these customer communications is available in the foreword of this standard and in the AWWA document *Communicating About Lead Service Lines: A Guide for Water Systems Addressing Service Line Repair and Replacement.*

Sec. 4.4 Flushing Service Lines After Full or Partial Replacement

4.4.1 *Flushing by the utility immediately after lead service replacement.* After all connections have been completed, flush the water from an outside connection (such as hose-bib or hose leading from the house side of the meter installation) to remove any particles in the service line and near point-of-entry. The flushing is best done, if possible and practical, before the meter is connected in the service using a "jumper" or straight pipe in place of the meter. The straight pipe will allow for a higher velocity flush and protects the meter from potential damage from lead pipe and other construction-related fragments. Flush at full velocity for at least

10 minutes. If the meter was replaced with a "jumper," it may be reconnected in the service after utility flushing. Following completion of flushing by the utility, the customer shall flush the interior premise plumbing as described in Sec. 4.4.2.

In situations where flushing by the utility is not performed, the customer should be notified with instructions to flush before using any water.

4.4.2 *Flushing by the customer after lead service replacement.* The customer should flush all interior premise plumbing the same day or before next water use following the replacement. Subsequent flushing by the customer should be done once every two weeks for three months or at other intervals based on monitoring results if available. Utilities may want to encourage best times to flush based on water demand and operations (for example, when neighbors' water usage is low, e.g., midmorning to dinner time or late at night). Customers shall be advised to not use hot water in the premise plumbing until initial flushing is completed to prevent sedimentation of lead particles in premise hot water tanks.

4.4.2.1 Suggested instructions for customers.

1. Find all the faucets that will drain, including the basement and all floors in your house.
2. Remove aerators and screens whenever possible, including the shower heads, from all faucets you plan to flush.
3. Include the laundry tubs, hose-bibs, bathtubs, and showers as flushing points.
4. After all the aerators are off, open the faucets in the basement or lowest floor in the house. Leave all faucets running at highest rate possible, using cold water.
5. After the faucets are all open in lowest floor, open the faucets on next highest floor of the house. Continue until faucets are open on all floors.
6. After all faucets are opened, leave the water running for at least 30 minutes.
7. After 30 minutes, turn off the first faucet you opened and continue to turn off other faucets in the same order you turned them on.
8. Clean aerators/screens at each faucet. You may need to replace screens/aerators if too old or worn.

Utilities and customers may consider an optional approach by coordinating a targeted flush of a few faucets at a time before opening all the faucets for the whole house flush. The targeted flush would start with a pattern of opening all faucets in a single area or single floor and then moving to the next to increase the flow velocities, followed by the whole house flush described above, with all faucets open.

4.4.2.2 Additional daily miniflush. As a precaution, the customer should do a miniflush of premise plumbing by running tap water each morning or when the water sits in the pipe for at least 6 hours. Flush for 5 minutes to displace water that has been sitting in the pipes inside the house and in the service line. This could include taking a shower, running the dishwasher, flushing a toilet, collecting water for plants/garden, or running the faucet. The customer should do this before using any water for drinking, cooking, infant formula, and so on. Daily miniflushes should continue for six months or until lead sample results show the lead level is below the regulatory guideline. The customer should clean debris from aerators and screens once a month for six months. After six months, clean debris twice a year.

4.4.2.3 Sampling. Water sampling and testing, following replacement and flushing, shall be conducted per Sec. 5.2.

SECTION 5: VERIFICATION

Sec. 5.1 Documentation of Construction Activities

Documentation of construction activities for each service line work activity may support verification that the lead service line has been fully or partially replaced. The following information shall be documented and recorded:

- Picture of home with house number
- Picture of test pits and meter pit showing new pipe or pipe ends and old lead pipe if in same location
- Length and material type of new pipe installed
- Type of pipe material the new pipe is connected to inside home
- Method of installation (trenchless, hand-excavation, etc.)
- Length and location of any abandoned lead service line pipe left in the ground

Flushing time and location(s) (for example, an outside hose-bib) shall be recorded. Some homes may not have an outside hose-bib turned on or other situations may arise that do not allow for postflushing by the utility. These situations shall be documented in field reports along with any communication attempted with the customer.

Sec. 5.2 Water Testing Following Replacement

Testing the water following the replacement shall be done to determine if appreciable lead is still present in the drinking water. Lead may still exist inside

home plumbing (lead solder, redeposited lead in scale of plumbing, and brass components) and could be disturbed during service line work. Therefore, lead present in the water following a full replacement does not mean the lead service has not been replaced. This condition should be explained to the customer. Flushing recommendations described in Sec. 4.4 can help remove released particles.

5.2.1 *Testing initiation.* Testing the water shall commence at least one month after the replacement to allow for sufficient in-house flushing and a period of normal use of water to occur. Utilities may consider initiating testing within the one-month period if supported by performance data. When only a partial replacement is completed and the lead service line replacement was mandatory as part of compliance with the Lead and Copper Rule (LCR), testing shall be conducted within 72 hours after the completion of the partial replacement of the service line per the requirements of the LCR.

5.2.2 *Test samples.* Testing shall include first-draw and second-draw samples. First-draw sample shall be the initial draw from the tap when it is turned on. Second-draw sample shall be collected with the objective of collecting water that stagnated in the service line, generally the fourth to seventh liter depending on site-specific conditions. Utilities may be able to omit the second draw sample if supported by documentation that the construction activities completely removed the lead service line and by acceptable first-draw lead data. Samples shall be collected from a frequently used tap inside the home, preferably the kitchen tap as the residents' consumption would likely be from the kitchen tap. Samples shall also be collected with the aerator on. Samples should be collected at the maximum flow rate of the tap and should be collected in wide-mouth bottles.

5.2.3 *Profile sampling.* Lead levels higher than expected from full lead replacements may occur and the utility or homeowner could investigate further with profile sampling. A profile is a series of bottles filled continuously following the stagnation period. The trend of lead concentrations coupled with measurements of the inside plumbing and service line will show which portion of plumbing or service contributes the highest lead by the liter number.

American Water Works Association

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Dedicated to the world's most important resource, AWWA sets the standard for water knowledge, management, and informed public policy. AWWA members provide solutions to improve public health, protect the environment, strengthen the economy, and enhance our quality of life.

ISBN 978-1-62576-269-6

1P–2M 43810-2017 (11/17) IW

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Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 1/16/2018 2:30:59 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Water Associations Support WIFIA Extension

https://waterfm.com/water-sector-groups-support-bill-extend-wifia/

FYI.

GTM

Message

From: Chris Hornback [CHornback@nacwa.org]
Sent: 11/28/2017 9:54:06 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: NACWA Meeting in Napa, California

Thanks Lee. I appreciate the feedback. We'll do just that and will follow-up as we get closer to the date of the meeting.

-Chris

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Tuesday, November 28, 2017 4:48 PM
To: Chris Hornback <CHornback@nacwa.org>
Cc: Campbell, Ann <Campbell.Ann@epa.gov>; Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: NACWA Meeting in Napa, California

Chris,

I would strongly suggest that you give David Ross the invitation. We have every reason to believe that he will be confirmed long before that meeting and it would be most appropriate for him to have the invite. If he can't attend and in the unlikely event that he has not yet been confirmed I would be happy to attend.

Lee

From: Chris Hornback [mailto:CHornback@nacwa.org]
Sent: Tuesday, November 28, 2017 4:18 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Cc: Campbell, Ann <Campbell.Ann@epa.gov>; Penman, Crystal <Penman.Crystal@epa.gov>
Subject: NACWA Meeting in Napa, California

Lee – Good to see you in Savannah. Thanks for making the trip and participating in the Law Seminar program.

We are planning for the Association's winter conference in Napa, California, February 6-9 (the audience will be our full membership, not just our clean water attorneys), and would like to have participation from the political leadership in the Office of Water. Depending on the status of David's confirmation, we'd like one or both of you to provide remarks as the opening featured speaker at 9am the morning of Friday, February 9th.

We wanted to get this on your calendar now. We hope you all will be able to participate and will follow-up with additional details soon.

Thanks,
Chris

Chris Hornback | Chief Technical Officer | National Association of Clean Water Agencies (NACWA)
(O) Ex. 6 | (M) Ex. 6 | chornback@nacwa.org

Save the Date...NACWA in Napa, California, February 6–9, 2018. Plan now to join us for *Exploring Net Environmental Benefit: Balancing Science & Cost*

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/15/2017 3:20:29 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: For your information

Webinar coming on using USDA resources for source protection

The Source Water Collaborative, a joint effort among EPA, AWWA, and many other organizations, will host a webinar on source water protection efforts utilizing U.S. Department of Agriculture resources and funding. AWWA is co-sponsoring and facilitating this event and encourages all who are interested in source water protection issues to attend. This information will be especially relevant to those who have interest in developing partnerships with the agricultural community to enhance source water protection.

The webinar will feature speakers from USDA, Cedar Rapids, Iowa, and the Watershed Conservation Resource Center. These speakers have extensive knowledge of USDA programs and how utilities can leverage them in partnership with the agricultural community for source water protection. The webinar will be held 1:30-3 p.m. EDT Jan. 11. Registration is available online and is free. Those unable to attend live may register to receive updates for the recording and other resources.

FYI.

GTM

Message

From: Sawyers, Andrew [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=49214552A00B4AB7B168EC0EDBA1D1AC-SAWYERS, ANDREW]
Sent: 12/5/2017 1:09:28 PM
To: Tracy Mehan [tmehan@awwa.org]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
CC: Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: WIFIA Reauthorization Bill ...

No.

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Friday, December 01, 2017 10:49 AM
To: Sawyers, Andrew <Sawyers.Andrew@epa.gov>; Grevatt, Peter <Grevatt.Peter@epa.gov>
Cc: Shapiro, Mike <Shapiro.Mike@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: FW: WIFIA Reauthorization Bill ...

Anyone know this was coming?

Pax.

Tracy

From: Tommy Holmes
Sent: Friday, December 01, 2017 10:37 AM
To: Dan Hartnett <hartnett@amwa.net>; Steve Dye <sdye@wef.org>; Nate Norris <NNorris@awwa.org>
Cc: Tracy Mehan <tmehan@awwa.org>; Doersch, Patricia <patricia.doersch@squirepb.com>; Mederos, Carolina <carolina.mederos@squirepb.com>
Subject: RE: WIFIA Reauthorization Bill ...

News to me as well. If the money is not siloed between EPA and Corps, this could be a very good thing. As always, the devil will be in the details.
Tommy

From: Dan Hartnett [mailto:hartnett@amwa.net]
Sent: Friday, December 01, 2017 10:32 AM
To: Tommy Holmes <THolmes@awwa.org>; Steve Dye <sdye@wef.org>; Nate Norris <NNorris@awwa.org>
Subject: WIFIA Reauthorization Bill ...

… introduced yesterday as H.R. 4492 by Rep. Mast with Gibbs as a cosponsor. Was anybody aware this was coming? Doesn't look like text is available yet, but according to Mast's press release it appears the bill would combine the EPA and Army Corps versions of WIFIA into a single program administered by EPA (with the Corps providing guidance on project applications that fall under its authority).

https://mast.house.gov/2017/11/mast-introduces-bill-to-accelerate-investment-in-water-infrastructure

Dan Hartnett
Chief Advocacy Officer for Legislative and Regulatory Affairs
Association of Metropolitan Water Agencies

1620 I Street NW, Suite 500
Washington, DC 20006

Ex. 6
hartnett@amwa.net

Message

From: Grevatt, Peter [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D3CAA0C39EBE44CB9D3AE44DA7543733-GREVATT, PETER]
Sent: 11/20/2017 9:40:09 PM
To: KMorley@awwa.org
CC: Tracy Mehan [tmehan@awwa.org]; svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Burneson, Eric [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2cacb9a8d49f49af80531e9e2ccb9018-eburneso]; Hernandez-Quinones, Samuel [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=4c46d56b82f143df82f81d322bd109d7-Hernandez-Quinones, Samuel]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: FW: AWWA perchlorate MCLG comments_11.20.17.pdf
Attachments: AWWA perchlorate MCLG comments_11.20.17.pdf

Thanks Kevin. I appreciate your giving us a heads up on AWWA's comments!

From: Kevin Morley [mailto:KMorley@awwa.org]
Sent: Monday, November 20, 2017 4:33 PM
To: Shapiro, Mike <Shapiro.Mike@epa.gov>
Cc: Grevatt, Peter <Grevatt.Peter@epa.gov>; Burneson, Eric <Burneson.Eric@epa.gov>; Hernandez-Quinones, Samuel <Hernandez.Samuel@epa.gov>; Tracy Mehan <tmehan@awwa.org>; svia@awwa.org
Subject: AWWA perchlorate MCLG comments_11.20.17.pdf

Please accept the attached comments from AWWA regarding the proposed MCLG approach for perchlorate.

Sent on behalf of G. Tracy Mehan, III.

Kevin M. Morley, PhD
American Water Works Association
Manager, Federal Relations
1300 Eye Street, NW Suite 701W
Washington, DC 20005
D: Ex. 6

American Water Works Association

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November 20, 2017

SUBMITTED VIA E-MAIL

Mr. Michael H. Shapiro
Acting Assistant Administrator
USEPA, Office of Water
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

RE: Comments on the draft Proposed Approaches to Inform the Derivation of a Maximum Contaminant Level Goal for Perchlorate in Drinking Water (82 FR 43354, EPA–HQ–OW–2016–0438)

Dear Mr. Shapiro:

The American Water Works Association (AWWA) appreciates the opportunity to review and comment on the Proposed Approaches to Inform the Derivation of a Maximum Contaminant Level Goal (MCLG) for Perchlorate in Drinking Water (82 FR 43354, EPA–HQ–OW–2016–0438).

We recognize and support EPA's efforts to address the recommendations made by the Science Advisory Board in 2013. Our review of the proposed MCLG approach and biologically based dose-response (BBDR) modeling for perchlorate has identified several areas of concern that should be considered closely by the Agency and the selected peer reviewers. A detailed assessment is attached, but in general terms the results of our review yielded the following overall conclusions:

1. The BBDR is not capable of adequately predicting iodine uptake or free thyroxine (fT4) based on attempts to simulate multiple key studies measuring perchlorate inhibition of iodine uptake, which is a necessary precursor to thyroid effects.
2. Several modeling assumptions are not appropriately documented or are based on insufficient data. This results in increased uncertainty associated with the scientific integrity of the model required to support the proposed MCLG approach.
3. EPA's process for selecting key studies linking changes in fT4 levels and neurodevelopmental effects in the proposed MCLG approach was (a) not transparent

and (b) introduced additional uncertainty, especially when confounding variables (e.g., hCG, iron deficiency) are not controlled.

In summary, while EPA's efforts to address the SAB recommendations are laudable, we believe the proposed approach contains significant uncertainties and is, therefore, insufficient for supporting a risk assessment. Until the uncertainties in the current MCLG approach can be addressed, EPA should continue to rely on the RfD recommended by the National Academy of Sciences for considering further regulatory action. The results of the modeling simulation we prepared for this review of the MCLG approach confirmed the conclusions of prior studies that low levels of perchlorate have no demonstrated health consequence that can be scientifically validated with the confidence necessary to support the proposed MCLG approach.

Should you have questions or would like to discuss this matter, please contact me (tmehan@awwa.org) or Kevin Morley (kmorley@awwa.org).

Sincerely,

G. Tracy Mehan, III
Executive Director – Government Affairs

cc: Peter Grevatt – EPA/OW/OGWDW
Eric Burneson – EPA/OW/OGWDW/SRMD
Samuel Hernandez – EPA/OW/OGWDW/SRMD

Prepared for
The American Water Works Association

Date
November 2017

By
Robinan Gentry, PhD, DABT
Tracy Greene, BS
Ramboll Environ US Corporation, Monroe, Louisiana

Harvey J. Clewell, III, PhD, DABT, FATS
C. Eric Hack, MS
ScitoVation, Research Triangle Park, North Carolina

COMMENTS ON USEPA 2017:

"PROPOSED APPROACHES TO INFORM THE DERIVATION OF A MAXIMUM CONTAMINANT LEVEL GOAL FOR PERCHLORATE IN DRINKING WATER"

RAMBOLL ENVIRON

CONTENTS

EXECUTIVE SUMMARY

The document provides comments on the US Environmental Protection Agency's (USEPA) 2017 report entitled "Draft Report: Proposed Approaches to Inform the Derivation of a Maximum Contaminant Level Goal for Perchlorate in Drinking Water", which was prepared by the USEPA's Office of Ground Water and Drinking Water (USEPA 2017). In this report, USEPA (2017) is proposing approaches to inform the derivation of a Maximum Contaminant Level Goal (MCLG) for perchlorate in accordance with recommendations made from previous reviews conducted by the USEPA's Science Advisory Board (SAB). This MCLG approach (USEPA 2017) includes revisions to a previously developed and peer reviewed biologically-based dose-response (BBDR) model that has been extended to predict the relationship between perchlorate exposure and thyroid hormone levels in sensitive life stages. These revisions, suggested by the SAB (2013), include the following:

- Derivation of a perchlorate MCLG that addresses sensitive life stages through PBPK/PD modeling;
- Expansion of the modeling approach to account for thyroid hormone perturbations and potential adverse neurodevelopmental outcomes from perchlorate exposure;
- Utilization of a mode of action framework for developing the MCLG that links the steps in the proposed mechanism leading from perchlorate exposure through iodide uptake inhibition to thyroid hormone changes and finally neurodevelopmental impacts; and
- Extension of "the [BBDR] model expeditiously to…provide a key tool for linking early events with subsequent events as reported in the scientific and clinical literature on iodide deficiency, changes in thyroid hormone levels, and their relationship to neurodevelopmental outcomes during sensitive early life stages" (SAB 2013, p. 19).

USEPA's (2017) attempts to address SAB's recommendations should be applauded. Revisions presented in the report include methods that extend the model to early pregnancy and incorporate biological feedback control of hormone production via TSH signaling, adding a description of the impact of lower levels of iodide nutrition. In addition, an attempt has been made to calibrate the model's behavior for upper and lower percentiles of the population, as well as the population median for thyroid hormone production. Finally, an uncertainty analysis for key parameters was conducted.

For the development of the MCLG, USEPA has proposed a two-stage approach linking the revised BBDR model results ("Stage 1") with quantitative information on neurodevelopmental outcomes from epidemiological studies ("Stage 2"). Stage 1 describes the thyroidal hormone levels in women of childbearing age with low to adequate iodide intake. In this stage, the revised BBDR model is applied to predict the relationship between perchlorate exposure and changes in thyroid hormone levels in early pregnancy. Data for Stage 2 of the approach is provided from epidemiological studies evaluating maternal thyroid hormone levels in early pregnancy and the relationship between changes in these levels and the observation of neurodevelopmental outcomes. USEPA (2017) has also developed an alternative population-based approach that uses the revised BBDR model to estimate changes levels of selected thyroid hormones, specifically free T4, resulting from perchlorate exposure that may result in a shift in the population of hypothyroxinemic pregnant women.

Following a review of USEPA (2017), comments were prepared and organized around three main topics:

- USEPA model revisions including those for extending the model to early pregnancy, incorporating biological feedback control of hormone production via TSH signaling, calibrating the model and evaluating its behavior, and conducting an uncertainty analysis for key parameters. This includes comparison of model output to results from key studies, including

those identified in previous assessments, including results reported by Greer et al. (2002), Braverman et al. (2006), and Téllez Téllez et al. (2005a, 2005b);

- Linking BBDR results to neurodevelopmental outcomes focusing on the identification of published literature to develop the quantitative relationship between thyroid hormone levels and neurodevelopmental outcomes; and
- Comparison of the results from the BBDR modeling and MCLG approach with results and key studies from previous USEPA assessments.

The results of our review of the EPA's proposed MCLG approach (EPA 2017) and BBDR modeling for perchlorate yielded the following overall conclusions:

- While we applaud the EPA for the application of a BBDR model in the MCLG approach, as these models integrate the available science for a compound of interest, there is some concern that uncertainties inherit in the model call into question its proposed application in the risk assessment for perchlorate and whether it is fit for that purpose. While the hormone component of the model is a definite scientific improvement in terms of incorporating the available biology, there is a lack of data to provide validation of multiple steps in the proposed approach and of the assumptions/parameters within the biologically based dose-response (BBDR) model.
- Many of the changes in free thyroxine (fT4) that are predicted by the MCLG approach to impact the population distribution of fT4 and therefore result in per unit changes in neurodevelopmental outcomes are small percent changes (some as low as a 1.3-4.3% change). This would appear to suggest that the extended version of the BBDR model has a capability to estimate small changes in fT4 with precision that is not demonstrated by any adequate validation. Further, the model predictions of fT4 underpredict observed data in various clinical studies by substantially more than 1.3-4.3%. This suggests that the model is not precise enough to predict such small changes in fT4. Moreover, considering the variability of fT4 in the populations of interest, there is uncertainty as to whether these slight changes could be measured clinically, considering the greater impact of iodine intake on hormone levels.
- Until additional data are available to validate current extensions of the BBDR model to the pregnant woman, the Greer et al. (2002) and Braverman et al. (2006) studies provide the critical information in determining concentrations of perchlorate that do not result in significant inhibition of iodide uptake and, therefore, impacts on fT4. Based on recommendations from the National Research Council (2005), points of departure provided by these studies used in combination with uncertainty factors were considered to be protective of sensitive subpopulations, and provides a basis for future risk management decisions.

Therefore, we conclude that while the MCLG approach as proposed by USEPA incorporates additional science into the process, it still contains significant uncertainties that call into question the use of this approach to support a regulatory decision. Until the uncertainties in the current MCLG approach can be addressed, USEPA should continue to rely on the RfD recommended by the NAS for considering further regulatory action.

1. MODEL REVISIONS

1.1 Extending the Model to Early Pregnancy

The MCLG approach (USEPA 2017) is based on a hypothesized mode of action for neurodevelopmental outcomes associated with the development of hypothyroxinemia as a result of perchlorate exposure. The sensitive populations of concern for exposure to perchlorate are the fetuses of hypothyroxinemic pregnant women. Extending the model to predict the impact of perchlorate exposure on fT4 during early pregnancy is complicated by the significant variability in the levels of fT4 in the general population and the challenges in measuring fT4, as well as by the uncertainty in the identification of an alteration that may over time change fT4 from an individual's "set-point" and therefore potentially impact circulating levels in both the mother and the fetus.

According to the "American Thyroid Association Task force on Thyroid Disease During Pregnancy and Postpartum", isolated hypothyroxinemia is defined as a normal maternal TSH concentration in conjunction with fT4 concentrations in the lower 5th or 10th percentile of the reference range (Stagnaro-Green et al. 2011). USEPA (2017) has also focused on selected percentiles of the reference range; however, reference ranges can vary from population to population (Alexander et al. 2017). Even within US populations and across ethnic groups, the 2.5th percentile can vary by up to 2 pmol/L or approximately 20% (9.3-11.4 pmol/L as reported by Alexander et al. (2017)).

The variation in fT4 reported in the published literature during early pregnancy is provided in USEPA (2017), Appendix A, Figure A-33. The levels of fT4 during early pregnancy, based on the studies identified by USEPA (2017), appear to range from approximately 12-16 pmol/L. This range is consistent with the range of fT4 means reported in the Greer et al. (2002) study at baseline of approximately 1.2 ng/dL (15.5 pmol/L). However, the 50th percentile model predictions at zero dose perchlorate and 170 µg/day iodine intake (approximately 10 pmol/L at gestation weeks 12, 13, and 16) are much lower than these reported values.

Measuring fT4 in the presence of high concentrations of bound T4 is challenging, especially in conditions where binding proteins are altered such as during pregnancy (Alexander et al. 2017). Measurement techniques are prone to inaccuracy during pregnancy due to disruption of the original equilibrium. The 95% fT4 reference intervals decrease gradually with advancing gestational age: from 1.08– 1.82 ng/dL (approximately 13.9 – 23.5 pmol/L) in week 14 to 0.86–1.53 ng/dL (approximately 11.1 – 19.8 pmol/L) in week 20.

In addition, as noted in USEPA (2017):

> *"Circulating T3 and T4 levels in an individual are maintained within a narrow range by a negative feedback loop with TSH from the pituitary and TRH from the hypothalamus (see Figure 2) that operates around a "set-point." This set-point is different from individual to individual, which generates a population variance in blood levels of thyroid hormone that is considerably broader than the individual variance (Andersen, Pedersen, Bruun, & Laurberg, 2002). Therefore, in euthyroid individuals, serum T4 and T3 fluctuate within a fairly narrow range (about 10% of the population variance), maintained by the negative feedback relationship with serum TSH from the pituitary gland. This normal variation creates a situation where single measures of free or total T4 and TSH are a somewhat imprecise measure of an individual's average T4 and TSH concentrations (Andersen et al. 2002)."*

Extending the thyroid BBDR model to address early gestation is a significant challenge due to the complex interaction between thyroid homeostasis and gestational development. While the model appears to accurately simulate average fT4 in early gestation in the absence of perchlorate exposure, (Figure A57 in Appendix A), a previous peer review panel noted that

the model of early 2017 was most appropriate for higher iodide and lower or zero perchlorate exposures. Considering the addition of TSH feedback dynamics, and an adjustment factor to match specific population percentiles, there is reason for concern regarding the uncertainty of the revised model predictions under low iodide intake conditions. Some of these concerns are highlighted below:

- In addition to regulation by TSH, hCG levels rise in early pregnancy and this increases NIS uptake activity and T4 production. hCG is structurally similar to TSH, and stimulates iodide transport and thyroid hormone synthesis through stimulation of the TSHR. In the model, the Vmax for NIS-mediated uptake is increased during pregnancy based on independent data, but that change is not described as a function of hCG. "VmaxNISF_thy_I is scaled to increase with pregnancy based on an empirical relationship between gestational age and radioactive iodide uptake." hCG is calculated as a function of gestational age, and is then used to increase T3 and T4 production, but the increase in thyroidal iodine uptake is mistakenly ascribed by the model to TSH. This suggests that the model structure is not true to the biology, introducing uncertainty to predictions of T4 during pregnancy.
- The current model uses a baseline first-order constant calibrated to NHANES 2007-2012 median, 10th, or 90th percentile non-pregnant data. The KProdT4F value for the median NHANES calibration is 6.25*10-7 /hr/kg$^{0.75}$ (Table A-2), which is lower than 2.45 x 10-6 used by Lumen et al. (2013) based on fitting to data of Nicoloff et al. (1972). This value is scaled in pregnancy with increasing KProdT4 through GW 16 (peak occurring ~ GW 9) based upon placental hCG increase over this time according to the linear relationship from Glinoer (1997): hCGreg = 1 + 0.00354 x hCG. However, the use of a T4 production rate that is lower than the published value is not adequately justified, given the importance of this parameter, which has a direct impact on predictions of fT4 changes, for the intended application of the model.
- The current model uses a Km for perchlorate binding to the NIS (KmNIS_P) that is 3-fold lower than Lumen et al. (2013) (i.e. a 3-fold higher affinity). Specifically, Km is the 2.5th percentile lower confidence limit of the population median based upon USEPA reanalysis of Greer et al. (2002). The value (50th percentile = 0.73 µM) is similar to that obtained from re-analysis of in vitro binding data, 0.59 µM (Schlosser 2016); use of KmNIS_P = 0.489 µM makes perchlorate 3 times more effective at competitive inhibition of NIS versus Lumen et al. (2013).
- Plots of NHANES 2007-2012 data for non-pregnant women demonstrated little relationship between iodine intake and fT4, even at iodide intake levels below 75 µg/day (Figure A-54). Given limited data in this range, USEPA has used the relationship between thyroidal iodide stores (mg) and iodine intake, which shows depletion of fT4 at iodide intake levels below 100 µg/day (Delange, 2000). It is clear from Figure A-54, this is inconsistent with the NHANES data. This relationship was used as part of a parameter calibration procedure to simulate population percentiles of fT4, T4, T3, and TSH identified from NHANES data (see Appendix A, Figures 54-56)." However, script files included with the BBDR model use an iodine intake of 90 µg/day. The model is much more sensitive to iodine intake than perchlorate dose, with minimal changes to hormone levels due to perchlorate exposure at high iodine intake levels. The various iodine intake levels used for model simulations need to be more clearly presented and justified.

1.2 Calibrating the Model and Evaluating its Behavior

In development of these comments, multiple studies were independently simulated to an attempt to duplicate datasets that were reported by USEPA (2017) to calibrate the model. This included studies

to evaluate the model's behavior and determine if the results were consistent with the final values reported in the draft MCLG approach. This included:

- Comparison to the Steinmaus et al. 2016 results
- Other key studies noted in previous assessments:
  - Greer et al. 2002 – 14 day worker study
  - Braverman et al. 2006 – 6 month study
  - Téllez Téllez et al. 2005a, 2005b – Chile study (see attached)

In efforts to produce these simulations, it was noted that instructions for running the model for different scenarios, and documentation of the rationale for the model parameter values associated with them, are inadequate and lack transparency; this deficiency is exacerbated by the number of permutations of parameter settings used to generate the figures in the document. As a result it is difficult to have confidence in the results of a model evaluation, even by an experienced modeler, due to the significant uncertainties regarding the steps necessary to reproduce the figures and tables in the report, or to perform comparisons of model predictions to data for alternative exposure scenarios or studies.

1.2.1 Comparison to the Steinmaus et al. 2016 Results

In Appendix B of USEPA (2017), a comparison of the predicted changes in both fT4 and TSH from the BBDR model were compared to the results reported by Steinmaus et al. (2016). The Steinmaus et al. (2016) study was conducted to evaluate the potential for perchlorate exposure to impact thyroid hormone levels in pregnant women in San Diego. They reported an effect of perchlorate on fT4 levels to be similar among women with both low iodine (<100 µg/day) and normal (100-300 µg/day), with a greater effect of perchlorate observed among pregnant women in the high iodine intake group (>300 µg/day). They noted that this effect has been observed in NHANES evaluations

The comparison of the predicted fT4 changes from the BBDR model and the Steinmaus et al. (2016) results associated with changes in perchlorate dose are reported in Figure B-1. Duplication of this BBDR modeling output was possible using the USEPA provided modeling code, with additional instruction from USEPA staff. However, this comparison clearly highlights the differences between the model predictions and those from a published study. The baseline simulations with normal iodine intake (170 µg/day) demonstrate no change in fT4, which is consistent with other studies in which no impact on fT4 has been observed at doses up to 7 µg/kg/day (Greer et al. 2002; Braverman et al. 2006). The model underpredicts the changes in fT4, even in the scenario with low dietary iodine intake (75 µg/day), in comparison to the changes reported by Steinmaus et al. (2016). This discrepancy demonstrates the significant uncertainty in the ability of the model to predict changes in fT4 associated with perchlorate exposure. In particular, the current MCLG approach results in small changes in fT4 as low as approximately 1% being predicted to result in unit changes in neurodevelopmental endpoints. Predictions of this precision would require a level of model precision that has not been demonstrated by comparison to existing data.

1.2.2 Other Key Studies Noted in Previous Assessments:

Greer et al. 2002 – 14 day study

The Greer et al. (2002) study was conducted to establish the dose-response in humans for perchlorate inhibition of thyroidal iodide uptake and any short-term effects on thyroid hormones following exposure for male and female volunteers to perchlorate in drinking water at doses of 7, 20, 100 or 500 µg/kg/day for 14 days. The results of this study have previously been relied upon by the USEPA (2005) to derive a reference dose (RfD) and to determine health reference levels (HRLs). The results of this study indicate a decrease in iodide uptake following exposure to a dose of 20

µg/kg/day, but no effect on hormone levels, including fT4 and TSH, at the highest dose tested. A No Observed Effect Level of 7 µg/kg/day was determined based on these results, and an RfD of 0.7 µg/kg/day was adopted, based on NRC recommendations, with the application of an uncertainty factor of 10 for intraspecies variability or sensitive subpopulations.

Consistent with the results of the study, simulating the exposure of the Greer et al. (2002) with the BBDR model indicated no significant change in fT4 at doses up to 500 µg/kg/day. However, predicted concentrations of fT4 are lower than those measured by Greer et al. 2002. The model simulation was run with an iodine intake of 90 µg/day, as this was the value USEPA used in the Greer_test.m script. However, 90 µg/day is not consistent with the 170 µg/day value EPA reports as representing a sufficient intake and USEPA's documentation does not indicate why a lower value was used for the individuals in the Greer study. Simulation of iodide uptake inhibition (RAIU) appears to over-predict the measured values, though the qualitative increasing trend of inhibition with dose behaves appropriately. This discrepancy may result from the low iodine intake chosen by USEPA.

Table 1. Simulation of the Greer et al. (2002) Perchlorate Study

Dose	RAIU (%)		fT4 (pM)	
(ug/kg/d)	Simulated	Measured	Simulated	Measured
0	100	100	10.33	-
7	89	98.2	10.33	-
20	74	83.6	10.32	16.09
100	37	55.3	10.31	15.26
500	11	32.9	10.30	15.44

Braverman et al. 2006 – 6 month study

The Braverman et al. (2006) study was conducted to determine whether prolonged exposure (6 months) to low levels of perchlorate (0.5, 1.0 or 3.0 mg/day) would perturb thyroid function. The study included a small number of individuals; however, iodine levels were comparable with those of the general population. The authors noted the limitations of the small sample size, but concluded that the results suggested that healthy, euthyroid individuals, with normal levels of iodine intake, can tolerate chronic exposure to perchlorate at doses of up to 3 mg/day (approximately 40 µg/kg/day) without any effects on thyroid function, including inhibition of iodine uptake.

The Braverman et al. study was simulated using the BBDR model, and predicted T3 and TSH levels were compared to the reported measurements. fT4 was not compared because it was not clear how to convert the T4 index to a concentration and vice versa. As with the Greer simulation, 90 ug/day was used for iodine intake. Baseline T3 and TSH are similar to the measured values. But, as was seen with fT4, the simulated change in hormone levels is severely dampened compared to the measured values.

Table 2. Simulation of Braverman et al. (2006) perchlorate study.

Dose	T3 (nM)		TSH (mIU/L)	
(ug/kg/d)	Simulated	Measured	Simulated	Measured
0	2.63	2.49	1.51	1.20
7	2.63	2.51	1.52	1.60
43	2.62	1.77	1.53	2.60

Téllez Téllez et al. 2005a, 2005b – Chile study in pregnant women

Téllez Téllez et al. (2005a, 2005b) reports the results of a longitudinal epidemiological study among pregnant women from three cities in Chile exposed to concentrations of perchlorate as high as 114

µg/L in the public drinking water. The focus of the study was to evaluate maternal thyroid function during pregnancy, neonatal thyroid function and developmental status at birth, and breast milk iodine and perchlorate levels during lactation. The National Academy of Sciences (2005) has reviewed this study in the context of health implications for perchlorate ingestion and concluded this study should be considered in the evaluation of the U.S. experience with perchlorate in drinking water. The total iodine nutrition among this cohort was also noted to be similar to that of U.S. pregnant women (Téllez Téllez et al. 2005a); therefore, this study should be a key consideration in evaluating the relationship between perchlorate exposure, changes in fT4 in pregnant women and developmental status.

Results from this study, relied upon for BBDR model parameters (specifically the elimination to urine parameter – CLFUP), indicated no effect on thyroid levels in early pregnancy, late pregnancy, or neonates at birth related to perchlorate in drinking water at concentrations up to 114 µg/L. It seems this study should provide a validation dataset for the impact of high concentrations of perchlorate exposure in drinking water on potential changes in fT4 or TSH.

The BBDR model was used to simulate the drinking water study. The predictions of fT4 are consistent with the negative results of the study, though the concentrations are again smaller than those observed. This is not a strong validation of the model given the weak trend of changes in hormone levels seen in comparisons to other studies.

Table 3. Simulation of the Tellez et al. study of pregnant women exposed to perchlorate via drinking water.

Dose	fT4 (pM)	
(ug/kg/d)	Simulated	Measured
0.01	9.74	12.5
0.08	9.73	12.2
2	9.69	12.7

Overall, the BBDR model reproduces the key elements of the findings from these three studies, which indicate that thyroid hormone levels are relatively insensitive to inhibition of thyroid iodine uptake by perchlorate concentrations several orders of magnitude higher than those predicted by the BBDR to affect fT4 in early pregnancy. In particular, it seems biologically implausible that concentrations of perchlorate up to 2 ug/kg/d were demonstrated to be without effect to pregnant women in the Tellez study, while the BBDR model predicts that perchlorate concentrations nearly an order of magnitude lower could result in changes in fT4 during the first trimester. During the first trimester, hCG increases the iodine uptake capacity of the thyroid and the T4 production rate so significantly that TSH concentrations are typically reduced. The BBDR model assumes that during the first trimester thyroid hormone production is controlled by both TSH and hCG but thyroid uptake is controlled by TSH only. However, hCG controls both organification and uptake. During pregnancy, hCG stimulates iodide transport and thyroid hormone synthesis through stimulation of the TSH receptor due to the structural similarity of hCG to TSH. This increase typically results in lower TSH levels (Pesce and Kopp 2014). Thus, during the first trimester, the thyroid is actually in a better position to respond to inhibition of iodine uptake through a direct TSH-mediated response if needed.

2. LINKING BBDR RESULTS TO NEURODEVELOPMENT OUTCOMES

Chapter 5 of USEPA (2017) focuses on the SAB's recommendation to "Identify literature and conduct analyses to support the model outputs for the downstream steps" from the BBDR's predicted changes in thyroid hormones following exposure to perchlorate. Specifically, Chapter 5 was developed to present the process USEPA used to identify literature to support the approach for derivation of the MCLG for perchlorate. USEPA (2017) states, "Based on the recommendations of previous peer review panels, USEPA assumed that changes in thyroid hormone levels would be expected to lead to neurodevelopmental outcomes", and because of this assumption, a complete systematic review of the body of literature on this topic was not performed. Instead, a "focused review of the published literature" was conducted.

The approach is inconsistent with recent recommendations from the National Research Council regarding systematic review and evidence integration (NRC 2014). These recommendations are currently being incorporated into the USEPA's Integrated Risk Information System (IRIS) process and USEPA has recently released scoping and problem formulation materials for several new Integrated Risk Information System (IRIS) assessments, including ethylbenzene (USEPA 2014a), and naphthalene (USEPA 2014b). The approach applied in these assessments is intended to follow recommendations provided by the National Research Council (NRC 2013). While development of MCLGs are not part of the IRIS process, the application of systematic review principles in the identification of studies to define the relationship between fT4 and neurodevelopmental effects, is needed. The application of these principles will not only assist in defining the highest quality studies to address a specific research question, they provide a way to integrate all of the available evidence for the specific research questions raised by the SAB. Systematic reviews include the formulation of a specific question to be addressed and developing a protocol that specifies the methods that will be used to address the question. While a broad research question can lead to a large systematic review, if the research question is limited, such as in the case of perchlorate, then the systematic review becomes more focused.

For the USEPA (2017) MCLG approach, a systematic review question could have been easily developed based on the SAB recommendation (i.e. "Identify literature and conduct analyses to support the model outputs for the downstream steps") and the protocol would simply be focused on the methods for conducting the systematic review to address this very focused systematic review question in a transparent manner. Transparency being defined by USEPA as "sufficient information will be available to understand the scientific rational behind decisions, as well as, reproduce methods used to identify and evaluate data". However, in the case of the literature identified for consideration in the MCLG approach for perchlorate, a well-defined protocol for all steps of the process has not been developed and therefore is inconsistent with the recommendations of the NRC (2013):

> *"A priori decisions and a predefined protocol are critical during the systematic review process (Berlin and Colditz 1999; Dickersin 2002); the protocol should describe the following steps: the research question, the search strategy and data sources, the study inclusion and exclusion criteria, the data to be abstracted and derived from the original studies (such as sample size, exposure and outcome assessment methods, and confounders evaluated), the criteria and methods for pooling effect estimates and measures of variability among studies. Systematic reviews and meta-analyses need to be replicable; other investigators following the same steps should be able to identify the same articles, abstract the same data, and reach similar conclusions."*

At each step of the process for identifying studies for use in the development of the MCLG approach for perchlorate, a detailed set of criteria is needed. For example, if decisions are made to include or exclude any studies, there should be very detailed criteria indicating why studies were included or excluded and it should be specified prior to the initiation of the literature searching process. The criteria for each step should be described in such a way that an independent reviewer could use it to replicate the results of the literature search and review; however, there are several areas in the USEPA (2017) MCLG approach for perchlorate where this level of detail is lacking, making it difficult for an independent reviewer to replicate the results.

2.1 Systematic Review Research Questions

An overall hypothesis or systematic review research question should be developed that is based on the SAB recommendation to clarify the focus of the review and the linkage between altered maternal fT4 (as predicted by the BBDR model) and the potential for adverse neurodevelopmental effects in offspring. Some additional explanation as to how USEPA arrived at the specific neurodevelopmental outcomes of concern should be provided.

2.2 Searching the Published Literature

While the literature search key words are presented in the USEPA (2017) report, there is a lack of explanation as to the reasoning behind the focus on the outcome of concern. The research question should be used to develop the literature search. The major points used or considered in developing the literature search strategy should be presented. In addition, there should be a detailed explanation of the screening criteria used to screen the literature search results. Furthermore, USEPA (2017) does not report the details of the literature search results. For each search string reported in Table 9 of the USEPA (2017) report, a total number of citations identified should be reported. In addition, the criteria used to screen the original search results should be clearly reported in the document. Essentially, each step of the literature search and review should be reported in such a way that any independent party could easily reproduce the results reported in Chapter 5 of USEPA (2017). The lack of this type of information does not allow the reader to determine if any key studies may have been removed from consideration.

2.3 Literature Screening Approach and Selection of Key Studies

USEPA (2017) states that a 3 step approach was used to identify studies for consideration in the development of the approach for derivation of the MCLG for perchlorate. The approaches utilized by USEPA (2017) to identify the epidemiological studies for this evaluation were strictly focused on the appropriateness of the quantitative data for consideration in combination with the output of the BBDR model. Group 2 (studies with categorical analyses only) and Group 3 (studies with analyses not directly compatible with BBDR output) studies were apparently eliminated from consideration in the assessment. While not directly compatible with BBDR modeling output, it is possible that these studies may provide information important in understanding the potential relationship between changes in thyroid hormones and the potential for neurodevelopmental effects, as well as potential key confounders.

While 15 studies were identified in Group 1, only 5 of these were determined by USEPA to include analyses that could be used to connect the results of the BBDR model to incremental changes in adverse neurodevelopmental effects. A clearly defined set of inclusion and exclusion criteria should be developed to clearly convey to the reader why the other 40 studies in Groups 1, 2, and 3 were not considered. In addition, studies that provide no evidence of an inverse relationship between perchlorate exposure and serum thyroid function (e.g. Ghassabian et al. 2014; Modesto et al. 2015; Moleti et al. 2016; Noten et al. 2015) should also be considered to not only understand why these

results are in contrast to the potential research question, but also that the overall weight of evidence can be determined. It is possible that the majority of studies provide evidence that critical factors that are not reported in some of the available studies may explain the reported changes in serum thyroid function.

2.4 Assessment of Study Quality and Risk of Bias

According to recent recommendations from the National Research Council (NRC 2014), the National Toxicology Program's (NTP) Office of Health Assessment and Translation (OHAT) method for the assessment of study quality and risk of bias of the literature (NTP 2015) is one method that should be considered for qualitative and quantitative assessments. "An assessment of study quality evaluates the extent to which the researchers conducted their research to the highest possible standards and how a study is reported. Risk of bias is related to the internal validity of a study and reflects study-design characteristics that can introduce a systematic error (or deviation from the true effect) that might affect the magnitude and even the direction of the apparent effect" (NRC 2014). Each study meeting inclusion criteria in Group 1, 2, and 3, should be evaluated against a predetermined set of study quality and risk of bias criteria and the results of this evaluation should be presented in the perchlorate MCLG approach report.

2.5 Uncertainties Critical to Characterizing Changes in Thyroid Hormone Levels in Pregnant Women Associated with Neurodevelopmental Changes in Offspring

The MCLG approach presented in USEPA (2017) to predict doses of perchlorate that would result in per unit changes in neurodevelopmental measures, is, as noted by USEPA (2017), "...dependent upon predictions from the BBDR model, the derivation of the distribution of fT4, and the evaluations of the relationship between fT4 and neurodevelopment. Each of these steps has inherent uncertainties associated with it."

A major source of uncertainty is related to the five studies in Group 1 with data that could be used to quantitatively describe the relationship between thyroid hormone levels in early pregnancy and changes in neurodevelopment (Pop et al. 1999, 2003; Finken et al. 2013; Korevaar et al. 2016; Vermiglio et al. 2004). None of these five studies relied upon data from US populations or have been demonstrated to have iodine intake similar to US populations. Yet according to Alexander et al. (2017) the reference range of both TSH and fT4 in pregnant women varies depending upon ethnicity. While two studies in Group 1 focused on population groups within the United States, neither were considered for the model because T4 and not fT4 was measured in the pregnant females (Oken et al. 2009) and the relationship between fT4 and neurodevelopment was evaluated in late pregnancy and did not reach statistical significance (Chevrier et al. 2011). USEPA (2017) (Section 6.5.1) states "there is no reason to believe that the impact of fT4 on neurodevelopment would differ by country, unless there is a substantial difference in iodine intake". While USEPA (2017) does make an effort to evaluate changes in iodine intake in women from various populations, including the US, there are not substantial data reported to validate the conclusions that the impact of fT4 on neurodevelopment would differ by population or uncertainty in iodine intake levels would have an impact on the derivation of the MCLG. This is inconsistent with data from the American Thyroid Association (Alexander et al. 2017) that suggest variability in the distribution of thyroid hormone levels across populations and even within ethnicities within a single population.

USEPA (2017) also notes that all five studies used for quantitative analysis relied on a one-time fT4 level during pregnancy (Section 6.5.5). The influence of changes in maternal fT4 on fetal brain development is likely greatest during early pregnancy. The variability in maternal fT4 levels during pregnancy and the lack of measurement of fT4 at time points throughout pregnancy in the studies relied upon introduces a significant amount of uncertainty to the assessment. As stated in USEPA (2017),

> *"Circulating T3 and T4 levels in an individual are maintained within a narrow range by a negative feedback loop with TSH from the pituitary and TRH from the hypothalamus (see Figure 2) that operates around a "set-point." This set-point is different from individual to individual, which generates a population variance in blood levels of thyroid hormone that is considerably broader than the individual variance (Andersen, Pedersen, Bruun, & Laurberg, 2002). Therefore, in euthyroid individuals, serum T4 and T3 fluctuate within a fairly narrow range (about 10% of the population variance), maintained by the negative feedback relationship with serum TSH from the pituitary gland. This normal variation creates a situation where single measures of free or total T4 and TSH are a somewhat imprecise measure of an individual's average T4 and TSH concentrations (Andersen et al., 2002)."*

Several other areas of uncertainty are also highlighted by USEPA (2017). Specifically, USEPA (2017) noted that none of the five studies carried forward provided iodine intake levels (Section 6.5.3), which adds significant uncertainty to the estimates. Three of the 5 studies (Pop et al. 1999, 2003; Vermiglio et al. 2004) also have populations of less than 30 decreasing the statistical power of the studies (section 6.5.4) relied upon for establishing the relationship between changes in fT4 and neurodevelopmental changes. USEPA (2017) also noted uncertainties in regards to the analytical methods used to evaluate fT4 levels and while approaches are being introduced to standardize analytical methods, results at different time points and from different countries may vary considerably due to differences in analytical procedures (USEPA 2017). USEPA (2017) also notes that "there is uncertainty regarding the true fT4 levels at various percentiles in the distribution around the median output from the BBDR model. This is exemplified by the fact that in this analysis larger unit changes are being seen with increasing percentiles of fT4 in most analyses." Finally, other confounders such as iron deficiency were not considered in the analysis. Iron deficiency in pregnant mothers may also be associated with hypothyroxinemia (Yu et al., 2015) and failing to directly account for a relationship between iron deficiency and hypothyroxinemia may introduce an uncertainty into this analysis.

While all of these uncertainties are noted by USEPA (2017), there is no attempt to adjust the MCLG approach in any way to account for these uncertainties. Many of these, especially confounders such as iron deficiency in the study population and a lack of information on iodide intake, can have a significant effect in characterizing changes in thyroid hormone levels associated with changes in neurodevelopmental outcomes. In the absence of adequately accounting for these uncertainties, it is difficult to conclude that small changes in a specific thyroid hormone (e.g. fT4) may accurately predict the potential for neurodevelopmental effects.

3. COMPARISON TO PREVIOUS ASSESSMENTS

In the MCLG approach, USEPA (2017) has focused on five studies that evaluated the relationship of maternal fT4 and several neurodevelopmental endpoints (IQ, mental development index (MDI), psychomotor development index (PDI), standard deviation of reaction time) based on the measurement of fT4 during early pregnancy. Results from previous studies have provided the basis for No Observed Effect Levels (NOELs) for health effects of perchlorate in the development of Reference Doses and currently recommended Health Reference Levels (HRLs), including Greer et al. (2002) which reported results similar to the BBDR model in human test subjects. Results reported by Greer et al. (2002) in which subjects were exposed to perchlorate in drinking water at doses of 0.007, 0.02, 0.1, or 0.5 mg/kg/day for 14 days demonstrated a NOEL for perchlorate inhibition of radioiodide uptake by the thyroid NIS following exposure to 7 µg/kg/day. The point of departure from the Greer et al. (2002) study represents a perchlorate level that precedes the inhibition of iodine uptake by the thyroid. The NAS RfD developed based on the point of departure (POD) from this study is a departure from the Agency's traditional approach of using a No Observed Adverse Effect Level (NOAEL) for regulatory actions. The NAS's use of a No Observed Effect Level (NOEL) is based on "using a nonadverse effect that is upstream of the adverse effect [which] is a more conservative and health protective approach".

While these studies have not been conducted in pregnant women (the population of interest for the MCLG approach), as noted by in USEPA (2017):

> *"...the BBDR model predicts very little difference in non-pregnant and first-trimester response to perchlorate. This likely occurs because the half-life of (organified) iodine in the adult thyroid is around six months, hence the availability of thyroidal iodine in the first trimester pregnant woman is determined to a very large extent by her nutrition and perchlorate exposure several years preceding pregnancy."*

This suggests comparison of the current modeling results to those from studies conducted in adults should provide insight into the predictions of the model and the conclusions regarding the changes in thyroid hormone levels that may result in neurodevelopmental effects.

The current approach for deriving the MCLG assumes any exposure to perchlorate reduces fT4 to some extent (p. 3-17 of USEPA doc). In addition, linear regression analyses conducted to evaluate the relationship between changes in fT4 and neurodevelopmental effects further assumes any change in fT4 results in some risk of neurodevelopmental effects. These assumptions are in contrast to the results from the Greer et al. (2002) in which exposures to perchlorate were as high as 500 µg/kg/day and no impact on thyroid hormone levels was observed. This was true for both men and women. In addition, in a study conducted by Braverman et al. (2006), 6 months of exposure to perchlorate in capsules at doses up to 3 mg/day (approximately 40 µg/kg/day) was reported to have no effect on thyroid function, including inhibition of thyroid iodide uptake as well as serum levels of thyroid hormones, TSH, and Tg in a small group of volunteers.

USEPA (2017) notes (p. 6-16) that from results of the literature review, it appears the relationship between maternal fT4 and fetal brain development has a temporal relationship, with this influence likely being greatest in early pregnancy (i.e. prior to mid-gestation). The focus of the evaluation is on gestational weeks 12, 13, and 16, where the mother's fT4 levels will have the greatest impact on the fetus. This should allow for comparison to the model results in pregnant women to results from previous studies focused on identification of perchlorate concentrations that would impact fT4 levels in adult women, such as the Greer et al. (2002) study.

In comparing the current BBDR model predictions to previous assessments, in Tables 35 and 40 of USEPA (2017) a perchlorate dose of 0.3-0.4 µg/kg/day would result in a 1% increase in the

proportion of the population with hypothyroxinemia and a perchlorate dose of 2.1-2.2 µg/kg/day would result in a 5% increase in proportion of the population with hypothyroxinemia. These modeling results suggest a potential for a significant change in thyroid hormones, as well as adverse effects on neurodevelopment at doses of perchlorate exposure for which there is evidence that decreases in fT4 are not observed. Based on the mode of action proposed by USEPA (2017), decreases in fT4 and increases in TSH would be prerequisite steps for the potential for neurodevelopmental effects. These changes in hormone levels are not observed in workers in the Greer et al. study following exposure up to 500 µg/kg/day. The current assessment suggests population changes in fT4 would be observed that would shift the proportion of pregnant women that would be hypothyroxinemic at doses of perchlorate below the previously defined NOEL (7 µg/kg/day).

Table 39 of USEPA (2017) provides the predicted dose of perchlorate per unit change in neurodevelopmental measure for low iodine intake individuals. Considering multiple neurodevelopmental endpoints (IQ, mental development index (MDI), psychomotor development index (PDI), standard deviation of reaction time), those for IQ are approximately at or above (6.5 – 45 µg/kg/day) the NOEL from Greer et al. (2002) and are associated with decreases in fT4 of 4.3 to 18.7%. The remaining doses associated with the other neurodevelopmental endpoints are 1.7 to 3.0 µg/kg/day and associated with decreases in fT4 of 1.3 to 2.4%. These percent changes in fT4 are very small and considering the potential uncertainty and variability in measuring fT4 levels, may not be detectable in the clinical setting. The dose of perchlorate estimated to result in a 1% or 5% increase in the proportion of hypothyroxinemic pregnant women is even lower, ranging from 0.3 to 2.2 µg/kg/day. Multiple studies in adults and pregnant women (Greer et al. 2002; Braverman et al. 2006; Téllez Téllez et al. 2005) provide evidence that no impact on iodine uptake or thyroid hormone levels would be expected at these dose levels. Based on the mode of action proposed by USEPA (2017), these events would be precursors necessary for the development of neurodevelopmental effects.

4. OVERALL CONCLUSIONS/COMMENTS

- While we applaud the EPA for the application of a BBDR model in the MCLG approach, as these models integrate the available science for a compound of interest, there is some concern that uncertainties inherent in the model call into question its proposed application in the risk assessment for perchlorate and whether it is fit for that purpose. While the hormone component of the model is a definite scientific improvement in terms of incorporating the available biology, there is a lack of data to provide validation of multiple steps in the proposed approach and of the assumptions/parameters within the BBDR model.
- Many of the changes in fT4 that are predicted by the MCLG approach to impact the population distribution of fT4 and therefore result in per unit changes in neurodevelopmental outcomes are small percent changes (some as low as a 1.3-4.3% change). This would appear to suggest that the extended version of the BBDR model has a capability to estimate small changes in fT4 with precision that is not demonstrated by any adequate validation. Further, the model predictions of fT4 underpredict observed data in various clinical studies by substantially more than 1.3-4.3%. This suggests that the model is not precise enough to predict such small changes in fT4. Moreover, considering the variability of fT4 in the populations of interest, there is uncertainty as to whether these slight changes could be measured clinically, considering the greater impact of iodine intake on hormone levels.
- Until additional data are available to validate current extensions of the BBDR model to the pregnant woman, the Greer et al. (2002) and Braverman et al. (2006) studies provide the critical information in determining concentrations of perchlorate that do not result in significant inhibition of iodide uptake and, therefore, impacts on fT4. Based on recommendations from the National Research Council (2005), points of departure provided by these studies used in combination with uncertainty factors were considered to be protective of sensitive subpopulations, and provides a basis for future risk management decisions.

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Message

From: Michael Deane [Michael@nawc.com]
Sent: 12/11/2017 5:18:01 PM
To: Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Best-Wong, Benita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6ee79b3d0fc0429b99f2c05481b0b957-bbestwon]; Lape, Jeff [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8d208a4970394d869eb5419e1ac8d589-Jlape03]; Gebhardt, Jim [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d25752bcb8c741fd831dbc3429088987-Gebhardt, J]; Ames, George [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=23fe9bb4f8ed4843ae2ec8398703514c-games]; Shanaghan, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=63bb2a6ab300454dbd58e2d3b9084cca-pshanagh]; Horne, James [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d18a5ec215d54ff0a42cceabded0faf4-jhorne]; Stein, Raffael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=280af9f00275496d96dc7587ab473480-Rstein]; Tarquinio, Ellen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=99c0c72e32d44fd4a7b7020b0ff87805-ETarquin]; Frace, Sheila [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ba25b075cb55480595d789b5e0765367-sfrace]; Thompkins, Anita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3b6aa114d53f4333bfb77d4385efe9f1-Thompkins, Anita]; Lopez-Carbo, Maria [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=447508c93bb448e3924d1d90e474b446-Mcarbo]; Burneson, Eric [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2cacb9a8d49f49af80531e9e2ccb9018-eburneso]; Abhold, Kristyn [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bfe730f27efa48beb8a6252c5ed0e71e-Abhold, Kri]; Brubaker, Sonia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6055e643e5154f25b83a5515161e1705-sbruba02]; Patella, Michael A. EOP/CEQ Ex. 6
Subject: Change at NAWC

Dear EPA Colleagues and Friends:

I want to share news with you before it is announced by NAWC shortly. I will be leaving the association around February 1st. It has been a true pleasure working with all of you (and many others I know I have missed on this list) while I have been at NAWC, as well as years before with so many of you. I look forward continuing that work together as I explore new adventures and decide what is next for me in our world of water. I hope to stay in touch, so after I leave NAWC, my contact information will be Ex. 6 and cell Ex. 6.

With best regards,

Michael

National Association of Water Companies Announces Departure of Executive Director

Washington, DC (December 11, 2017) – The National Association of Water Companies (NAWC) announced today that its executive director, Michael Deane, will leave the association on or about February 1, 2018. Deane has led the trade organization for private regulated utilities and operating companies since June 2009.

"Michael's leadership over the past eight years has strengthened the association and established NAWC as a trusted and well-respected organization in our work with state regulators, federal and Congressional officials, and our colleagues in the water sector to bring efficient, sustainable solutions to the nation's water infrastructure investment and management challenges," said Christopher Franklin, President and CEO of Aqua America and president of NAWC's Board of Directors. "The Board of Directors and members of NAWC thank Michael for his hard work and his commitment to our industry. We wish him well in his future endeavors."

"The recent review of our strategic priorities has shifted NAWC's primary focus to a more vigorous offering of solutions to municipal systems that seek partnerships while continuing our strong focus on addressing the nearly $1 trillion dollars of water and wastewater infrastructure needs in our country," Franklin said.

Deane commented, "It has been my pleasure and a privilege to lead NAWC during a period of increasing attention to the critical importance of water infrastructure and services to the nation and the need for innovative financing and management that the private sector delivers every day to communities across the country. The association is well positioned for growth and continued success."

For more information about the National Association of Water Companies, visit www.nawc.org.

About the NAWC
The National Association of Water Companies (NAWC) is the voice of the private water industry and the organization exclusively representing this group of quality water service providers, innovation drivers, creative financiers and responsible partners. To learn more about NAWC, visit NAWC.org or follow them on Twitter and Facebook.

###

Michael Deane
Executive Director
National Association of Water Companies
Ex. 6
Michael@nawc.com

Message

From: Amanda Waters [AWaters@nacwa.org]
Sent: 11/20/2017 5:30:44 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: CLE Form for the Clean Water Law Conference

Lee,
Thanks again for attending. We were honored to have you join us.

We have not yet received credit from Virginia, but as long as you signed in on the CLE forms, you are all set. Once we receive credit which can take a few months, we will let you know the code for reporting. Let me know if you have any other questions.

Amanda

Amanda J. Waters | National Association of Clean Water Agencies | General Counsel | Ex. 6 | Ex. 6 cell | awaters@nacwa.org | @amandawaters99 | Visit us at www.nacwa.org

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Monday, November 20, 2017 9:03 AM
To: Amanda Waters <AWaters@nacwa.org>
Subject: CLE Form for the Clean Water Law Conference

Amanda,

I really enjoyed attending the Clean Water Law Conference last week in Savanah (misquotes BNA notwithstanding). I do have bit of favor to ask. Could I get the Virginia CLE Course code so I Can do the paperwork for the time that I did attend your event?

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700

Forsgren.Lee@epa.gov

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 11/14/2017 6:12:55 PM
To: Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
Subject: NAPA Report
Attachments: NAPA_EPA_FINAL_REPORT_110117.pdf

Andrew and Peter,

As I read the NAPA report, attached, it is recommending more consideration for drinking water, etc., in the calculations of affordability in CSO decrees. I hope we can discuss this report and its ramifications in the near future.

Happy Thanksgiving!

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (direct)
(cell)

Attachment

A Report by a Panel of the

NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

Developing a New Framework for Community Affordability of Clean Water Services

U.S. Environmental Protection Agency

National Academy of Public Administration

October 2017

ABOUT THE ACADEMY

The National Academy of Public Administration is an independent, non-profit, and non-partisan organization established in 1967 and chartered by Congress in 1984. It provides expert advice to government leaders in building more effective, efficient, accountable, and transparent organizations. To carry out this mission, the Academy draws on the knowledge and experience of its over 850 Fellows—including former cabinet officers, Members of Congress, governors, mayors, and state legislators, as well as prominent scholars, business executives, and public administrators. The Academy helps public institutions address their most critical governance and management challenges through in-depth studies and analyses, advisory services and technical assistance, congressional testimony, forums and conferences, and online stakeholder engagement. Learn more about the Academy and its work at www.NAPAwash.org.

Report by a Panel of the

NATIONAL ACADEMY OF

PUBLIC ADMINISTRATION

for the Environmental Protection Agency

October 2017

Developing a New Framework for Community Affordability of Clean Water Services

PANEL OF FELLOWS

Stanley J. Czerwinski (Chair)

Elizabeth Fretwell

R. Scott Fosler

Greg Lindsey

Michael A. Pagano

Study Team

Joseph P. Mitchell, III, *Director of Academy Programs*
Brenna Isman, *Project Director*
Kenneth F. Ryder Jr., *Senior Fellow and Senior Advisor*
Lawrence B. Novey, *Senior Advisor*
Sylvia Tognetti, *Senior Advisor*
Elijah C. Evans, *Research Associate*
Melissa Wood, *Intern*

The views expressed in this report are those of the Panel. They do not necessarily reflect the views of the Academy as an institution.

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October 2017
Printed in the United States of America
Academy Project Number: 2210

Foreword

Over the past several years, the government's ability to provide affordable clean water services to communities and individuals has reached a critical juncture. Aging infrastructure, regulatory obligations and rising costs, and increasing economic segmentation in the United States have adversely affected both water utilities and the low-income customers who use are most vulnerable to water rate increases. The delivery of clean, affordable water requires collaboration across levels of government and the public and private sectors, given the fragmented nature of water governance in this country. Despite the complexity of these issues, numerous creative and innovative solutions have been implemented across the country and provide opportunities to optimize and revolutionize water service delivery operations in the coming years.

Against this backdrop, the Senate Appropriations Committee, in a committee report on FY 2016 legislative language, directed the Environmental Protection Agency (EPA) to contract with the National Academy of Public Administration (the Academy) to conduct an independent study to create a definition of, and framework for, community affordability of clean water. The recommendations of this report approach the task in four specific ways: 1) Revising the 1997 guidance document titled *Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development*; 2) highlighting best practices for integrated planning, 3) identifying innovative solutions to further address affordability by lowering costs, and 4) discussing the best approaches to analyzing the costs and benefits. The Panel's recommendations will require sustained leadership at all levels of government in order to ensure that the nation's community water systems are able to protect the health of our environment and of our citizens.

As a congressionally chartered non-partisan and non-profit organization with over 850 distinguished Fellows, the Academy brings nationally-recognized public administration experts together to help public organizations address future challenges. We were pleased to conduct this study and appreciate the support of EPA leaders and industry stakeholders, all of whom provided important insight and context to inform this report.

I extend my earnest thanks to the members of the Academy Panel, who provided invaluable expertise and thoughtful analysis to this undertaking, and to the professional Study Team, led by Brenna Isman, that provided critical support on this project. I expect that this report will contribute to EPA's efforts to develop an updated framework for community affordability within the Office of Water as well as to their continued engagement with local partners in pursuit of innovative stormwater management solutions.

Teresa W. Gerton
President and Chief Executive Officer
National Academy of Public Administration

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Acronyms

Academy	National Academy of Public Administration
AR	Affordability Ratio
BES	Bureau of Environmental Services
BLS	Bureau of Labor Statistics
BMP	Best Management Practices
CAP	Consumer Assistance Plan
CBO	Congressional Budget Office
CBP3	Community Based Public Private Partnership
CDBG	Community Development Block Grant Program
CEQ	Council on Environmental Quality
CIFA	Council on Infrastructure Financing Authorities
CIP	Capital Improvement Plan
CPH	Cost Per Household
CPI	Consumer Price Index
CRS	Congressional Research Service
CSS	Combined Sewer System
CSO	Combined Sewer Overflows
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
DDOE	DC Department of Energy and Environment
DWSRF	Drinking Water State Revolving Fund
ECHO	Enforcement and Compliance History Online
EFAB	Environmental Finance Advisory Board
EFC	Environmental Finance Center
EIB	Environmental Impact Bond
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAQ	Frequently Asked Questions
FCA	Financial Capability Assessment
FCI	Financial Capability Indicator
FCRA	Federal Credit Reform Act
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GAO	Government Accountability Office
GI	Green Infrastructure

GIS	Geographic Information System
GSE	Government Sponsored Enterprise
GSI	Green Stormwater Infrastructure
HUD	Department of Housing and Urban Development
IP	Integrated Planning
IP3	Integrated Planning and Permitting Policy
LGEAN	Local Government Environmental Assistance Network
LIHEAP	Low Income Home Energy Assistance Program
LIWAP	Low Income Water Assistance Program
LTCP	Long Term Control Plan
MADS	Maximum Annual Debt Service
MCDA	Multiple Criteria Decision Analysis
MCL	Maximum Contamination Level
MS4	Municipal Separate Storm Sewer Systems
MHI	Median Household Income
NEPA	National Environmental Policy Act
NLAC	National Level Affordability Criteria
NMC	Nine Minimum Controls
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
OCDWEP	Onondaga County Department of Water Environment Protection
OIG	Office of the Inspector General
OST	Office of Science and Technology
O&M	Operating and Management
OMB	Office of Management and Budget
OW	Office of Water
OWM	Office of Wastewater Management
PCI	Percent Capita Income
PFS	Pay for Success
PPP/P3	Public Private Partnerships
POTW	Publicly Owned Treatment Work
RI	Residential Indicator
SDWA	Safe Drinking Water Act
SRC	Stormwater Retention Credits
SRF	State Revolving Funds
TAP	Tiered Assistance Program
TBL	Triple Bottom Line
TEB	Tax-Exempt Bond

TIFIA	Transportation Infrastructure Finance and Innovation Act
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
UNC	University of North Carolina
USACE	United States Army Corps of Engineers
WIFIA	Water Infrastructure Finance and Innovation Act
WEF	Water Environment Foundation
WERF	Water Environment Research Foundation
WQS	Water Quality Standards
WQT	Water Quality Trading
WRAP	Water Residential Assistance Program
WRDA	Water Resources Development Act
WWT	Wastewater Treatment
WWFT	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant

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Key Policy Documents and their Abbreviations

1994 CSO Control Policy

U.S. Environmental Protection Agency. "*Combined Sewer Overflow (CSO) Control Policy: Notice.*" 59 Fed. Reg. 18688 (April 19, 1994).

1995 Interim Economic Guidance

U.S. Environmental Protection Agency, Office of Water. "*Interim Economic Guidance for Water Quality Standards: Workbook.*" (EPA 823-B-95-002, March 1995.)

1997 FCA Guidance

U.S. Environmental Protection Agency, Office of Water, Office of Wastewater Management. "*Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development.*" (EPA 832-B-97-004.February 1997.)

2012 IP Framework

U.S. Environmental Protection Agency, Office of Enforcement. "*Integrated Municipal Stormwater and Wastewater Planning Approach Framework.*" (May 2012.)

2014 FCA Framework

U.S. Environmental Protection Agency, Office of Water, Office of Enforcement and Compliance Assurance. "*Financial Capability Assessment Framework for Municipal Clean Water Act Requirements.*" (November 2014.)

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Executive Summary

Communities and governments at all levels face growing challenges in effectively managing the water resources necessary to support growing populations, thriving residential, commercial, industrial, and agricultural sectors, and healthy and productive natural environments. Water utilities and the local communities that they serve play central roles in this effort. Water utilities must build and maintain infrastructure and operate the treatment plants that supply safe and clean drinking water to the community and that collect and discharge wastewater in an environmentally acceptable manner. In addition, decisions by communities, businesses, and individual citizens regarding the management of stormwater can mitigate or exacerbate the challenges faced by utilities in dealing with both wastewater and drinking water.

Two federal environmental statutes, both administered by the Environmental Protection Agency (EPA), establish programs that particularly pertain to the functions of water utilities. The Clean Water Act (CWA) establishes structures for regulating pollutant discharges into surface waters that are subject to federal regulatory jurisdiction, and water utilities' water discharges are generally permissible only under permits issued under the CWA. These permits limit discharges to levels necessary to ensure attainment of Water Quality Standards (WQS), which are established by states consistent with designated uses of the water body – which may include drinking water. The Safe Drinking Water Act (SDWA) authorizes national health-based standards that specify maximum contaminant levels in drinking water, which public water systems must satisfy, and requires states to conduct source water assessments as the first step in a preventive, multiple barrier approach to drinking water protection. Under both statutes, EPA, states and tribes, and water utilities all must work together to achieve the congressional objectives.

Some vitally important CWA and SDWA objectives can be quite expensive to meet. For communities and water utilities that face problems with affordability, Congress and EPA have developed programs to offer assistance with financing and to provide certain kinds of leeway with respect to timing and sequencing of CWA compliance activities. In the CWA context, EPA issued policies in the mid-1990's that focused on the development and approval of compliance schedules for communities that had trouble affording the control of combined sewer overflows (CSOs) (i.e., discharges of raw sewerage from certain kinds of sewerage infrastructure that overflow during heavy rains). Building on these original CSO-related policies, EPA has issued further guidance over the years to clarify (1) how a community's financial capability is measured, including the kinds of financial burdens that may be taken into account, (2) the kinds of CWA compliance that may be scheduled under the guidance, and (3) the kinds of CWA obligations and control measures that may be sequenced when a community engages in integrated planning.

The Academy conducted this study and developed this report in response to a congressional directive to update these EPA policies and guidance on affordability. Accordingly, the Panel used EPA's existing policies and guidance as a starting point, including the agency's initial focus on the affordability of controlling CSOs and the agency's potential application of these policies and guidance in the broader CWA context, which applies to all wastewater and stormwater discharges. However, in developing its analysis, findings, and recommendations, the Panel broadened its scope to address a broader range of water environmental issues, beyond the CWA issues currently pursued by EPA.

The collective responsibility for assuring clean, affordable water services for all Americans, and the challenges this poses for both communities and individuals, has garnered increasing attention in recent years for three principal reasons:

- Aging water infrastructure in the United States, with high costs associated with maintenance, upgrades, and replacements that are projected to surpass $1 trillion dollars in the next 25 years. These costs could triple the cost of household water bills.[1]

- Compliance with WQS, which apply to wastewater and stormwater discharges, adds to the above costs. In the context of enforcement, limits on the financial capability of communities only provide the basis for negotiating extended schedules for compliance with WQS. This may spread costs further over time, thereby keeping rates more affordable. However, through the development of integrated plans, the process could lead to cost reductions through the identification of more cost-effective and innovative solutions. These costs are separate from those of providing safe drinking water, which may require treatment or prevention of pollution from non-point sources that are beyond the control of urban areas.

- Affordability is an increasingly critical issue, particularly for low-income customers who are far more vulnerable to increased water costs. This greater vulnerability reflects both the greater share of their income that low-income users devote to paying for water services and the limited resources they have to respond to water rate increases. These water affordability issues have intensified over the last 15 years as water costs have risen more quickly than the Consumer Price Index and the costs of other utilities—except electricity, while lower income populations have experienced slower income growth.

All levels of government in the United States share in the responsibility for clean, affordable water, though their authority for doing so is notoriously fragmented. The principal responsibility

[1] American Water Works Association, *Buried No Longer: Confronting America's Water Infrastructure Challenge*, 2012.

for water resource policy, finance, operations, and enforcement historically has rested with state and local governments, which have employed a wide variety of institutional arrangements to meet their obligations. Historically, local governments and their citizens, as well nongovernmental water utilities, have borne the vast majority of the costs of providing clean water services. They continue to bear the brunt of the rising cost burden of clean water, especially as they work to comply with water quality standards, which are established by states under the Clean Water Act, subject to approval by the federal government. States are also feeling pressure, since they have the responsibility for determining the organizational and financial structure of water operations within their territories, and for ensuring that their citizens have clean affordable water.

It was not until after World War II that the federal government began to assume a share of responsibility for setting and enforcing water quality standards, and financing some portion of the cost of meeting those standards, in the interests of addressing water-related concerns that crossed state and local boundaries, as well as in the interest of the nation as a whole. The federal government has attempted to fulfill its responsibility by passing and enforcing laws and regulations, and providing financial support to assist in their implementation. Congress has passed the laws and appropriated the funds, principally by way of the Clean Water Act, while delegating responsibility for issuing and enforcing regulations, and administering some of the financing to the Environmental Protection Agency (EPA).

EPA continues to work toward achieving the goal of protecting America's waters in an increasingly complex environment which is often resource constrained. In carrying out its responsibility, EPA provides a definition and framework for community affordability, which communities and the EPA use to assess financial burdens and develop compliance schedules for meeting communities' Clean Water Act (CWA) objectives. While endeavoring to ensure that federal law is enforced, EPA also works with communities to find practical ways of meeting Water Quality Standards (WQS) at an affordable cost, in part by issuing guidance that is attuned to the practical realities, as well as the legal responsibilities, of state and local water authorities. The key components of EPA's current guidance include:

- *Interim Economic Guidance for Water Quality Standards–Workbook* (EPA-823-B-95-002, March 1995)
- *Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development* (EPA 832 B-97-004, February 1997)
- *Integrated Municipal Stormwater and Wastewater Planning Approach Framework* (May 2012)
- *Financial Capability Assessment Framework for Municipal Clean Water Act Requirements* (November 2014)

The Senate Appropriations Committee, in a report on FY 2016 legislation, directed EPA to enter into a one-year contract with the National Academy of Public Administration (the Academy) – an independent, nonpartisan, nonprofit organization chartered by the U.S. Congress – to conduct an independent study to create a definition and framework for community affordability. The Senate Committee further specified that the Academy would consult with stakeholders, review certain existing studies, and consider community funding experience, and would submit a report containing the Academy's findings, conclusions, and recommendations. The current definition and framework for community affordability consists of the procedures and analyses that EPA has adopted for developing compliance schedules to meet Clean Water Act (CWA) objectives – primarily Combined Sewer Overflow (CSO) controls, and the Academy was thus tasked with producing findings, conclusions, and recommendations that EPA can use in updating its community affordability procedures and analyses. Additionally, addressing the framework for community affordability includes the potential integrated planning process, which can provide the context in which to consider innovative solutions that can lower costs.

An Academy Panel of Fellows guided the work of the professional Study Team that encompassed a comprehensive literature review, over 100 stakeholder interviews, a stakeholder survey, and a roundtable table discussion. This research and analysis led to a deep understanding of the accomplishments, opportunities for improvement and promising practices of leaders in all levels of government who are working to provide clean, affordable water it its citizens. The data gathering also allowed the Panel and Study Team to gain insight into the perspectives of other stakeholders invested in successfully managing water issues throughout the country.

Panel Findings and Recommendations

As a result of this research the Panel developed a number of observations regarding the challenges and opportunities for delivering clean and affordable water to the nation's citizens. Some principal findings that informed the 21 recommendations in this report include:

- Many communities are struggling to comply with CWA and SDWA requirements while confronting not only the ongoing tension between providing clean *and* affordable water, but also a number of other financial challenges.

- The fragmented governance of the water industry and regulatory approaches at all levels of government add layers of complexity to the affordability equation and have resulted in formidable implementation challenges.

- There are considerably varied viewpoints and often a lack of common understanding of both the "why" and the "how to" improve clean water affordability efforts. Dynamic, two-way communication is not taking place consistently throughout all layers of water service delivery and regulation.

- Communities have implemented many innovative approaches to help address clean water affordability issues. There is not always clarity and direction on how to best foster continuation of these efforts to reduce specific infrastructure costs, secure more favorable financing, adopt more efficient and equitable rate structures, and other creative organizational and structural changes. EPA support is consistently described as a critical element for successful implementation and extension of these initiatives.

- The delineation between CWA and SWDA compliance creates bifurcated regulatory and organizational structures. Governance structures reflect separately-managed silos for drinking water, wastewater, and stormwater at all levels of government. While some utilities at the local level may manage all water in integrated fashion; others provide more limited water services. Nonetheless, users bear the costs of these services, whether they appear as a single or multiple water bills.

Focusing on Water Affordability Issues:

A key focus of this report is the Panel's assessment of EPA's community affordability framework for determining the financial capability of permittees to provide clean and affordable water services. The 1997 Guidance for Financial Capability Assessment and Schedule Development (1997 FCA Guidance) cited "the need to address the relative importance of environmental and financial issues when developing an implementation schedule for CSO controls to be contained in the LTCP,"[2] that is, the long term control plan developed and approved in either the National Pollutant Discharge Elimination System (NPDES) permit process or an enforcement process (e.g., consent decrees).

That 1997 FCA Guidance and the subsequent 2014 FCA Framework appropriately identified two critical components affecting clean water affordability issues – the user's ability to pay for clean water services and the utility or service provider's financial capability to deliver those services. The 1997 FCA Guidance identified a Residential Indicator (RI) to reflect a permittee's ability to pay higher costs for needed infrastructure investments based on the impact on its users, and a Financial Capability Indicator (FCI) to reflect the permittee's ability to obtain financing for and maintain those investments. The 1997 FCA Guidance also established specific metrics for permittees to use for both indicators, but also noted a willingness to consider supplementary data. The subsequent 2014 FCA Framework retained the original metrics for the RI and FCI components, but re-enforced EPA's flexibility in considering alternative metrics.

Water industry stakeholders supported both EPA's efforts to assess a permittee's financial capabilities in determining acceptable time frames for meeting clean water regulatory requirements and the distinction between users' ability to afford increased water costs and the service provider's ability to finance, manage, and maintain needed investments. However,

[2] 1997 FCA Guidance, page 6, citing the 1994 CSO Control Policy, 59 Fed. Reg. 18688, 18694 (April 19, 1994).

stakeholders identified serious deficiencies in the 1997 FCA Guidance's specific metrics for the RI and FCI components that limited their ability to effectively assess user affordability and permittee financial capability issues. Stakeholders have also proposed a range of alternative metrics to improve the original RI and FCI components while still maintaining their flexibility to provide supplementary data to identify any excessive financial burdens in meeting EPA proposed clean water compliance time schedules.

The Panel's recommendations acknowledge the stakeholder identified deficiencies in the 1997 FCA Guidance's specific metrics for the RI and FCI components and propose improvements to both components that will provide a better starting point for EPA and permittees to address clean water compliance schedule issues. The diverse organizational structures among clean water permittees and the varying economic and financial conditions they face require EPA to maintain its flexibility in considering alternative metrics. But EPA also needs an effective and equitable starting point for all permittees, since many communities lack the managerial and financial capacity to provide extensive additional supplementary data and economic modeling alternatives to demonstrate potential excessive burdens in meeting proposed compliance schedules.

Stakeholder input and literature research provided many examples of alternative metrics for identifying affordability issues for the most vulnerable users as well as the financial strength of the utilities. For the RI component, stakeholders agreed that

- Median Household Income (MHI) was an inadequate metric for identifying affordability issues for the most vulnerable low-income rate payers, and
- All water costs should be included in assessing rate payer burdens.

Stakeholders also agreed that the FCI component should focus on

- The financial strength of the utility providing clean water services; and
- The economic and social conditions affecting the utility's market area.

Stakeholder input also identified options for addressing a more effective threshold (or set of thresholds) for the various metrics proposed to assess low-income user affordability and utility financial strength issues. Threshold options varied from specific normative ones (e.g., operating revenues being profitable - greater than one, or incurring losses less than one) or utilizing sample averages to compare specific permittee affordability and financial strength issues. These are discussed in greater detail in Chapter 2 of the report.

To help EPA support the flexibility communities need to address their CWA obligations in an affordable way, the Panel recommendations proposed specific criteria any specific metric must satisfy. In addition, the Panel recommendations to improve the RI and FCI components identified the key elements for each component that need to be assessed using alternative

metrics. The Panel believes these recommendations will retain the flexibility EPA and permittees need while providing a more effective and equitable starting point for all permittees to resolve clean water compliance schedule issues.

The chart below (Figure 1) depicts the key components and elements the Panel recommends be included in an improved community affordability framework. Panel recommendations 1-5 will be key foundational elements to help EPA address community affordability concerns while enabling them to meet the goal of delivering clean, affordable water services to all citizens.

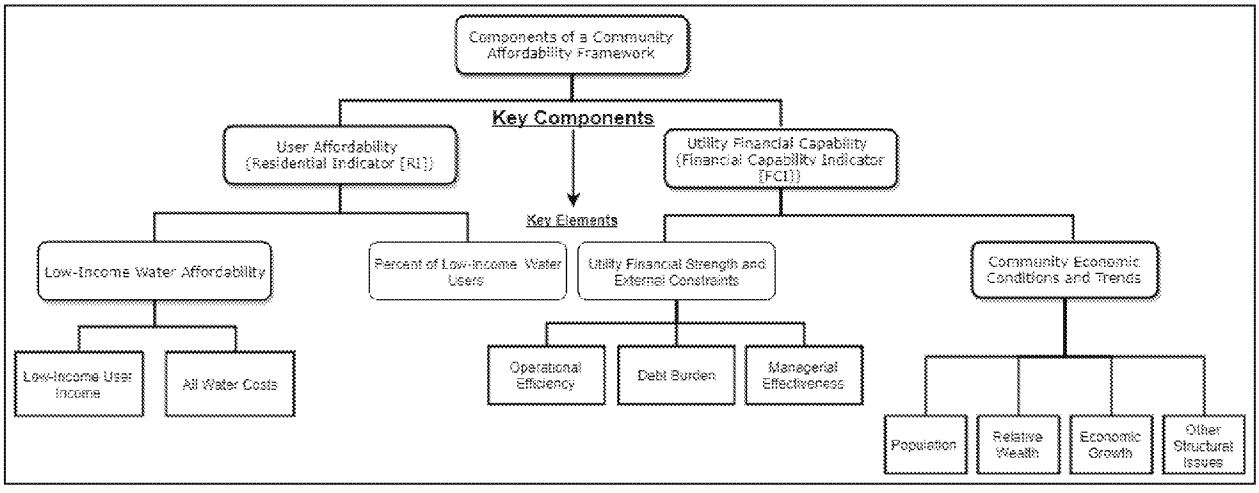

Figure 1. Components of a Community Affordability Framework (NAPA).

Panel Recommendation #1

The Environmental Protection Agency (EPA) should improve the metrics used for the Residential Indicator and Financial Capability Indicator components in the 1997 Financial Capability Assessment Guidance if it wants to establish a common starting point for all permittees while still considering supplementary permittee data in assessing a permittee's burden in meeting its Clean Water Act goals.

Since there is no perfect way to measure affordability and financial capability, the metrics used should meet the following criteria:

1. Readily available from publicly available data sources;
2. Clearly defined and understood;
3. Simple, direct, and consistent;
4. Valid and reliable measures, according to conventional research standards; and
5. Applicable for comparative analyses among permittees.

Panel Recommendation #2

To improve the 1997 Residential Indicator component, the elements defining the current component should be revised to:

1. Include all water costs, not just selected clean water costs, to include all drinking water and clean water costs – Combined Sewer Overflow control costs, stormwater costs, other sewer costs – as well as planned water infrastructure investments and any deferred costs of system operations and maintenance, in the burden assessment;
2. Focus on the income of low-income users most vulnerable to rate increases rather than Median Household Income;
3. Identify the size of the vulnerable users relative to the utility's total rate payer base; and
4. Avoid arbitrary normative thresholds to determine relative burdens.

Panel Recommendation #3

To improve the 1997 Financial Capability Indicator component, the current elements defining that component should be revised or refocused to:

1. Focus on the operational efficiency, debt burden, and managerial effectiveness of the utility supplying clean water services; and
2. Expand the socioeconomic components affecting the utility's market conditions to include trends in population, relative wealth, economic growth, and other economic structural problems in the community served by the utility.

Panel Recommendation #4

The Environmental Protection Agency should consider using the improved Financial Capability Assessment framework, in all of its clean and drinking water regulatory decision processes consistent with current statutory requirements.

Although the 1997 FCA Guidance and the 2014 FCA Framework indicated EPA's flexibility in considering alternative metrics for identifying excessive burdens, a number of stakeholders perceive that some regional EPA enforcement staff and state regulatory staff continue to rely primarily on the RI component and its 2% MHI measure to assess permittee burden in CSO

assessments. This stakeholder perceived inconsistency between stated EPA policy and policy implementation in the field is compounded by the lack of information on the number of CSO permittees found to have high burdens warranting some relief in compliance time frames and the amount of extended time schedule relief provided them, if any. This persistent stakeholder perception only reinforces the need for better communication of EPA policy and highlights the need for more effective follow-up and monitoring of regulatory actions taken in the field.

Panel Recommendation #5

The Environmental Protection Agency (EPA) should improve its two-way communication strategy with its regions, state regulators, and other stakeholders to assure formal, consistent, and clear messaging on policy changes, and effective monitoring and follow-up of clean water regulatory actions in the field.

Additionally, EPA should ensure that its management information system, at a minimum, provides the following information:

1. The number of permittees found to have high burdens;
2. The specific reasons for that finding; and
3. The degree of regulatory relief, in the form of lengthened compliance schedules, provided to those highly-burdened permittees.

Focusing on Integrated Planning:

For some time, communities have been working to meet regulatory requirements and make capital investments in an integrated fashion, recognizing the need to identify more cost effective sequencing and scheduling. With an eye toward more sustainable and comprehensive solutions for improving water quality and expanding the potential benefits, communities are drawing upon activities and analysis that provide detailed information regarding community impact, potential alternatives and detailed financial strategies for decision making. Integrated Planning (IP) is a voluntary planning process designed to assist communities in meeting their Clean Water Act (CWA) obligations by prioritizing and sequencing stormwater and wastewater project activities. As stated in the Integrated Municipal Stormwater and Wastewater Planning Approach Framework (2012 IP Framework)[3], it "will allow a municipality to balance CWA requirements in a manner that addresses the most pressing public health and environmental protection issues first." EPA established the 2012 IP Framework in May 2012 as a response to concerns that while EPA, states, and municipalities have achieved significant progress in implementing the CWA, there are still many factors stressing the implementation of key programs as currently, they often

[3] U.S. Environmental Protection Agency, *Integrated Municipal Stormwater and Wastewater Planning Approach Framework,* May 2012.

focus on each CWA requirement individually. The 2012 IP Framework is written broadly to allow community-specific flexibility in the development and adoption of integrated plans, identifying key operational principles, and providing municipalities opportunities to pursue more innovative cost-saving solutions to managing stormwater and wastewater requirements. As a result of a comprehensive integrated planning process, the conclusions or preferred actions identified can inform the permit, enforcement order, or consent decree processes. As the 2012 IP Framework states, "The integrated plan will be the starting point for development of appropriate implementation actions, which may include requirements and schedules in enforceable documents."[4] Additionally, this deliberate, data-informed process allows for more informed choices of innovative solutions. The stakeholder engagement and the rigorous decision analysis enable communities to identify the optimal suite of new technologies and approaches to stormwater management. Integrated planning allows for municipalities to pursue innovative projects with more knowledge about the potential benefits and a higher level of confidence that this is the correct approach for its citizens. The chart below (Figure 2) identifies a number of components in an Integrated Planning Process.

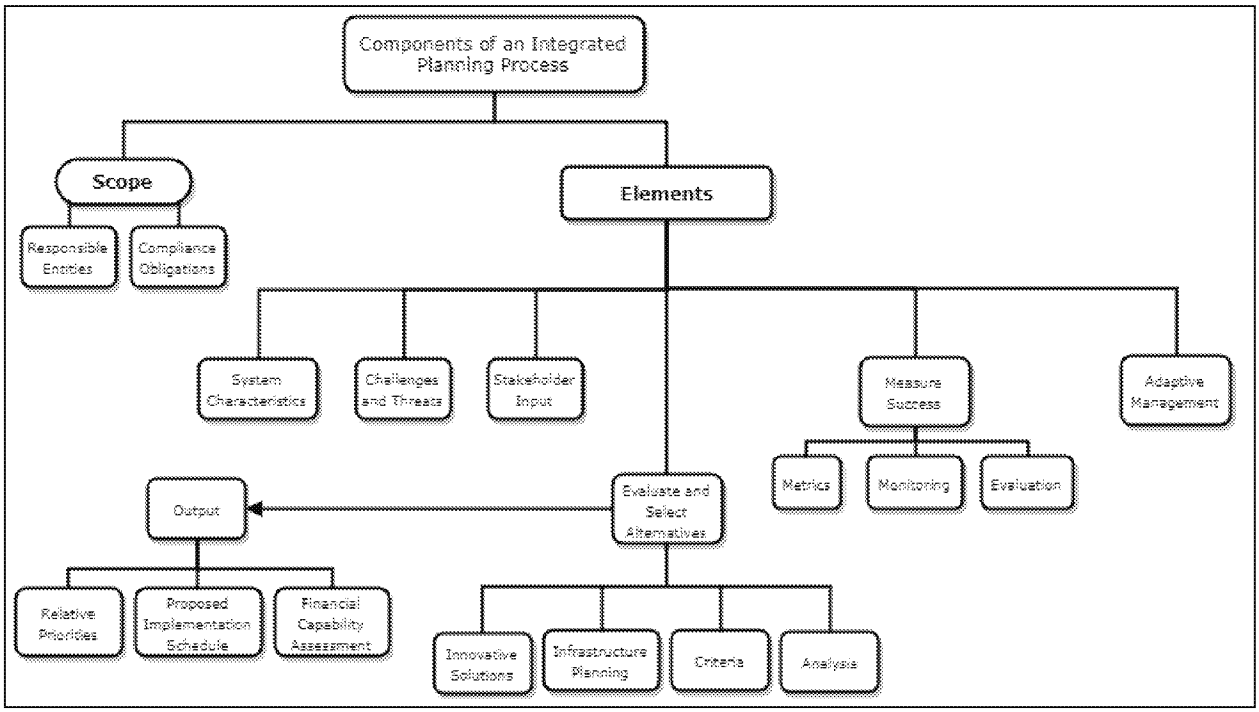

Figure 2. Components of an Integrated Planning Process (NAPA).

Due to the insight from the five communities that received technical assistance from EPA to develop elements of integrated plans for municipal wastewater and stormwater management

[4] U.S. Environmental Protection Agency, *Integrated Municipal Stormwater and Wastewater Planning Approach Framework,* May 2012.

(Burlington, Vermont, Durham, New Hampshire, Onondaga County, New York, Santa Maria, California, and Springfield, Missouri) as well as other communities pursuing some form of integrated planning, it became clear to the Panel that additional codification and communication is necessary. Many communities understand the value of the process, but are still unclear about how to progress in development and implementation. Additionally, communities are struggling with how to coordinate an integrated plan in a way that best addresses both Clean Water Act (CWA) as well as the Safe Drinking Water Act (SDWA) imperatives. Finally, communities remain uncertain about how EPA and state regulators will use the results of their integrated plan in resolving clean and drinking water environmental issues.

Panel Recommendation #6

The Environmental Protection Agency (EPA) should develop additional guidance that articulates expectations for implementation and maps out the "how" for both the communities as well as the front-line regulators. This guidance could include a centralized repository of lessons learned and technical assistance that municipalities could access in order to inform their own integrated planning implementation strategies. Making information that the five technical assistance recipients acquired available to all interested communities expands the value of that assistance and further demonstrates the value of EPA's investment. EPA should use both the recently developed Water Finance Clearinghouse and possibly a new website/portal to share this information. Similar to the Clearinghouse, any new site should allow approved contributors to submit information. Some key areas in which to provide information should include:

1. Case studies (both technical assistance recipients and other successful Integrated Planning efforts);
2. Information on availability of grants, loans, and technical assistance, as well as a community's local in-kind or cash match contribution to water-related projects (this information is currently in EPA's Water Finance Clearinghouse and may be linked to in a new site);
3. Links to other organization's resources for focused and specific Integrated Planning implementation guidance; and
4. The ability for communities to interact and share information with one another.

EPA will need to direct financial resources to support the Water Finance Clearinghouse and the development of any new information portal. Support for human capital to manage and monitor the information and participant engagement is important as well.

Panel Recommendation #7

The Environmental Protection Agency (EPA) should establish guidelines for developing flexibilities that allow compliance with Clean Water Act and Safe Drinking Water Act requirements within a timeframe that correlates with well-defined prioritization of community objectives, statutory and regulatory requirements, and integrated planning activities.

1. Much like the Ombudsman concept reflected in proposed Senate Bill 692 – Water Infrastructure Flexibility Act, this liaison between Headquarters and Regional EPA offices, states, and municipalities would provide a mechanism for aligning Water Quality Standards with the concerns and priorities of the local residents to optimize the value of each dollar of investment. This resource would also provide additional guidance to state and regional environmental oversight in order to ensure consistent application of flexibilities.
2. EPA will need to provide a consolidated review of the proposed Integrated Plan for consideration, which includes those impacted components.
3. An additional consideration is to use the Supplemental Environmental Projects policy, which currently provides accommodations for Integrated Planning activities in enforcement actions.

Panel Recommendation #8

An Environmental Protection Agency (EPA) effort to expand Integrated Planning guidelines should require that each Integrated Plan provide established criteria and a formalized agreement between the community and appropriate governmental authorities to guide communities toward compliance and shared responsibility for achieving both compliance and Water Quality Standards.

This Framework would require that each Integrated Plan include a set of requirements outlining responsible parties, deadlines for meeting requirements, and a clear identification of each stakeholder's responsibilities. Each Integrated Plan must be accompanied by a funding plan when submitted to regulators. In addition to the flexibility that Integrated Planning affords, additional incentives may include technical and planning support, and funding.

Focusing on Measuring Costs and Benefits:

In the development and approval of control measures for combined sewer overflows (CSOs) and for other pollution sources considered together in an integrated process, the proponents of a control plan and the regulators reviewing it will take account of benefits and costs at several

points in the process. Such consideration is called for both by regulatory requirements and policies and by governmental decision-making practices of plan proponents. Currently, communities often struggle with the process of identifying and analyzing benefits and costs associated with long-term control plans and integrated plans. There is a lack of clarity regarding optimal levels of effort and sophistication as well as how to expand beyond cost effectiveness in a way that truly illustrates a comprehensive set of environmental and health costs and benefits.

Panel Recommendation #9

In estimating and evaluating benefits and costs relevant to the development and consideration of control plans and integrated plans, the following principles should be considered:

1. Analytical effort should be commensurate with the issue's importance.
2. Simple cost effectiveness analysis should suffice for most individual Combined Sewer Overflow control issues.
3. More complex Integrated Plans may benefit from more extensive assessment of benefits and costs.
4. Distribution of benefits and costs among various populations should be considered.
5. Ancillary benefits and countervailing risks are often important and should be considered.
6. The impact of an extended implementation schedule on benefits and on costs, including any effect on how benefits and costs affect various groups differently, should be considered.
7. Retrospective evaluation of the benefits actually achieved and the costs actually incurred is often important for subsequent decision-making.

Panel Recommendation #10

The Environmental Protection Agency (EPA) should build on its existing efforts to make informational resources and other support and assistance available that would help both plan proponents and front-line regulators develop, review, and, eventually, agree on the assessments of costs and benefits needed to establish long-term control plans and integrated plans making best use of the flexibilities and opportunities offered under EPA's policies.

Identifying and Evaluating Innovative Solutions and Smart Practices:

The integrated planning process provides a context in which to identify and evaluate the feasibility and cost-effectiveness of innovative and more sustainable solutions for achieving compliance goals, as well as for providing other economic, social and environmental or Triple Bottom Line co-benefits that may make it possible to leverage additional funding sources. Costs of regulatory compliance and deferred maintenance, as well as the need to replace and upgrade aging water infrastructure, are all driving the development of new approaches and adoption of smart management practices that can lower costs. However, investment in innovation also presents risk and challenges for implementation as well as costs associated with developing and standardizing new procedures, all of which need to be carefully considered and evaluated.

A key challenge is that there is still a lack of full understanding and consistent practices for evaluating the benefits and cost of innovative stormwater management practices, and proven management practices that can guide implementation. Additionally, innovative and creative approaches to financing are not always widely understood and details of successful initiatives aren't broadly shared to facilitate replication. For example, stormwater, which remains a growing source of pollution, is beginning to be reduced by managing it at the source, using onsite innovative stormwater management practices, commonly referred to as "green infrastructure" to filter and regulate the flow of water, along with more integrated watershed management approaches. Inherent in this decentralized approach is the need for innovative institutional arrangements and management strategies. [5] Other types of innovative approaches include the use of smart technologies to reduce overflow events by optimizing the use of storage capacity in existing gray infrastructure systems and enable proactive maintenance through early detection of leaks. Finance mechanisms are also moving toward greater emphasis on providing performance and market-based incentives for pollution reduction and the development of new business models that reduce the cost of innovation. Some examples of these include Community-Based Public-Private Partnerships (CBP3s), and new funding models to support infrastructure investments.

Recommendations 11-20 focus on promising practices that utilize new technologies and approaches to managing stormwater, knowledge management strategies, performance-based incentives, market-based approaches, new business models, and creative financing mechanisms to supplement existing efforts.

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[5] Reese, A., *Stormwater Paradigms: An expert takes an irreverent look at how our ideas about stormwater have changed*, 2001. http://foresternetwork.com/daily/water/stormwater-management/stormwater-paradigms/; Reese, A., *Ten Emerging Stormwater Best Practices*, Stormwater 17(5), July 2016. http://foresternetwork.com/stormwater-magazine/sw-water/sw-stormwater/ten-emerging-stormwater-management-best-practices/

A common theme underlying recommendations 11-15 is enabling innovation through the development of new tools and methodologies for evaluation, policies, market infrastructure and other institutional capacities associated with financing and managing decentralized infrastructure that has very different characteristics from pipes and tunnels. These also indicate the different, complementary roles of EPA, state, and local governments.

Panel Recommendation #11

The Environmental Protection Agency (EPA) should continue to strengthen efforts to engage stakeholders and collaborate in the development of tools, standard methods, and policies that can foster better understanding of the benefits of innovative Stormwater Management practices, and in the ongoing review of lessons learned from their application, as a basis for updating these. Better understanding of these benefits can also provide the basis for partnerships and the ability to obtain funding from additional sources.

Panel Recommendation #12

The Environmental Protection Agency (EPA) should support innovation in water infrastructure management by working with communities to encourage and enable the use of practices that are consistent with generally accepted principles of good planning, and by institutionalizing the process of adaptive management in enforcement and permitting, as well as in planning. This is a process that involves monitoring, evaluation, learning from outcomes, and building on experience, thereby incentivizing innovation and the development of new capacities. The process should be supported through:

1. Financial assistance for planning and development activities, should be made available for early and comprehensive public engagement in these activities, so that stakeholders have an opportunity to gain understanding of the purpose of Green Stormwater Infrastructure and the importance of stewardship. This early engagement will also enable them to provide meaningful input into planning, design, and decision-making.

2. Use of place-based assessment, with stakeholder input, to identify appropriate locations for effective and implementable projects, as well as the potential for innovation and barriers to it that may need to be addressed.

3. Identification of opportunities to improve equity in the distribution of benefits by addressing Environmental Justice concerns.

4. Building capacity for proactive asset management including the evaluation of opportunities for investment in natural infrastructure to prevent increases in stormwater runoff and flooding.

Panel Recommendation #13

Markets for Stormwater Retention Credits (SRCs) are promising for growing cities with active real estate markets. The Environmental Protection Agency (EPA) should facilitate the adoption of these SRCs in other cities by providing guidance, technical assistance, and start-up grants to cities to enable them to build their capacity to develop and manage a credit market.

Inclusion of stormwater in water quality trading has the potential for significant cost savings and is worth considering where certain conditions can be met. EPA should work with states to identify places where these conditions can be met, (i.e., where there are opportunities for trading, upstream from impaired urban water bodies and water intakes, that can contribute to meeting their National Pollutant Discharge Elimination System permit and Total Maximum Daily Load requirements as well as protect drinking water) and determine what enabling legislation or regulations may be needed to support trading in these conditions. In addition to protecting water quality, agricultural best management practices can also allow for other economic and environmental co-benefits that provide the basis for partnerships and opportunities for additional funding.

Panel Recommendation #14

Local governments should improve communication about stormwater management, and the value of the user fee as a more equitable approach to paying for it, highlighting ways the fee has been successfully used to recover as well as reduce costs of managing stormwater and to mitigate repetitive flooding.

Because user fees can be significant, they need to be coupled with incentive programs that enable property owners to reduce stormwater fees in exchange for the adoption of green infrastructure practices. Local governments should also consider combining these types of fees with grants or loans for upfront costs on large non-residential properties. Since not all local governments have the authority from their states to charge these fees, enabling legislation should be considered in those states that do not have it.

Panel Recommendation #15

New business models such as Community-Based Public Private Partnerships (CBP3s) are promising. The Environmental Protection Agency (EPA) should encourage the carefully structured and appropriate experimentation with CBP3s through knowledge sharing activities that build critical government capacity to manage the process, and for strategic planning to guide project selection.

The limited federal resources available through EPA's Water Infrastructure Finance and Innovation Act (WIFIA) loan program and capitalization grants for the Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) programs are not sufficient to meet the nation's substantial water infrastructure investment needs. The Panel finds, therefore, that it is critically important for EPA to ensure that these separate programs are used effectively to fund the highest priority water infrastructure investments. Collaboration between WIFIA and the SRFs can help ensure that these complementary programs work together to maximize funding available for critical, high-priority water infrastructure investments.

Panel Recommendation #16

An evaluation of any state use of Water Infrastructure Finance and Innovation Act (WIFIA) loans to expand their State Revolving Fund (SRF) lending activities is needed to compare the advantages and disadvantages of this leveraging technique relative to other leveraging techniques (e.g., tax exempt bonds). The evaluation can also identify potential program or statutory impediments to increasing SRF lending operations by leveraging WIFIA resources and assessing WIFIA's ability to meet its statutory goals by allocating some of its loan resources to increase SRF lending activity.

Panel Recommendation #17

Those proposing financial reforms to address local community and utility water infrastructure investment needs should focus on the most critical issue – additional resources to lower costs and provide greater access to long-term financing to meet water infrastructure investment needs.

Panel Recommendation #18

The Environmental Protection Agency (EPA) should ensure that the Water Finance Clearinghouse and technical assistance activities provided through the Water Infrastructure and Resiliency Finance Center (Water Finance Center) include sharing information on the risks, costs, and advantages of any innovative financial instrument being proposed with states and localities before those instruments are used.

EPA's Water Infrastructure and Resiliency Finance Center and the Environmental Finance Centers affiliated with universities in each of EPA's 10 regions have the analytical expertise to develop and provide that information.

Water affordability issues, primarily for low-income users, compound the complex choices utilities face in increasing water rates and/or revising their rate structures to meet their rising costs from infrastructure investment needs and EPA water regulatory requirements. The presence

of state statutory limitations on the ability of water utilities to adopt Consumer Assistance Plans (CAPs) or develop rate structures that could make water rates more affordable for financially distressed low-income users also add to low-income water affordability issues.

Panel Recommendation #19

The Environmental Protection Agency (EPA) should work with local and state governments to eliminate barriers restricting utilities' ability to develop more efficient and equitable water rate structures, including specific Consumer Assistance Plans (CAPs) for financially distressed low-income ratepayers. EPA's Water Finance Center should continue to develop and disseminated information on CAPs to water industry stakeholders and other interested parties.

Panel Recommendation #20

The Environmental Protection Agency's (EPA) Water Infrastructure and Resiliency Finance Center staff and the staff at the 10 Environmental Finance Centers should extend their work with local communities and utilities to help them apply those principles of equity, efficiency, effectiveness, transparency, and collectability in adopting more effective water rate structures and Consumer Assistance Plans to address increasing water affordability issues for low-income users.

Focusing on Performance Standards

A widely-accepted principle in regulatory policy is that performance standards are generally preferable to design standards. For decades, there has been a focus on addressing regulatory issues by specifying performance objectives, rather than the behavior or process in which compliance is achieved. Utilizing this approach, which focuses on outcomes rather than specifying the means to those ends, gives the regulated parties the flexibility to achieve regulatory objectives in the most cost-effective way manner and should provide for the achievement of the greatest water-quality benefits as quickly as financially feasible. Best practices and lessons learned that were shared by stakeholder and in research informed the Panel's final recommendation.

Panel Recommendation #21

The Environmental Protection Agency (EPA) should consider whether it is feasible and desirable to develop and apply performance standards against which the sufficiency of integrated plans would be evaluated. In developing such performance standards, EPA should consider the following components:

1. Under the performance standard, an integrated plan for compliance with National Pollutant Discharge Elimination System (NPDES) requirements (in addition to meeting other applicable conditions) should provide for the achievement of the greatest water-quality benefits as quickly as affordable.
2. Under the performance standard, an integrated plan for compliance with both NPDES and Safe Drinking Water Act requirements (in addition to meeting other applicable conditions) should provide for the greatest water-quality and drinking-water benefits as quickly as is affordable. Regulators should encourage and accept such a proposed one-water integrated plan only if they are willing and able to collaboratively apply equitable and principled criteria for reviewing and, if appropriate, approving the proposed choices among water-quality and drinking-water priorities.
3. The performance standard might list several specific conditions with which the proponents of a control plan should be required to demonstrate compliance, in such areas as:
    - Compliance with applicable statutory and regulatory requirements.
    - Methodology for constructing an acceptable implementation schedule.
    - Consideration of green infrastructure.
    - Use of available sources of financing to enhance affordability.
    - That the sequencing addresses higher-priority environmental or public-health risks soonest.
    - Avoidance or mitigation of any disproportionate adverse impacts on disadvantaged communities.

The Panel recognizes that there are a number of issues that have been raised that require response and support from beyond those at EPA headquarters and in the regions. They reflect a number of challenges that would need to be addressed by other actors, such as Congress and state and local

leadership. Often these are areas of focus that require legislative change and/or funding, champions or enablers to support and implement the actions, and a broader paradigm shift with a look toward a longer timeline in order to implement the recommendations in this report.

EPA continues to explore ways for communities to leverage funding and identify innovative efforts to reduce costs and provide new and expanded benefits. The Agency has engaged with states and localities as well as many other stakeholders such as non-governmental organizations, associations, academia, and business and industry groups in order to gain a deep understanding of what potential solutions exist.[6] EPA is well aware of the risk of waiting to address stormwater management concerns and is embracing the concept of long-term comprehensive answers to difficult questions. EPA has also made a concerted effort to implement communication with its stakeholders to ensure information sharing is taking place. The findings and recommendations of this report aim to supplement current actions and to assist EPA in providing continued valuable guidance and support to communities as they pursue clean, affordable water for their citizens.

[6] U.S. Environmental Protection Agency, *Memorandum, Community Solutions for Stormwater Management: A Guide for Voluntary Long-Term Planning*, October 26, 2016, https://www.epa.gov/sites/production/files/2016-10/documents/memo_long-term_stormwater_guide-508.pdf.

Chapter 1: Introduction

1.1 Introduction

Government has a responsibility to assure clean water services at an affordable cost to all of its citizens and to the community as a whole. Clean water means the production and distribution of safe and reliable drinking water to users, and the safe and reliable collection and disposal of wastewater in a manner that protects water ways, including streams, rivers, lakes, and bays.

In recent years, government responsibility for assuring clean water that is also affordable to both communities and individuals has become an increasing challenge for three principal reasons. First, water infrastructure in the United States is aging, which imposes additional operating costs for emergency repairs of underground pipes that have been permitted to deteriorate as a result of deferred maintenance. Upgrading or replacing aging infrastructure that is beyond repair also increases capital costs, as well as the operating costs required to support long-term capital financing. It is projected that over $1 trillion dollars will be needed in the next 25 years to replace systems built circa World War II, which could triple the cost of household water bills.[7]

Second, compliance with federal Water Quality Standards (WQS) under the Clean Water Act (CWA) requirements adds to the above costs. In addition, the need to control pollution from non-point sources may limit water quality improvements associated with controlling point sources. Although not regulated under the CWA, states may address non-point sources under state laws. They are also addressed through voluntary incentive-based programs, such as the USDA NRCS Environmental Quality Incentives (EQIP) program. In the context of enforcement, limits on the financial capability of communities only provide the basis for negotiating phased or extended schedules for compliance with WQS. The FCA is not intended to reduce costs or compliance obligations. Rather, it is used to determine the appropriate implementation schedule after EPA works with the municipality to determine what work needs to be done to come into compliance with the CWA. This may spread costs further over time, thereby keeping rates more affordable. However, through the development of integrated plans, the process could lead to cost reductions through the identification of more cost-effective and innovative solutions.

And third, affordability is an especially critical issue for low-income customers throughout the United States. According to an AWWA survey, rates for water and wastewater increased by 41% and 37% from 2008-2014.[8] Although average (mean) annual expenditures for water are generally low relative to other utilities, they represent a higher share of income for those with the lowest

[7] American Water Works Association, *Buried No Longer: Confronting America's Water Infrastructure Challenge*, 2012.

[8] U.S. Government Accountability Office, *Water Infrastructure: Information on Selected Midsize and Large Cities with Declining Populations*, September 2016.

20% of income.[9] In the past 15 years, costs of water have also risen three times faster than inflation, while household incomes have risen at a rate lower than inflation. In addition, there has been a decrease in the number of households in the middle income ranges, which reduces the usefulness of median income levels as an indicator of the financial condition of a community.[10] However, these mean values do not provide an indication of the greater challenge of affordability in inner cities with older infrastructure, that have a higher concentration of poverty and a diminishing rate base as a result of declining populations. For example, in Baltimore, which has an MHI of $39,386, and has had increases in water and sewer rates of close to 83% from 2010 to 2017; over 13% of the population and 27% of families have an annual income below $10,000. The overall percent of low-income householders is greater than the national average, while those in the higher income ranges are lower than the national average.[11] A recent study found that Census tracts at "high risk," for which current rates are a challenge, and Census tracts "at risk" from projected rate increases, are concentrated in urbanized areas, and that 23.5% of all American households are at risk. The study also found that the percentage of households for which water is unaffordable could triple, from 11.9% to 35.6% if water rates rise as projected.[12] Although unaffordability is not the only reason for water shutoffs and there is no comprehensive survey of these, reports from selected cities suggests that water shutoffs are on the rise. The most high-profile case is that of Detroit, where 50000 shutoffs have been reported since 2014. In Philadelphia, according to water department figures, 1 in 5 accounts have had water shut off at least once since 2012.[13] In Baltimore, 8000 shutoffs were reported in 2015, and 1400 in 2016. In 2017, notices were sent to customers with delinquent bills informing them that their homes could go to a tax sale.[14]

All levels of government in the United States share in the responsibility for clean, affordable water, though their authority for doing so is notoriously fragmented. The principal responsibility for water resource policy, finance, operations, and enforcement historically has rested with state and local governments, which have employed a wide variety of institutional arrangements to meet their obligations. In particular, local governments and their citizens, as well as nongovernmental water utilities, now bear the brunt of the rising cost burden of clean water, especially as they work to comply with state and federal water quality standards. States are also

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[9] U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Expenditure Survey Table 1101. Quintiles of income before taxes: Annual expenditure means, shares, standard errors, and coefficients of variation*, 2016.

[10] Mumm, Jason and Julius Ciaccia, *Improving the Narrative on Affordability and the Measurements We Need to Take Us There*, Journal-American Water Works Association 109(5), 2017,: 42–48.

[11] City of Baltimore, Department of Public Works, *[reply to] NAPA Request for Information*, September 8, 2017.

[12] Mack, Elizabeth A., and Sarah Wrase, *A Burgeoning Crisis? A Nationwide Assessment of the Geography of Water Affordability in the United States*, PLOS ONE 12(1), January 11, 2017, doi:10.1371/journal.pone.0169488.

[13] Walton, Brett, *Philadelphia Water Rate Links Payments to Household Income*, Circle of Blue, May 16, 2017. http://www.circleofblue.org/2017/water-management/pricing/philadelphia-water-rate-links-payments-household-income/

[14] Weiner, Deborah, *Insurmountable bills lead to water shutoffs in Baltimore*, Baltimore Sun, February 13, 2017. *http://www.wbaltv.com/article/insurmountable-bills-lead-to-water-shutoffs-in-baltimore/8775838*

feeling pressure, since they have the responsibility for determining the organizational and financial structure of water operations within their territories, and for ensuring that their citizens have clean affordable water.

It was not until after World War II that the federal government began to assume a share of responsibility for setting and enforcing clean water standards, and financing some portion of the cost of meeting those standards, in the interests of water-related concerns that crossed state and local boundaries, as well as in the interest of the nation as a whole. The federal government has attempted to fulfill its responsibility by passing and enforcing laws and regulations, and providing financial support to assist in their implementation. Congress authorized the Environmental Protection Agency (EPA), under the CWA to issue and enforce regulations, and administer financing. However, average federal funding decreased by over half beginning in 1984, after the initial grant program was phased out, and converted to the capitalization of state revolving loan funds.

In carrying out its responsibility, EPA provides a definition and framework for community affordability, which communities and the EPA use to assess burden and develop compliance schedules for meeting communities' CWA objectives. While endeavoring to ensure that federal law is enforced, EPA also works with communities to find practical ways of meeting WQS at an affordable cost, in part by issuing guidance that is attuned to the practical realities, as well as the legal responsibilities, of state and local water authorities. The key components of EPA's current guidance and policy memos include:

- *Interim Economic Guidance for Water Quality Standards: Workbook* (EPA-823-B-95-002, March 1995)
- *Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development* (EPA 832 B-97-004, February 1997)
- *Integrated Municipal Stormwater and Wastewater Planning Approach Framework* (May 2012)
- *Financial Capability Assessment Framework* (November 2014)

The Senate Appropriations Committee, in FY 2016 legislative language, directed the Environmental Protection Agency (EPA) to contract with the National Academy of Public Administration (the Academy) —an independent, nonpartisan, nonprofit organization chartered by the U.S. Congress— "to conduct an independent study to create a definition and framework for community affordability." The Academy was thus tasked with recommending options for updating the current EPA definition and framework for community affordability.

For this task the Academy specifically focused on the 1997 document titled *Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development*. In addition, the Academy was asked to consider potential opportunities for innovative solutions that may promote affordability through cost savings. This report reviews efforts underway to explore and implement integrated planning (IP), innovative stormwater management practices, and creative financial mechanisms that have the potential for significant cost savings, as well as increased cost-effectiveness.

1.1.1 The Clean Water Act: A National Goal of Clean, Affordable Water

The federal government first took a definitive interest in the growing problem of water pollution in 1948 when Congress passed the Federal Water Pollution Control Act (Public Law 80-845).[15] In 1972, in response to growing public awareness and concern for water pollution, as well as lack of action by states,[16] Congress amended the 1948 act, and the resulting revised law became known as the Clean Water Act (CWA).

The question of affordability was front and center in the 1972 legislative debate. After President Nixon vetoed the original Congressional legislation, two prominent senators responded forcefully. [17] Senator Edmund Muskie asked rhetorically:

> Can we afford clean water? Can we afford rivers and lakes and streams and oceans which continue to make possible life on this planet? Can we afford life itself? Those questions were never asked as we destroyed the waters of our Nation and they deserve no answers as we finally move to restore and renew them. These questions answer themselves.

And Senator Howard Baker asserted:

[15] U.S. Environmental Protection Agency, *History of the Clean Water Act*. https://www.epa.gov/laws-regulations/history-clean-water-act

[16] Houck, Oliver A, *Cooperative Federalism, Nutrients, and the Clean Water Act: Three Cases Revisited*, Environmental Law Reporter 44(10426), May 2014.

[17] Cited in: Adler et al 1993 The Clean Water Act 20 Years Later.

> I believe that the [act] is far and away the most significant and promising piece of environmental legislation ever enacted by Congress.... Of course, such an ambitious program will cost money – public money and private money. The bill vetoed by the President strikes a fair and reasonable balance between financial investment and environmental quality....If we cannot swim in our lakes and rivers, if we cannot breathe the air God has given us, what other comforts can life offer us?

Congress answered in the affirmative by overriding the presidential veto, and provided significant resources to municipalities to help them achieve the goals. From 1972 through 2016, total appropriations under the CWA and SDWA totaled over $94 billion. Of this, close to $41 billion was appropriated through 1984, under Title II of the CWA for construction of Wastewater Treatment Plants (WWTPs), as grants for up to 75% of project costs until 1981 when the federal share was reduced to 55%, with an exception for the use of innovative technologies. Under amendments to the CWA in 1987, these grants began to be phased out and were replaced by grants to states to capitalize the State Water Pollution Control Revolving Fund, commonly known as the Clean Water State Revolving Fund (CWSRF).[18]

So, the tension between federal clean water standards and the declining proportionate share of the costs required to meet those standards that the federal government was willing to shoulder added to the mounting cost burden on state and local government to assure clean affordable water services for their communities and citizens.

1.1.2 The Changing Realities of Water Infrastructure

Meanwhile, the practical realities of assuring clean, affordable water services were becoming ever more challenging to states and local communities.

Assuring clean water requires attention to the entire cycle of water flow and use, and to the natural and human infrastructure that supports it, from the protection of original sources in the ground, lakes, and rivers, to the extraction of "raw water" from those sources for human use, to its treatment and distribution to users (e.g. household and business establishments), and to the collection and safe disposal of wastewater (including both from users and also stormwater runoff.)

[18] U.S. Library of Congress, Congressional Research Service, *Clean Water Act: A Summary of the Law*. By C. Copeland, 2016.

Until the mid-19th century, private and municipal water systems typically paid little heed to the water cycle, invariably disposing of wastewater channeled through open ditches directly back into the ground or natural waterways. As population grew and urban areas became denser, more numerous, and more closely located to one another, the public health dangers posed by such practices became obvious, not least because of the actual disease and death they caused. The development of sewer systems, driven by concerns about sanitation in the 19th century, is credited as one of the most significant advances in public health. It also marked a shift, toward acceptance of public health as a public good rather than an individual responsibility, thereby bringing about a change the way cities are governed.[19]

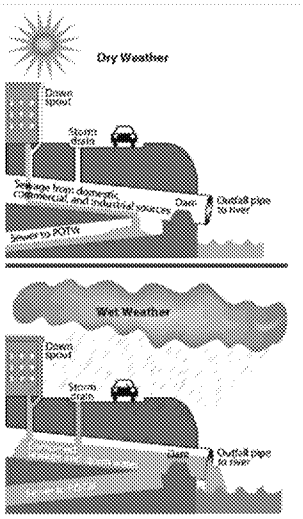

Figure 3. Schematic of a typical combined sewer system that discharges, directly to surface waters during wet weather. Source: EPA

When Combined Sewer Systems (CSS) were introduced in 1855 they represented a major improvement to the ditches that ran through urban areas and spilled sewage during wet weather events. A CSS gathers rainwater runoff, human waste, and industrial wastewater into one pipe for disposal. Originally, CSSs discharged directly into bodies of water, but in the early 20th century sewage treatment plants were introduced to treat the wastewater before discharge. During periods of dry weather, the CSS ordinarily has a low volume of water and waste, which the treatment plants can handle. However, during periods of rain, stormwater levels surge and the pipe can no longer handle the volume of water. The sewers were specifically designed with emergency outflow pipes to prevent backups into houses and buildings. This is similar to the overflow valve in old sinks and tubs to prevent overflow and can be seen in Figure 3. When capacity of the system is exceeded during a wet weather event the CSS discharges the untreated wastewater through the outfall pipe directly into the surface water source. This event is called a Combined Sewer Overflow (CSO) and involves the dumping of raw sewage into lakes, rivers, and coastal waters, which poses significant danger to public health and the environment.

Combined Sewer Systems exist in cities that span 32 states and serve over 40 million people. The majority of these systems are in Maine, New York, Pennsylvania, West Virginia, Ohio, Indiana, Michigan, and Illinois. In 2004, EPA reported that CSOs are a major concern for 772 cities and estimated that they release approximately 850 billion gallons a year of untreated wastewater and stormwater.

[19] National Academy of Science, *The Future of Public Health*, 1988. Committee for the Study of the Future of Public Health; Division of Health Care Services, Institute of Medicine. ISBN: 0-309-58190-7. URL: http://www.nap.edu/catalog/1091.html; Melosi, M.V., *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present,* 2000.

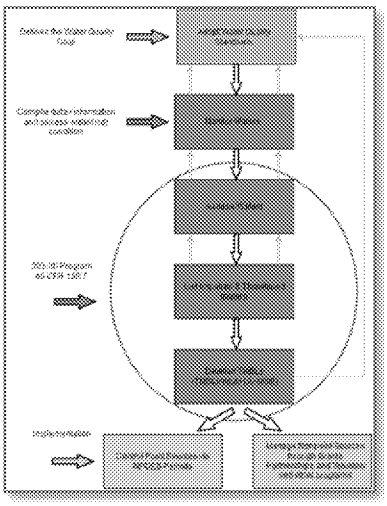

Figure 4. Water Quality-Based Approach of the Clean Water Act. Source: EPA

Consequently, aging public sewer systems have become a major concern in assuring clean water, and their maintenance, repair, and replacement became a major cost burden.

1.2 Regulatory History

As the regulatory obligations and costs have increased, federal funding has decreased. Local obligations have mounted because of this drop in federal spending and a spike in water-related costs. In the context of compliance with the Clean Water Act, affordability concerns have been driven primarily by the costs associated with CSO Long Term Control Plans (LTCPs) needed to prevent the discharge of raw sewage and ultimately meeting Water Quality Standards (WQS), which reflect the CWA goals of making our nation's waterways fishable and swimmable, where attainable. In addition to the implementation costs of CSO LTCPs, there are a number of additional costs driving growing concern about water affordability for water utilities providing water services and for their recipient customers.

Additional costs of meeting Water Quality Standards include those of achieving Total Maximum Daily Loads (TMDLs) which are established when technology-based effluent levels (TBELs) are not sufficient to meet the standards. TMDLs are developed for water bodies listed as impaired for each of the pollutants that contribute to the impairment, and are allocated among sectors as Waste Load Allocations (WLAs) for individual point sources. These WLAs provide the basis for Water Quality Based Effluent Limitations (WQBELs) which are incorporated into National Pollutant Discharge Elimination System (NPDES) permits. TMDLs also include Load Allocations (LA) for non-point sources but as these are not regulated under the CWA, they are not incorporated into NPDES permits. Instead, non-point sources are addressed through voluntary incentive programs and may be addressed through state laws. Among the key costs for meeting NPDES permit obligations are those of reducing discharges from Municipal Separate Storm Sewer Systems (MS4). Given large differences in cost between urban and agricultural BMPs, EPA also encourages states to allow water quality trading between point and non-point sources for WQBELs. However, these programs are nascent and face significant implementation challenges. In addition to WQS costs, there are also significant infrastructure lifecycle costs which include deferred maintenance and overdue replacement and upgrading of aging water infrastructure systems.

In addition, changes in water use patterns, and declining populations in inner cities and small communities reduce the rate base while many of the costs of providing services remain fixed. This last issue is one of the more significant challenges with respect to CSOs because so many CSSs are in small communities with fewer people on a line per mile and thus have a smaller rate

base, which results in less revenue to fund water infrastructure updates and compliance requirements. In addition to the issues outlined above, the fragmented governance of the water industry and regulatory approaches at all levels of government add layers of complexity to the affordability equation.

EPA released its Combined Sewer Overflow Control Policy in April 1994 (1994 CSO Control Policy), and the policy provided a national framework for the control of CSOs through the National Pollutant Discharge Elimination System (NPDES) permitting program, which was established in 1979 in the National Municipal Policy and Strategy document. The 1994 CSO Control Policy represented a "comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities, and the public engage in a comprehensive and coordinated planning effort to achieve cost effective CSO controls that ultimately meet appropriate health and environmental objectives." This policy left municipalities with two general options: 1) replace the combined sewer systems; or 2) find a way to store and treat peak flows during wet weather events.

In March of 1995, EPA released the Interim Economic Guidance for Water Quality Standards: Workbook (1995 Interim Economic Guidance), which functioned as the umbrella economic guidance for all water quality standards (WQS) programs pursuant to Water Quality Standards Regulation (40 CFR 131). This regulation limits consideration of economic factors to the use attainability and anti-degradation provisions, for those impacts that result for treatment beyond that required by the technology-based regulations when these are not sufficient to meet WQS. The guidance was intended to help states and applicants understand the economic factors that may be considered and the different tests available for determining if a designated use can or cannot be attained without "substantial and widespread economic and social impacts" and whether the benefits of development "unquestionably outweigh the costs of lowering water quality." In practice, Use Attainability Analysis (UAA) is rarely done because it would lead to a change in the water quality standard, and implies acceptance of lower water quality in economically disadvantaged areas. However, UAA may also be used to support the granting of a temporary variance, so as to allow time to develop alternatives. This guidance provided a significant amount of flexibility if the permittee could demonstrate substantial and widespread economic impact through an economically viable method of analysis. In 2000, the consolidated appropriations for FY 2001 enacted that all permits, orders, or decrees issued must conform with the 1994 CSO Policy.

In February 1997, EPA released Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development (1997 FCA Guidance), which, as noted earlier, is a focal document for review in this study. Unlike the umbrella 1995 Interim Economic Guidance, the 1997 document applied exclusively to communities with CSOs. The 1997 guidance uses a two phase approach. The first phase calculates the Residential Indicator (RI) and the second phase calculates the Financial Capability Indicator (FCI). In this guidance, the RI uses 2% of a

municipality's Median Household Income (MHI) as a primary screener for distinguishing whether wastewater and CSO control costs would be a high or low burden on individual households and to trigger a conversation about negotiating a phased or extended compliance timeline. The FCI examines the debt, socioeconomic, and financial conditions of a permittee and evaluates their capacity to acquire and hold debt. However, there are significant limitations to the guidance's ability to identify burden and disparate impact to the community.

1.3 Regulatory Flexibility and Integrated Planning

In 2012, EPA released a memorandum on integrated planning (IP) titled *Achieving Water Quality through Integrated Municipal Stormwater and Wastewater Plans*. It discussed the May 2012 Integrated Municipal Stormwater and Wastewater Planning Approach Framework (2012 IP Framework), which was EPA's first attempt at introducing greater flexibility to the 1997 FCA Guidance. Early efforts to utilize the Guidance and use an integrated planning framework have illustrated communities' interest in addressing affordability in new and innovative ways. This programmatic approach to reducing burden can lead to higher levels of accountability for all who have a role in ensuring the community has affordable, clean water for its citizens. Conceptually, integrated plans enable municipalities to customize and prioritize their approach with data-informed decisions.

EPA's second attempt at flexibility was in 2014 when the agency released a guidance document that provided examples of other relevant financial or demographic information that can be considered to illustrate the unique or atypical circumstances faced by a permittee. This guidance document was titled *Financial Capability Assessment Framework for Municipal Clean Water Act Requirements* (2014 FCA Framework). In a memorandum releasing the 2014 FCA Framework, EPA expressed the rationale for the guidance to communities, saying "[it] provides examples of additional information that may help some communities provide a more accurate and complete picture of their financial capability as is envisioned in the FCA guidance."[20]

Although driven by the costs of Long-Term Control Plans for CSOs, the 1997 FCA Guidance for considering affordability was carried forward into a subsequent framework for IP which considers the costs of all wastewater and stormwater obligations under the CWA, and is to be consistent with TMDLs. At the time the 1997 FCA Guidance was developed, relatively few TMDLS had been approved. EPA had given priority to the regulation of point sources through the establishment of Best Available Technology standards. Concern with the increase in pollution from agricultural non-point sources and urban runoff, which remain the highest sources of water pollution, led to a series of citizen suits in the 1990s, and to the publication in 2000 of more comprehensive regulations for the preparation of TMDLs which established fixed

[20] U.S. Environmental Protection Agency, Memorandum from Deputy Assistant Administrator, Office of Water, and Assistant Administrator, Office of Enforcement and Compliance Assurance, *Financial Capability Assessment Framework for Municipal Clean Water Act Requirements*, November 24, 2014.

deadlines and required the preparation of implementation plans.[21] However, most of the now over 71,000 existing TMDLS were not approved until after 2008.[22] The 1997 FCA Guidance has not been applied to meeting broader TMDL objectives and there is little familiarity with it beyond municipalities with obligations to control CSOs.

The FCA Guidance and Framework and IP approach have primarily been used in the context of consent decrees, as part of federal enforcement actions. However, the 2012 IP Framework defines it to be applicable to both enforcement and NPDES permitting, which is carried out by the states to which authority for CWA regulation has been delegated. In testimony to Congress, states have expressed support for integrated planning as a way to establish priorities. However, they have also expressed concern about lack of clarity regarding both the state role in the process and how IP would work in the context of permitting. Some issues that could arise include how to accommodate schedules for activities beyond the 5-year permit term, and whether prioritization agreements would be vulnerable to legal challenges by third parties. A tradeoff between use in enforcement and permitting is that while enforcement actions allow for more flexibility, the permitting process provides greater transparency (beyond what is afforded in the initial 30 day public comment period of consent decrees). In this context, it is also important to consider the implications of innovative practices and creative financial mechanisms that have the potential for significant cost savings as well as increased cost-effectiveness.

Some of the interplay between enforcement and permits is illustrated by the City of Portland, Oregon, which began to develop its CSO program in 1991 in response to a citizen suit which alleged that discharges from 54 CSO outfalls were not covered by the 1994 NPDES permit and violated state water quality standards. In a draft 1990 permit, the state Department of Environmental Quality (DEQ) required the City to meet water quality standards at these discharge points. As this could not be done within the 5-year timetable of an NPDES permit, a separate compliance order was issued. The new permit listed all CSOs as permitted discharge points, and the City agreed to replace the CSO system over a 20 year period.[23]

1.4 The Potential for Innovative Solutions

The Integrated Planning Framework provides a process for identifying and evaluating the potential for innovative solutions that can lower costs and/or deliver additional benefits. This

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[21] Houck, O., *The Clean Water Act Returns (Again): Part I, TMDLs and the Chesapeake Bay,* Environmental Law Reporter 41(10208), 2011.

[22] U.S. Environmental Protection Agency, Water Quality Assessment and TMDL Information, *Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS) National Summary of State Information, Cumulative Number of TMDLs* (1996 to 2017). https://ofmpub.epa.gov/waters10/attains_index.home

[23] United States Court of Appeals, Ninth Circuit. NORTHWEST ENVIRONMENTAL ADVOCATES, a Non-Profit Oregon Corporation; and Nina Bell, Plaintiffs-Appellants, v. CITY OF PORTLAND, Defendant-Appellee. No. 92-35044. Decided: June 07, 1995. http://caselaw.findlaw.com/us-9th-circuit/1316526.html

also provides an opportunity to consider the next generation of water infrastructure. Innovative solutions are considered in several categories: technical approaches related to management of stormwater, performance-based incentive mechanisms, market-based strategies, and creative financing mechanisms. In reviewing all of these arenas, the report identifies challenges to implementing innovative solutions, how they might be facilitated, and ways of dealing with their inherent risk.

Technical approaches to the management of stormwater have evolved from moving stormwater offsite to managing it at the source, using green practices that leverage the functionality of ecosystems to filter and regulate the flow of water while also providing economic and social as well as environmental, or triple-bottom-line benefits, which are not provided by underground pipes. Used as a complement to more conventional or "gray" infrastructure, green infrastructure has been shown to reduce costs in at least some cases. However, standard practices for comparison of green and gray approaches as well as place-based assessment of opportunities for using particular practices will be important in determining and selecting those that are most appropriate and cost-effective. As with other types of infrastructure, assessment is not limited to technical/engineering considerations, as these aspects interact with social, economic and environmental ones.

The decentralized and distributed nature of green infrastructure has implications for how it is managed and maintained as well as financed. Many aspects of management and maintenance are consistent with principles of good planning and collaborative adaptive management that are not always put into practice, such as early engagement of stakeholders. Finance mechanisms have evolved toward greater emphasis on performance-based incentives and returns on investments, new more equitable sources of revenue, potential for new or modification of existing funding mechanisms that can lower the costs of borrowing, and new utility business models that can enable utilities to share the costs of innovation with other utilities or lower costs, such as through generation of energy from recovered resources. Different types of trading mechanisms also have the potential to reduce costs.

Ultimately, the challenge is one of maintaining affordability while also recovering the full-costs of providing water services, which, in the absence of low-income assistance, is limited by low-income households' ability to pay. Rate structures themselves may place a disproportionate share of the burden on low-income households. The report also considers options for consumer assistance as well as more equitable rate structures.

1.5 Methodology of the Academy Study

The Study Team used an approach based upon multiple methodologies and incorporated data from multiple sources. The Study Team conducted an extensive review of literature, including legislation, regulatory guidance, and other relevant perspectives on environmental policy. The Study Team also administered a long-form electronic survey to local practitioners in order to garner a better understanding of the perceived strengths and weaknesses of the existing FCA guidance and the potential to reduce costs through innovative solutions. The survey was initially disseminated to a small group of stakeholders who then distributed the survey through their networks. The Study Team received 23 responses, many of which were collective responses by organizations or municipalities. The technical, focused nature of the FCA Guidance limited the number of responses from survey recipients. The Study Team conducted face-to-face and telephonic interviews with over 100 stakeholders to obtain more detailed explanations of the challenges communities are facing relative to affordability; to achieve a more comprehensive knowledge of innovative solutions to address water quality in an affordable manner; and to identify best practices and other studies to draw on for this report. Additionally, the Study Team hosted a stakeholder roundtable in an effort to understand broad perspectives of a diverse selection of stakeholders with a dedicated and sustained interest in providing affordable, clean water services to citizens.

In order to better understand challenges that municipalities are facing and the innovative solutions that are being generated at the local level, the Study Team made four site visits, which included:

- Springfield, MO – Integrated Planning Technical Assistance Recipient
  - Met with key stakeholders involved with their Integrated Plan Environmental Priorities Task Force.
- Onondaga County, NY – Integrated Planning Technical Assistance Recipient
  - Met with members of both Onondaga County and the city of Syracuse to better understand their Integrated Planning process and their Save the Rain initiative.
- Philadelphia, PA– Center for Watershed Protection Conference
  - Attended to better understand green infrastructure and stormwater project funding efforts in Philadelphia as well as other localities.
- King George County, VA– Local Government Advisory Committee to the Chesapeake Bay Executive Council
  - Attended meeting and presented information about the Academy Study in order to garner additional stakeholder input.

The information was initially synthesized to provide background and context to the Panel of five Academy Fellows (for more information on the Panel members, please see Appendix A) for ultimate determination of findings and recommendations. For more information regarding Study Team and Panel research and analysis processes, please see Appendix B.

1.6 The Challenges Being Faced

Communities and the water agencies that provide the crucial service of clean water to citizens will continue to experience constrained resources and will be challenged with making decisions about how to best respond to public health, environmental impact, and regulatory compliance obligations. This will all be addressed against the backdrop of a severely compromised infrastructure and the ongoing competing imperatives of each municipality.

EPA's methods for analyzing the affordability of federal mandates stemming from the Clean Water Act will continue to be tested; states and local entities will continue to identify new ways to address water quality concerns and economic shortfalls; and calls for further coordination across all levels of government will continue in order to attain the ultimate goal of delivering clean water services at an affordable rate to all communities. The continual discovery of innovative approaches to stormwater management, planning, and financing has, and will continue to produce new ways to optimize each taxpayer dollar and offer additional flexibilities to the permitting and enforcement procedures.

However, the clean water regulatory program has remained relatively unchanged in recent years and there are significant limitations on the authority of different government entities to address the sources of problems. For example, there is a variance across the nation in local government authority for land-use decisions and the utilization of revenue raising devices. This can limit control of local development patterns, the use of stormwater fees, and extend the effects of deferred maintenance.

Therefore, a key challenge is determining the options for improving water quality, but also who has authority and capability to act on these options. This is compounded by larger watersheds spanning multiple jurisdictions with problems that are covered by different legal authorities.

This fragmentation of authority is both vertical and horizontal. The vertical fragmentation is between federal, state, tribal, and local governments. The horizontal fragmentation is across agencies with different but overlapping and interdependent mandates, and across states and local governments that share watersheds. Given the citizen suit provisions of the Clean Water Act, critical roles are also played by citizen groups and the Courts in what Oliver Houck refers to as a "four-way arrangement of cooperative federalism."[24]

[24] Houck, Oliver A, *Cooperative Federalism, Nutrients, and the Clean Water Act: Three Cases Revisited*, Environmental Law Reporter 44(10426), May 2014.

Under the CWA, which covers wastewater discharges, EPA retains authority for enforcement (states are able to conduct enforcement as well), with permitting authority and responsibility for establishing water quality standards delegated to all but four states. However, this authority is limited to the control of point source discharges, which include discharges from MS4s. Non-point sources, such as agricultural runoff, which are the largest source of nutrient pollution, and which add to costs of water treatment in downstream urban areas, are only subject to voluntary controls, typically through various forms of cost-share agreements with farmers. Although drinking water and wastewater are all part of one water cycle, they are regulated under separate legislation, with drinking water protection falling under the Safe Drinking Water Act (SDWA). These are overseen by different congressional committees and different offices within and across agencies at federal and state levels.

A common purpose of affordable clean water services unites these various stakeholders. The Panel recognizes this, and aims to put these water affordability issues into a broader context that highlights and addresses the problems at hand in the clearest of terms.

The Panel also recognizes the substantial progress that EPA has made to address the issues of affordability as it relates to the compliance of the Clean Water Act, while maintaining a steadfast focus on the core mission of providing "protection from significant risks to human health and the environment where they live, learn and work"[25] and ensuring that all citizens have the clean, safe water to which they are entitled. The report will also identify opportunities for improvement in this endeavor with a look toward a comprehensive and diverse set of observations and recommendations for improvement.

The following chapters address the evolving challenges of the affordability issue and discuss several key mechanisms and approaches for responding to the problem. These mechanisms include utilizing flexibilities of schedule development (i.e., extending the compliance timeline via affordability assessments of burden); introducing programmatic efforts such as IP and innovative solutions to reduce the cost of compliance; and utilizing innovative financing instruments and strategies to manage the cost of capital.

[25] U.S. Environmental Protection Agency, *Our Mission and What We Do*. https://www.epa.gov/aboutepa/our-mission-and-what-we-do

Chapter 2: Water Affordability Issues – A Growing Concern

An array of water affordability issues currently confronts water utilities, their recipient customers, and water industry stakeholders in different ways. Water affordability issues from the utility or service provider's perspective center on the need to maintain, repair, and replace aging and deteriorating water infrastructure systems, provide safe and sanitary water services to its customers, and meet national water quality goals established in the Clean Water Act (CWA) and regulatory requirements mandated by the Safe Drinking Water Act (SDWA). Affordability from the customer or user perspective focuses on their ability to pay for essential water services while paying for other basic needs.

Several industry experts (Manuel Teodoro, Jon Davis, Eric Rothstein) prefer to use different terminology for utility and customer affordability issues. Teodoro and Davis use the term **financial capability** – "the ability of the utility to pay for the capital and operations cost associated with providing safe and reliable water and wastewater services" – for utility affordability issues. They define **affordability** as "the ability of individual customers to pay for water and wastewater services that are adequate to meet their basic needs, while maintaining the ability to pay for other essential costs."[26]

Utility Financial Capability Challenges

Utilities providing water services face a number of significant financial challenges while attempting to meet their national water quality goals. Those challenges that can diminish their financial capability to meet those goals include poor and aged condition of their water infrastructure, deferred maintenance, unequal distributions of costs and service requirements, declining rate bases, and low levels of federal assistance relative to other national infrastructure needs. Not all utilities face all of these challenges and the extent and severity of the challenges vary among those utilities facing specific challenges. But the cumulative effect of these financial challenges help explain the financial burdens many utilities bear in meeting both their water service requirements and water quality goals.

In its 2017 report on the state of U.S. infrastructure, the American Society of Civil Engineers (ASCE) rated the nation's clean water infrastructure a D+ and the nation's drinking water infrastructure a D. These quadrennial ratings have shown little improvement since 1998. ASCE notes that a D rating indicates a poor, at-risk condition for the infrastructure, reflecting below standard conditions and a large volume of systems approaching the end of their effective service life.

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[26] Davis, Jon, P. and Teodoro, Manuel, P., *Financial Capability and Affordability,* Chapter 22 in Water and Wastewater Financing and Pricing, Fourth Edition, ed. by George Raftelis. New York: Taylor & Francis p.443-466.

In light of the dismal ASCE infrastructure report card, local communities and their water utility service providers face substantial investment costs over the next 20 years to repair, replace, and improve their aging water infrastructure. EPA's latest quadrennial surveys indicate the total investment need for drinking water infrastructure to be $384.1 billion over the 2011-2030 period.[27] In 2012, an EPA report estimated clean water infrastructure needs to be $271 billion over the 20 year period of 2012-2031.[28] Additionally, the American Water Works Association (AWWA) developed an alternative survey of water infrastructure investment needs indicating drinking water investment needs and operations and maintenance costs over the next 25 years to be $1 trillion.[29]

In addition to the costs of updating water infrastructure, achieving CWA and SDWA goals adds substantial costs to the financial challenges local communities and their utility service provider's face. In its 2004 report to Congress on Combined Sewer Overflows (CSOs), EPA estimated that the costs required to achieve its goals for containing CSOs were over $50 billion, while the costs to control Sanitary Sewer Overflows over the next 20 years exceeded $88 billion.[30] This did not include additional costs for meeting other CWA and SDWA water quality goals outside of CSO control mandates.

Another facet of this problem is that these financial challenges are not evenly distributed among all utility service providers. Moreover, the diverse structure of the water industry compounds these aggregate financial challenges. According to EPA, there were more than 14,748 publicly owned treatment works (POTWs) serving 76% of the US population (238.2 million) in 2012. About 80% of these POTWs (11,571) serve small communities – those with populations under 10,000. These smaller POTWs serve an estimated 22.2 million people – about 7% of the US population. In addition, there were another 4,846 decentralized or satellite clean water systems serving 29.6 million users, but this was only about one half of the population served by small independent systems such as septic tanks, chemical toilets, etc.[31]

Many of these smaller utilities lack the rate base to pay for substantial new investment costs and may also lack access to capital markets to obtain necessary financing. Even some of the larger utilities, especially those in the Northeast and Midwest with declining populations and large fixed costs, face unique challenges as highlighted in a recent Government Accountability Office

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[27] U.S. Environmental Protection Agency, *Report to Congress: Drinking Water Infrastructure Needs Survey and Assessment,* April 2013.

[28] U.S. Environmental Protection Agency, *Report to Congress: Clean Watersheds Needs Survey*, January 2016.

[29] American Water Works Association, *Buried No Longer: Confronting America's Water Infrastructure Challenge,* 2013. (The differences in the estimated drinking water infrastructure investment costs between the AWWA survey and EPA's survey may reflect differences in the time frames covered [e.g. 20 versus 25 years], the sampling design and response rates for utilities surveyed, and the types of costs included [e.g. AWWA included O&M costs in their estimate].)

[30] U.S. Environmental Protection Agency, *Report to Congress: Impacts and Control of CSOs and SSOs*, August 2004, p. ES-10.

[31] U.S. Environmental Protection Agency, *Report to Congress: Clean Watersheds Needs Survey*, January 2016.

report.[32] Adding to these financial challenges is the declining federal share of water infrastructure costs over the last decade. As Dr. Richard Anderson has documented, "federal financial assistance to local government for public water and wastewater has been flat since the mid to late 1980s; and has declined as a proportion of total investment."[33] This declining federal share is only likely to continue given the federal fiscal challenges and impending budget reductions in domestic spending programs.

Figure 5, comparing federal infrastructure spending on various forms of infrastructure relative to state and local spending, documents the substantial burden localities bear for water infrastructure relative to other infrastructure spending. Clearly, the federal government spends less on water infrastructure needs relative to most other infrastructure. Local government continues to be the predominant source of spending on water and wastewater services, based on analyses of Census data on local government finances and expenditures. As Dr. Anderson has noted, "the local spending share on sewer is about 95 percent; and the local spending share on water supply is upwards of 99 percent."[34]

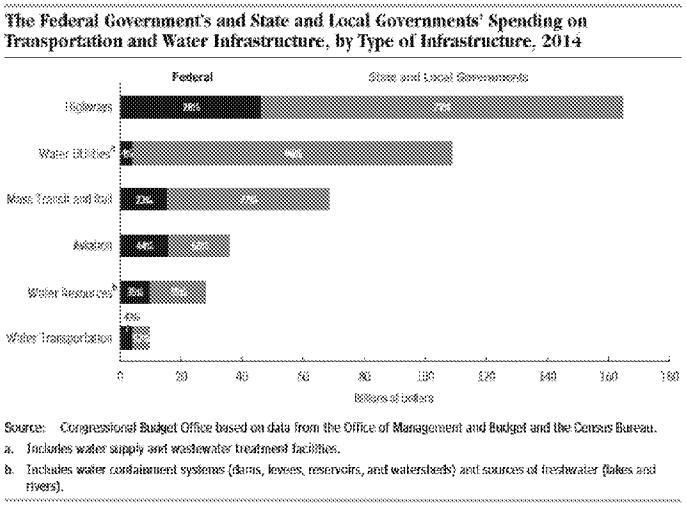

Figure 5. Difference in Federal/Local Spending on Water Infrastructure

[32] U.S. Congress. House. Committee on Energy and Commerce, Subcommittee on Environment and the Economy, *Water Infrastructure: Information on Selected Midsize and Large Cities with Declining Populations,* 114th Cong., September 2016.

[33] Anderson, Richard, F., *Trends in Local Government Expenditures on Public Water and Wastewater Services and Infrastructure: Past, Present and Future,* February 2010, p. iv.

[34] Anderson, *Growth in Local Government Spending on Public Water and Wastewater – But How much Progress Can American Households Afford*, April 2013 p. 6.

Ratepayer Affordability Issues

From the customer or user perspective, affordability reflects the user's ability to pay for the quality water services they expect to receive. These water services include both drinking and clean water services. Although recognized as a basic human right by the United Nations General Assembly through Resolution 64/292, water is not free.[35] In fact, the water industry generally operates on a "user pay" principle and many states require utilities to charge customers based on the costs of service provided. Yet, despite water affordability problems, in the aggregate, water costs are low relative to other utilities and consumer expenses.

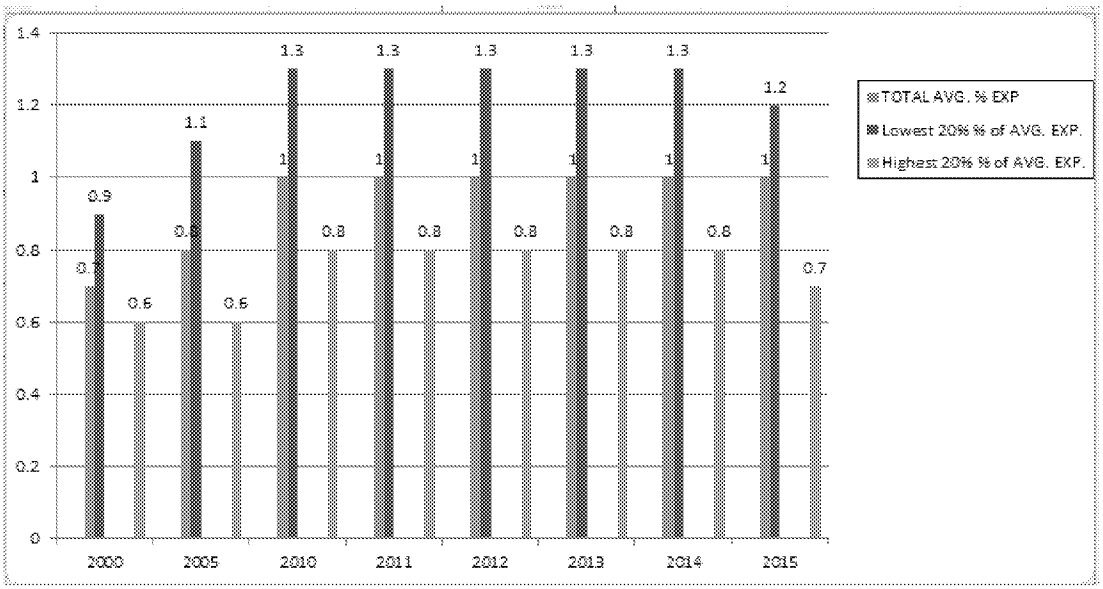

Figure 6. Percent of consumer expenditures on water and other services for lowest and highest income quintile consumers. Source: NAPA, based on Bureau of Labor Statistics data.

Low-income users' water bills account for a larger share of total low-income household expenditures than higher income households. Bureau of Labor Statistics (BLS) consumer expenditure data (Figure 6) indicate that the lowest income quintile commits 40% more of its total expenditures on water[36] than the highest income quintile.

Over the past 15 years, water rates have increased faster than the Consumer Price Index (CPI) and personal income levels. These adverse trends are even more pronounced for low-income users. As Figure 7 shows, low-income consumers – the lowest quintile – had their share of

[35] General Assembly Resolution 64/292, *The human right to water and sanitation,* A/64/PV.108, July 28, 2010, available from http://www.un.org/en/ga/64/resolutions.html

[36] The BLS consumer expenditure glossary defines consumer expenditures on water and other public services as "water and other public services, such as garbage and trash collection, sewerage maintenance, septic tank cleaning". Both drinking water and clean water costs are included in this consumer expenditure category.

expenditures for water and electricity increase substantially faster than higher income consumers over the 2003-2013 period.

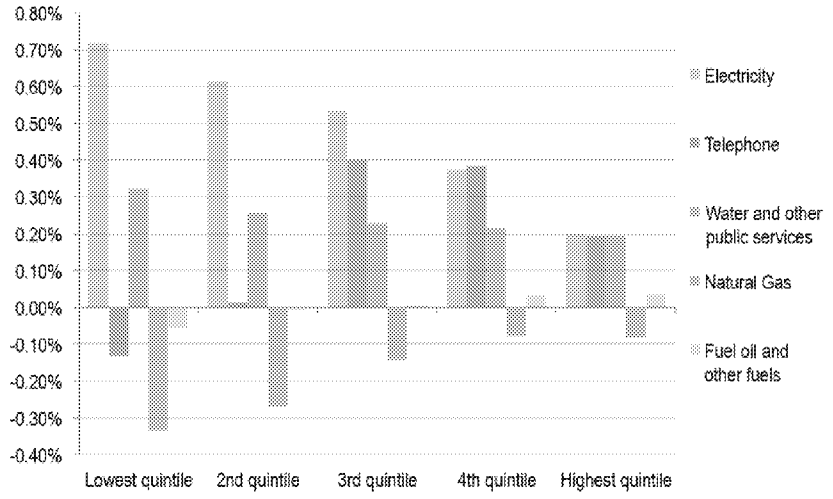

Figure 7. Changes in Percentage of Consumer Expenditures on Utilities by Income Quintile (2003-2013). Source: IPU-MSU based on BLS data, Beecher (2015).

Based on survey responses from their members (167 responses in their 2016 survey), the National Association of Clean Water Agencies (NACWA) has developed a cost of clean water index. These NACWA data, displayed in Figure 8, show that average annual service charges for clean water services have significantly outpaced annual CPI increases over the last 16 years. As the NACWA report notes, "from 2002 to 2016, the average annual service charge (for clean water services) has doubled from $239 to $479…(while) the CPI has increased only 33 percent."[37] This trend in increased clean water costs has had a particularly significant impact on low-income users. NACWA compared the national average annual clean water charges to national poverty level incomes for a family of four. "The average annual sewer charge of $479 (in 2016) represents 1.97% of the 2016 Federal poverty income threshold ($24,300) … and this proportion has risen from 1.3% in 2000."[38] National averages mask substantial variations among states, localities, and other geographical areas. But the NACWA data do indicate that the most economically vulnerable users – poverty households – may currently be facing clean water affordability problems that middle and higher income users are not confronting even using aggregate national averages. This is illustrated in the City of Baltimore, which has an MHI of $39,386 but where 26% of the population has income below the poverty line, and 12% below 50% of the poverty line.[39]

[37] National Association of Clean Water Agencies, *2016 Cost of Clean Water Index*, May 18, 2017, p. 1.
[38] Ibid., p. 1.
[39] City of Baltimore, Department of Public Works, *[reply to] NAPA Request for Information*, September 8, 2017.

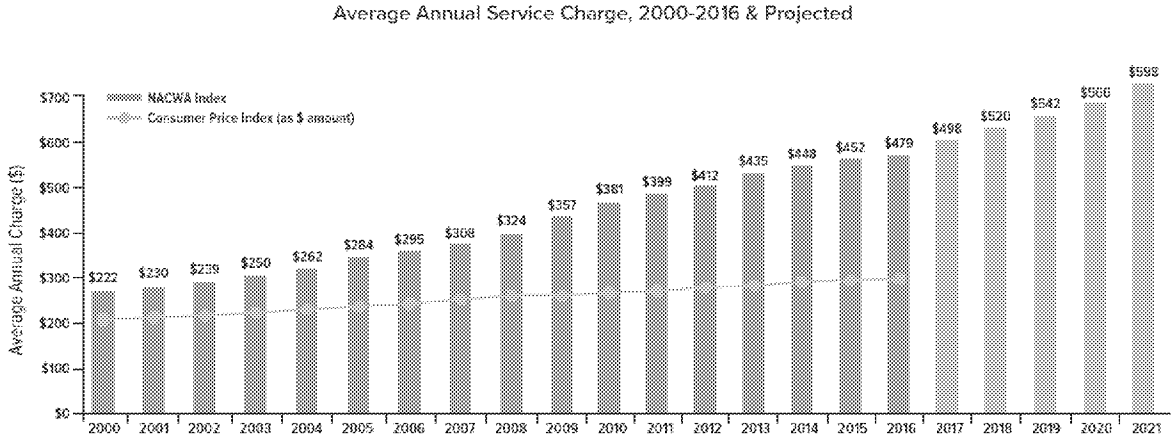

Figure 8. Average Annual Service Charge from 2000-2016 and Projected. Source: National Association of Clean Water Agencies, 2016 Cost of Clean Water Index, May 18, 2017, p. 2.

Income trends over the past decade have also been more adverse for low-income households, as higher income households have realized the bulk of the income increases over that period. Consequently, these low-income households are more vulnerable to rate increases and potential service interruptions or cut-offs because they have fewer financial assets and resources and expend more of them on basic necessities, including water and wastewater services.

2.1 Balancing Financial Challenges with Water Quality Goals

Notwithstanding these affordability issues and other financial challenges confronting them, communities are tasked with achieving pollutant limits set by Water Quality Standards (WQS). Yet, CWA and SDWA, in establishing water quality goals, also acknowledged the need to recognize potential financial limitations confronting communities, utilities, and others charged with meeting those goals. For example, the SDWA [PL 104-182] states in Sec 3 8(c) – (the Congress finds that) "more effective protection of public health requires prevention of drinking water contamination through well-trained operating water systems with adequate managerial, technical, and ***financial capacity***." Section 9 further states that "compliance with the requirements of the SDWA continues to be a concern at public water systems experiencing technical and ***financial limitations***."

EPA policies and guidance on implementation of the CWA explicitly recognized the need to consider financial capabilities. These include: the National Combined Sewer Overflow (CSO) Control Strategy issued on August 10, 1989 (1989 CSO Control Strategy) and the Combined Sewer Overflow (CSO) Control Policy published on April 19, 1994 (1994 CSO Control Policy), which confirmed that CSO overflows were covered by the CWA and subject to National Pollutant Discharge Elimination System (NPDES) permit requirements.

The 1994 CSO Policy provided that implementation schedules for CSO controls could be phased, based on certain environmental priorities and on a permittee's financial capability,[40] and the Policy further elaborated by describing several economic and financial factors and stating that "such factors as" those should be considered in assessing financial capability.[41] The requirements of the 1994 Policy were subsequently enacted into law by reference in the CWA.[42]

In 1995, EPA provided more explicit guidance to assist states and permittee applicants in understanding the economic factors affecting permittee financial capability. The document was titled Interim Economic Guidance for Water Quality Standards: Workbook (1995 Interim Economic Guidance).[43] This Interim Economic Guidance distinguished between "financial impacts" and "socioeconomic impacts" – "the term 'financial impacts' refers to impacts on the entity or party that will pay for the pollution control whereas the term 'socioeconomic impacts' refers to changes in the social and/or economic conditions of the affected community."[44] The guidance also reflected EPA regulations requiring that adverse impacts warranting some regulatory relief must be both 'substantial' and 'widespread.' In short, "only demonstrating substantial financial impacts is not a sufficient reason to modify a use or grant a variance from water quality standards. Rather, the applicant must also demonstrate that compliance would create widespread socioeconomic impacts on the affected community."[45]

The Interim Economic Guidance proposed a two-part test. The first part examines whether the permittee can pay for the required investment by estimating costs per household or residential user. The second part examines the permittee's ability to obtain financing given its current financial strength and underlying socioeconomic conditions.

The 1994 CSO Policy and the subsequent Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development (1997 FCA Guidance) both recognized "the need to address the relative importance of environmental and financial issues when developing

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[40] 1994 CSO Control Policy, 59 Fed. Reg. 18688, 18694 (April 19, 1994).

[41] The 1994 CSO Control Policy states: "Construction phasing should consider: . . . / c. The permittee's financial capability including consideration of such factors as: / i. Median household income; / ii. Total annual wastewater and CSO control costs per household as a percent of median household income; / iii. Overall net debt as a percent of full market property value; / iv. Property tax revenues as a percent of full market property value; / v. Property tax collection rate; / vi. Unemployment; and / vii. Bond rating; / d. Grant and loan availability; / e. Previous and current residential, commercial and industrial sewer user fees and rater structures; and / f. Other viable funding mechanisms and sources of financing." Ibid.

[42] Section 402(q)(1) of the CWA, as codified at 33 U.S.C. § 1342(q)(1), states: "Each permit, order, or decree issued pursuant to this chapter after December 21, 2000, for a discharge from a municipal combined storm and sanitary sewer shall conform to the Combined Sewer Overflow Control Policy signed by the Administrator on April 11, 1994 (in this subsection referred to as the 'CSO control policy')." . Enacted by Public Law 106-554 (December 21, 2000).

[43] U.S. Environmental Protection Agency, Office of Water, *Interim Economic Guidance for Water Quality Standards–Workbook*, EPA-823-B-95-002, March 1995, https://www.epa.gov/sites/production/files/2016-03/documents/econworkbook-complete.pdf

[44] Ibid., 1-2

[45] Ibid., 1-5

an implementation schedule for CSO controls to be contained in the LTCP [long term control plan]"[46] developed and approved in either the NPDES permit process or other enforcement processes (e.g., consent decrees).

The 1997 FCA Guidance noted that "NPDES permitting authorities should consider the financial capability of permittees when reviewing CSO control plans."[47] More specifically, the 1997 FCA Guidance identified two separate components – the Residential Indicator (RI) to reflect a permittee's ability to pay higher costs based on the impact on its users, and the Financial Capability Indicator (FCI) to reflect the permittee's ability to obtain financing for and maintain the investment.

The Residential Indicator (RI) used to assess ratepayer impacts is the ratio of total annual wastewater and CSO control costs to median household income (MHI) in the service area, with ratios exceeding 2% deemed to be "high burden". The Financial Capability Indicator (FCI) used to assess a community's financial capacity includes six separate metrics to examine the community's financial condition, socioeconomic status, and financial management strength. The six measures are detailed in Figure 9 from EPA's 1997 FCA Guidance.

[46] 1997 FCA Guidance, page 6, referring to the 1994 CSO Control Policy, 59 Fed. Reg. 18688, 18694.
[47] U.S. Environmental Protection Agency, Office of Water, *Combined Sewer Overflows–Guidance for Long-Term Control Plan*, EPA 832-B-95-002, September 1995, p. 3-4, https://www3.epa.gov/npdes/pubs/owm0272.pdf

Indicator	Strong	Mid-Range	Weak
Bond Rating	AAA-A (S&P) Baa (Moody's)	BBB (S&P) Baa (Moody's)	BB-D (S&P) Ba-C (Moody's)
Overall Net Debt as a Percent of Full Market Property Value	Below 2%	2% - 5%	Above 5%
Unemployment Rate	More than 1 Percentage Point Below the National Average	+/- 1 Percentage Point of National Average	More than 1 Percentage Point Above the National Average
Median Household Income	More than 25% Above Adjusted National MHI	+/- 25% of Adjusted National MHI	More than 25% Below Adjusted National MHI
Property Tax Revenues as a Percent of Full Market Property Value	Below 2%	2% - 4%	Above 4%
Property Tax Collection Rate	Above 98%	94% - 98%	Below 94%

Figure 9. Permittee Financial Capability Indicator Benchmarks

The commonly-held principle in the water industry of user pay for water services ensures a degree of interdependence between the users' (the RI component) and the utilities/water service providers' (the FCI component) affordability issues. This is because the utilities must recover increased costs from users through higher water bills. Thus, the 1997 FCA Guidance combined both components to determine the severity of a permittee's financial burden imposed by the proposed CSO control costs.

The matrix in Figure 10 was also included in the 1997 FCA Guidance. The matrix suggests that if the FCI component was deemed weak, a local community or utility could be deemed highly-burdened even if the RI component did not exceed 2% MHI. However, many stakeholders continue to believe that many EPA regional and state enforcement staff focus exclusively on the RI component.

Permittee Financial Capability Indicators Score (Socioeconomic, Debt, and Financial Indicators)	Residential Indicator (Cost Per Household as % of MHI)		
	Low (Below 1.0%)	Mid-Range (Between 1.0 and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

Figure 10. Financial Capability Matrix

2.2 Financial Capability Assessment (FCA) Guidance Limitations

2.2.1 Stakeholder Identified Residential Indicator (RI) Metric Deficiencies

Although the metrics EPA used for both RI and FCI components were extensively criticized by a wide range of stakeholders, the metrics for the RI component were the most severely challenged. The stakeholders challenging the adequacy and accuracy of the metrics for the 1997 RI component included EPA's Environmental Financial Advisory Board (EFAB), the Council of Mayors and other governmental entities, water industry groups including NACWA, AWWA, Water Environment Federation (WEF), academics (Jeff Rexhausen, Manuel Teodoro, Jon Davis, and Janice Beecher), consultants (Jason Mumm and Eric Rothstein), and other stakeholders.

Some of this RI criticism may also reflect the fact that the RI component was considered the first test in the 1997 FCA Guidance. If a permittee was not facing a high RI burden, the secondary measures for the FCI component alone would not be sufficient to warrant an extended regulatory compliance schedule. EPA noted from the start that the RI component was not really intended to address specific user affordability issues, but rather focused on an overall assessment of general user ability to bear higher costs and thus the ability of the permittee to assure capital markets of its ability to repay borrowings needed to finance the required CSO control investments.

Notwithstanding that caveat, stakeholders cited the following major deficiencies in the 1997 RI metric:

- *Not focused on the poor or most economically vulnerable users* – Using MHI did not accurately reflect the impact on the most vulnerable households, the low-income users least able to absorb higher water bills.

- *Incomplete water cost measure* – The RI numerator only included a limited set of wastewater costs, not all water (drinking and all wastewater) costs or water bills actually paid.

- *Basis of 2% threshold unknown and inherently subjective* – The 1997 FCA Guidance contained no methodological or theoretical explanation for the derivation of the 2% MHI threshold. Moreover, any normative threshold defining high burden or unaffordability of water rates is inherently suspect given the wide range of economic factors affecting affordability issues. As Stacy Isaac Berahzer at the University of North Carolina's Environmental Finance Center notes "there is no perfect way to measure affordability."[48]

- *Static metrics ignore critical trends* – The 2% threshold has been unchanged since the early 1990s, while water affordability issues for low-income users have intensified as water costs have increased faster than other utilities, CPI and income growth, and as lower-income households have suffered static income growth over the past decade.

BLS consumer expenditure data indicate that the lowest quintile share of expenditures on water increased over 40% from 2000, but still only spent 1.3% of total expenditures on 'water & other public services'. As shown in Figure 11, water CPI increases exceed actual water expenditures increases since users, even the lowest quintile, reduce water usage as prices increase.

[48] Walton, Brett, *Water Systems Need Investment and Affordability*, Circle of Blue, November 24, 2016, http://www.circleofblue.org/2016/united-states/water-systems-need-investment-affordability/

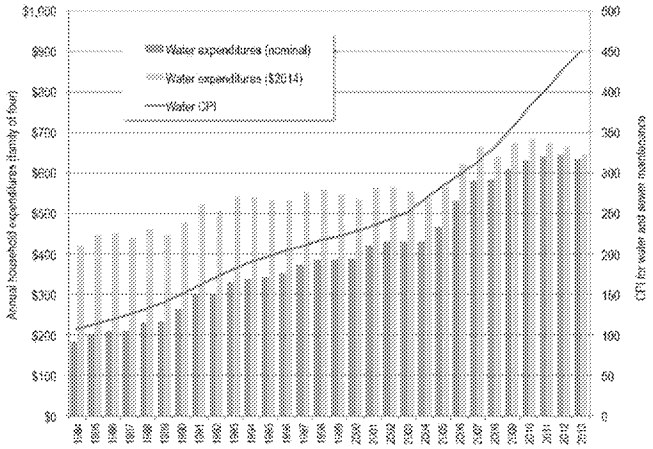

Figure 11. Expenditure and Price Trends for Water. Source: IPU-MSU, Beecher (2016).

2.2.2 Stakeholder Identified Financial Capability Indicator (FCI) Metric Deficiencies

Stakeholders also cited a number of limitations for the 1997 FCI metrics including:

- Utilities providing wastewater and other water services to local residents are often separate from, if not independent of, the local community and all of the FCI metrics focus on the community's financial, socioeconomic, and managerial conditions.
- Bond ratings may not exist for many of the smaller utilities and often have a scale bias.
- Several measures are highly correlated with each other or duplicate other measures.
- All the measures are "static" and do not reflect critical trends.
- The debt measures did not include revenue bond debt or other long-term obligations such as pension liabilities.

Clearly, a utility's ability to absorb increased costs depends upon its operating efficiency and current profitability, its outstanding debt burden, its other investment requirements to maintain or expand water services, and its ability to raise water rates. A utility that is currently meeting its total operating costs with its operating revenues is obviously better able to accommodate additional costs required to meet clean water goals than a utility incurring operating losses. Similarly, a utility with a low current debt burden is more likely to access capital markets to borrow and/or obtain a lower interest cost for any additional borrowing needed to meet clean water goal investment requirements than a utility with a higher debt burden. Where utilities face explicit statutory debt limitations, those with higher debt burdens may not even have a borrowing

alternative. Utilities that have deferred maintenance on their assets or have older assets with greater maintenance needs also are less likely to be able to absorb additional costs to meet clean water goals. Finally, utilities with statutory limitations on their ability to raise rates or with high current rates and a declining and/or poor ratepayer base will also face greater challenges in raising rates to fund any higher clean water goal costs than others. The 1997 FCI metrics did not directly measure any of these elements assessing the utility's financial strength, debt burdens and managerial capabilities or limitations – especially its ability to increase rates to generate additional revenues.

2.2.3 EPA's 2014 FCA Framework

In response to these stakeholder-identified limitations in its original 1997 FCA Guidance metrics EPA issued its 2014 Financial Capability Assessment Framework for Municipal Clean Water Act Requirements (2014 FCA Framework) that more clearly articulated the types of additional data communities could provide beyond the 1997 FCA Guidance metrics to document their burden in meeting current clean water costs. However, EPA retained the 1997 FCA Guidance metrics, while allowing communities to supplement that initial information. This was done for two reasons: 1) they wanted to have a common set of measures applicable to all communities to provide a consistent starting point; and 2) many smaller communities might not be able to afford or have the management capacity to develop and present more complex measures of their economic and financial burden.

The number of permittees designated as highly-burdened under either the original 1997 FCA Guidance or the 2014 FCA Framework is not known or clearly documented. A 2013 paper by NACWA asserted that, "before 2007 no major metropolitan permittee had been deemed to face a 'high burden' enabling schedule relief under the 1997 FCA Guidance. Since then, several communities (Honolulu, Kansas City, St Louis Metropolitan Sewerage District, Northeast Ohio Regional Sewer District and MSD Greater Cincinnati) have been acknowledged as facing such a burden and granted over 20-year compliance schedules."[49] These subsequent 'high burden' findings for these specific communities appeared to be due to extensive efforts to develop and present substantial additional supplementary data to document severe and widespread affordability issues and financial limitations.

In light of this, many stakeholders perceive that, in certain regions, EPA regional staff, state regulators, and enforcement staff still rely almost exclusively on the 2% MHI test for assessing a permittee's level of burden from mandated CSO control costs, notwithstanding EPA's view that EPA is providing flexibility to permittees in assessing financial capacity and excessive burden.[50]

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[49] National Association of Clean Water Agencies, *The Evolving Landscape for Financial Capability Assessment: Clean Water Act Negotiations and the Opportunities of Integrated Planning*, May 2013.

[50] EPA HQ enforcement staff note that HQ enforcement staff are involved in all judicial CD's and that this involvement provides an opportunity to share information on the resolution of individual CSO control disputes to help assure some consistency in individual CSO dispute resolutions among and within regions. This information

Several stakeholders cite this as a problem particularly in EPA's mid-west Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin). But this may simply reflect the fact that Region 5 contains a significant percentage (over 46%) of the CSO permits[51] granted.

The Panel finds that EPA's 2014 FCA Framework, including the original 1997 FCA Guidance, appropriately distinguished between users' ability to pay – the RI component – and a utility/service provider's financial capabilities – the FCI component. EPA's 2014 FCA Framework did reaffirm its flexibility and willingness to consider additional data to assess the level of burden imposed on permittees, but still retained the original 1997 FCA Guidance metrics for both the RI and FCI components. The metrics used in the 1997 FCA Guidance to measure the RI and FCI components were inadequate metrics for assessing low-income ratepayers ability to pay and the financial conditions of the utility providing wastewater services.

2.2.4 A Desired Common Starting Point

Consistent with their 2014 FCA Framework EPA asserts they will continue to remain flexible in allowing permittees to submit additional supplementary data to document their claims that the required investments to meet CWA goals impose an excessive burden. However, EPA believes it needs to maintain a simple, transparent formulation for its FCA guidance to ensure a common starting point for all permittees, even though EPA will consider supplementary data in determining the level of burden imposed on the permittee.

This belief acknowledges that both sides of the negotiation require simple, readily available, and clearly understood metrics for the RI and FCI components in any updated FCA framework. One reason for establishing a common starting point is the need to ensure that the smaller systems that lack the necessary resources and expertise to develop more complex and sophisticated models are not disadvantaged at the start of the negotiation. In other words, a common starting point helps to assure all permittees consistent consideration at the start of any negotiation.

The deficiencies in the metrics used for the RI and FCI components in the 1997 FCA Guidance, cited by various stakeholders and described above, limit the ability of those metrics to establish an acceptable and equitable common starting point.[52] Given these limitations, EPA will need some improved metrics to provide a useful common starting point for all permittees.

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sharing, however, appears to be on an informal basis, not through an established, formal management information system and is not shared with others, especially other permittees. The lack of a formal management system containing these types of data makes it difficult to evaluate the consistency and equitability of all negotiated CSO control CDs.

[51] U.S. Environmental Protection Agency, *Report to Congress: Impacts and Controls of CSOs and SSOs*, August 2004. (Figure 4-1, p 4-14 indicates that region 5 had 387 of the 828 CSO permits granted.)

[52] As the 1997 FCA Guidance memo notes [p7] "the financial indicators do provide a common basis for financial burden discussions between the permittee and EPA and state NPDES authorities". Both the 1997 FCA Guidance and the 2014 FCA Framework also encourage permittees to submit supplemental data, but there remains the strong desire to have a common, simple starting point that is equitable for all permittees.

Some EPA staff are concerned about the adverse impact on current consent decrees if the current FCA framework is substantially revised. Since the 1997 FCA Guidance was used during the negotiation of most consent decrees and hasn't been changed in 20 years, any significant changes to that Guidance could change the burden assessment for specific litigants, thus generating demands to reopen their consent decrees. This, in turn, could significantly increase workloads for regional EPA and state enforcement staff. Some have also noted that, if any proposed changes to EPA's FCA policies are inconsistent with the requirements of the 1994 CSO Control Policy that have been enacted into law,[53] those proposed policy changes would be permissible only if allowed by statutory amendment.

2.3 Alternatives for improving current metrics for RI and FCI

2.3.1 Stakeholder Proposed Alternative Residential Indicator Metrics

Many of the stakeholders who criticized the 1997 RI metrics used by EPA have also proposed alternative metrics to improve the effectiveness of the RI component in measuring user affordability issues. Most have focused on the need to examine the impact on the most vulnerable users – low-income users. Many have also suggested a change in the numerator of the RI metric to include additional water costs beyond the limited wastewater treatment and CSO costs in the original 1997 formulation. Others have raised questions about the basis of the threshold used to determine the degree of burden – more specifically the appropriateness (much less the derivation) of the 2% of MHI standard. Some have also suggested including additional elements within the RI components to reflect the extensiveness of low-income users' impact and a dynamic element to assess potential changes in current conditions.

The RI Options table compares the 1997 RI component metrics to the slight changes in the 2014 revisions and to alternatives proposed by various stakeholders that suggest different changes in the costs measured, the household or user income used, and other measures to determine high or excessive user burden.

[53] As noted above, the requirements of the 1994 Policy were enacted into law by reference in section 402(q)(1) of the CWA, 33 U.S.C. § 1342(q)(1).

Residential Indicator Alternatives			
Options	**WATER COSTS INCLUDED**	**HOUSEHOLD INCOME**	**OTHER METRICS**
EPA 1997 Formula	CSO/SSO Costs	Median Household Income (MHI)	• Cost/MHI greater than 2% = High burden
EPA 2014 Framework	CSO/SSO Costs + Stormwater Costs	MHI	• **Supplementary data** o Quintile income distribution national average o Poverty rates and trends • **Supplementary data** o Clean water costs per income quintile
EFAB 2007	All Water Costs	Income by Quintile	• Projected water costs and income levels • Composite metric including Poverty rate and Income distribution
EFAB 2014	All Water Costs	Income by Quintile Income by geographic area (e.g., Census tracts)	• **Trends and projections of costs and income** • **Composite metric including** o Poverty rate + income distribution o Cost of living differences o Housing cost burden (renters + owners) o Non-residential user impacts
Mayors/AWWA 2013	Average Water Bill	Income by Quintile Income for poor, elderly, or renters Income for poor areas	• Non-discretionary expenses as % of income by Quintile • Poverty Rate • High Housing Cost Burden • Percentage of the population eligible for LIHEAP
NACWA 2013	Projected Water Bill	Income by Quintile—especially Lowest Quintile (LQI) projected	• Burden on Sub-populations within service area

Figure 12. Residential Indicator Alternatives

More Comprehensive Cost Measures

Most of these alternatives propose that the costs included in the RI component be expanded beyond those used in the 1997 FCA Guidance or the 2014 FCA Framework to include either all clean water costs, or average water bills paid (thus including drinking water as well as all clean water costs).Total water costs can include proposed investments for maintenance, repair or expansion of current water infrastructure as reflected in approved capital improvement plans and planned expenditures to address deferred maintenance or maintenance backlogs. Some alternatives propose projecting current total water costs to incorporate these planned investments and other likely costs increases. While the specific metrics may vary, there is a general consensus that the 1997 RI metric did not include all critical water costs that the utility faces and includes in ratepayer water bills. In short, the RI component does not include all water costs borne by ratepayers, particularly low-income users.[54] For simplicity, these total water costs are

[54] Given the diversity of organizational structures within the water industry, not all wastewater utilities provide both waste water and drinking water services. However, even when users receive drinking water and waste water services from separate utilities, they still must pay both water bills. The total water bill burden remains the same

usually formulated as an average cost per household or user. But using an average total water cost or average water bill can overstate water costs for lower income users, since water usage increases with income levels.[55] Unfortunately, it is not clear if utilities have readily available data on actual bills paid by lower-income users. However, if EPA chooses to compare the revised individual utility RI to some group average (e.g., state or regional averages), this may mitigate the bias, since utilities within the comparison group are likely to have a similar bias.

Another factor to consider is that the average water bill or average total water costs, including proposed CSO control costs, may not reflect the total water costs actually paid by users, if the community subsidizes water costs through general fund transfers. While the user-cost principle and the substantial other demands on local budgetary resources suggest such transfers are unlikely to be widespread and/or extensive, the actual extent of such broader taxpayer subsidization of utility water costs is not readily available. Despite these caveats, including a broader measure of total water costs in the RI metric has wide support among stakeholders.

Measuring Low-Income User Affordability

Most stakeholder suggested alternatives emphasize the importance of a better household or user income measure than MHI to identify the impact of water rate increases on the most vulnerable users – low income households in the local service area. Perhaps the most critical and consistent criticism of the 1997 RI component was its use of MHI to examine user affordability issues. Clearly, MHI is too broad an income measure to reflect the impact of water rate increases on low-income users. While several alternatives suggest using the income for the lowest quintile – this actually represents the median for the two lowest quintiles – others have suggested some variation of poverty income levels as a better indicator of the impact on low-income users than the current MHI measure.

It is important to note, as multiple stakeholders maintain, that any form of household income measure does not address water affordability issues for low income renters who may not have separate water bills and who may be a substantial portion of the service area's low-income users.[56] Unfortunately, it is not clear if water usage differs significantly between low-income renters and homeowners, nor how rents adjust to increases in water rates. Several studies have indicated significant price elasticity for water rates. Thus, users reduce their water consumption in response to rate increases. Since many renters are not charged directly for their water usage, their consumption may not be as sensitive to rate increases as low-income homeowners or other users who are billed directly for their water use. Notwithstanding this caveat, stakeholders agree

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for users -- whether combined or two separate bills -- and this is one of the two critical components – RI and FCI -- in assessing financial burden.

[55] Osann, Ed, *Flawed Analysis Muddies the Water on Water Affordability*, National Resource Defense Council, June 20, 2016, https://www.nrdc.org/experts/ed-osann/flawed-analysis-muddies-water-water-affordability

[56] Ibid.

that use of MHI masks the severity of potential affordability issues for economically vulnerable low-income users.

Extent of Low-Income Affordability Issues

Several of the alternatives for improving RI metrics also include an additional adjustment to measure not only the severity of low-income water affordability issues, but also how widespread or extensive those issues are among all users within the utility's service area. As noted earlier, EPA's guidance for considering some possible extended regulatory compliance schedules requires that the adverse impact on users be both 'substantial' and 'widespread'. A common metric used to assess the extensiveness of low-income user affordability is the percentage of poverty in the local service area.

Even wealthy communities can contain "pockets of poverty" or distressed neighborhoods, where low-income users could face severe water affordability issues. However, it is important to focus on communities with substantial poverty problems, indicating that the low-income user burden is not only substantial but widespread as well. Extensive poverty in a service area can also indicate the presence of other significant economic structural issues adversely affecting the utility's market conditions.

The 2% Threshold

Since the start of this review, Academy staff have sought an explanation for the derivation of this simple, widely applied 2% of MHI standard for determining excessive burden for clean water users. Several analysts have speculated about the origins of that elusive standard, but no definitive methodological basis for the standard has emerged.[57] The standard is not consistent with BLS consumer expenditure data presented earlier in this chapter. It also appears inconsistent with economic theory that would suggest that water and sewer expenditures must be weighed against both the costs of a range of other basic necessities (e.g., housing, food, health care, clothing, energy, transportation) and available discretionary income to determine the severity of impact from water rate increases. As Dr. Teodoro has succinctly stated, "the 2% standard appears to emerge from the agency's (EPA's) 1997 guidelines on Combined Sewer overflow compliance schedule (EPA 1997) though that document offers no theoretical or empirical rationale for the 2.0 standard."[58]

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[57] EPA maintains that the 2% standard was developed using data developed circa 1988 to support EPA's then Office of Policy, Planning and Evaluation's [OPPE] Municipality's Ability to Pay Model. Costs of wastewater services as a percentage of household income were calculated and the 2% threshold presumably represented two standard deviations from the average expenditure per household. No documentation describing this methodology, the size of the data sample, the source data, and the actual statistical distribution developed was available for further review. The stability of that analysis over a multiple year period is also unknown, but the trends discussed previously show the importance of updating that initial distribution and analysis.

[58] Teodoro, Manuel P., *Draft Working Paper: Measuring Household Affordability for Water and Sewer Utilities*, June 2017, p. 4.

Even if there were a sound methodological or theoretical basis for the 2% standard, that standard has remained the same since its publication in 1997. But there have been significant changes over the last 20 years that render that static 1997 standard suspect. As shown earlier in this chapter, water rates have increased faster than the Consumer Price Index and income levels over this period. Moreover, income levels for the lower income groups have not increased commensurately with higher income levels, yielding a less vertically equitable income distribution. This failure to adjust to changes over time is another deficiency in the fixed 2% standard and may be one reason why some stakeholders have suggested comparing an individual utility's revised RI to some group average RI to accommodate such potential changes. While there is merit in having a simple, clear standard, that merit is vitiated if there is no empirical or theoretical basis for the standard.

Trends and/or Projections for Key RI Metrics

Finally, another alternative includes the trends in low-income users' costs and incomes, and in area poverty rates to provide a dynamic component to the RI metric. Two permittees may have the same current condition, but the one with an adverse growth trend may be facing a greater challenge than the one with a positive growth trend and perhaps an expectation that the current condition will improve. However, assuming past trends will continue can be problematic unless the reasons for those trends are well understood and can be projected with some degree of confidence. The analyses needed to support such extrapolations may exceed the capabilities of some of the smaller utilities thereby disadvantaging them relative to other utilities seeking relief or adjusted compliance schedules due to claimed affordability issues.

More Elaborate Alternatives

Some academics and water consultants have proposed more elaborate methodologies for defining water affordability issues and improving the RI metric. Both approaches require use of more detailed Census data and additional computations or assumptions that could prove challenging for smaller, less sophisticated utilities. One methodology proposed by Jason Mumm of StemTech – the Weighted Average Residential Index or WARi – involves the "calculation of the weighted-average financial burdens across all income levels, in all Census tracts in a given utility's service area."[59] An alternative RI metric proposed by Professors Teodoro and Davis, is their Affordability Ratio (AR). The AR ratio compares the cost of minimum water services per member of the user household to the available disposable household income after other basic needs have been met. "The numerator of the AR is the price of basic (water) service to a customer, which varies depending on the utility's rates, the per-person volume of service that is considered necessary to maintain health and the number of people occupying the given household. The denominator is the customer's disposable income, which varies depending upon on the customer's after-tax income, less the costs of essential goods and services, such as

[59] Mumm, Jason and Ciaccia, Julius, *Improving the Narrative on Affordability and the Measurements We Need to Take Us There*, American Water Works Association Journal 109(5), 2017, p. 44.

housing, food, health care, and home energy."[60] While these and other creative methodologies illustrate the types of supplementary data that some permittees may want to introduce to document their claim of an extensive excess RI burden, they appear to require additional assumptions and/or additional detailed data and analysis that may exceed the capability or resources of many permittees.

Another alternative not included in either the RI or FCI alternatives tables is one that would not update the 1997 FCA Guidance and instead rely on an approved local integrated plan to set priorities and timetables for meeting CWA and even SDWA water goals. The local integrated plan will reflect the local community's and its utility's financial capability to undertake a full range of investments to improve water infrastructure, reduce CSOs or other pollutants, and meet other community needs while avoiding imposing excessive burdens on local ratepayers and taxpayers. The need to update the 1997 FCA Guidance in this instance will depend upon how EPA plans to use the FCA Guidance in assessing the priorities established in the local integrated plan. The relationship between EPA's FCA Guidance and local integrated plans is discussed more fully in the next chapter.

2.3.2 Stakeholder Proposed Alternative FCI Metrics

Several stakeholders have also proposed different metrics for improving the 1997 FCI Guidance's components. Many of these options for alternative FCI metrics focus on measures of the financial health and strength of the utility providing clean water services and on the underlying market conditions affecting its service area. The organizational structures of water utilities and their relationship to the local community/jurisdiction served vary substantially. Some are privately-owned, while many are publicly owned. Some serve multiple local jurisdictions, while some jurisdictions have multiple utilities. Some publicly owned utilities are independent entities within the local jurisdiction and others are departments within the local jurisdiction's governmental structure. In addition to these organizational differences, the types of water services provided by local water utilities can vary. Some utilities provide a full range of clean water and drinking water services; others may provide only a limited set of clean water services.

These organizational and structural complexities only reinforce the need to focus on the financial strength of the utility providing clean water services. This need is consistent with perhaps the most critical key criticism of the current FCI metrics – the focus of the 1997 FCA Guidance FCI metrics only on the financial strength and socioeconomic conditions for the local jurisdiction.

Alternative metrics proposed by stakeholders to measure the utility's financial strength generally focus on three critical elements: 1) operational efficiency; 2) debt burden; and 3) management effectiveness. But stakeholders also recognize that a utility's financial strength and health can be

[60] Davis, Jon, P. and Teodoro, Manuel, P., *Financial Capability and Affordability,* Chapter 22 in Water and Wastewater Financing and Pricing, Fourth Edition, ed. by George Raftelis. New York: Taylor & Francis p. 455.

affected by key socioeconomic conditions in the utility's market or service area. As the table on the following page illustrates, there are different metrics for assessing all of these critical elements determining a utility's financial strength.

FINANCIAL CAPABILITY INDICATOR ALTERNATIVES							
	FINANCIAL CONDITION		**FINANCIAL MANAGEMENT**		**SOCIO ECONOMIC CONDITIONS**		
	Operating Ratio	**Debt Burden**	**Collection Rate**	**Other**	**Popula-tion Change**	**Wealth/ Growth**	**Structural Problems**
EPA 1997 METRIC		• Debt/Total Property Value • Go Bond Rating	Property Tax Collection Rate	Property Total Revenue/ Total Property Value		Local Median Household Income(MHI) /National MHI	Local Unemploy-ment/ National Unemploy-ment
EFAB METRIC	• Operational Revenue/Operational Costs • Total Operational Revenue • Revenue & Number of Users (size of system • Cash + Liquid Assets/Operational Costs	• Debt Asset + Working Capital • Debt/Use • Net Revenue/ • Yearly Debt Service	Water Bill Collection Rate	Bad Water Debt/Total Water Accounts		Income Distribution	• % Poverty • Top 10 Rate Payers Share Total Revenue
MAYORS/ AWWA2013 **METRIC**	Trend in local Revenue	• Total long-term debt +obligations /Total Property Value • Legal Debt Ceiling	Utility Collection Rates				• Local Unemployment/ • Nat'l. Unemploy-ment • Local Un-employment • % Poverty • % HI Housing Costs

Figure 13. Financial Capability Indicator Alternatives

FINANCIAL CAPABILITY INDICATOR ALTERNATIVES							
	FINANCIAL CONDITION		**FINANCIAL MANAGEMENT**		**SOCIO ECONOMIC CONDITIONS**		
	Operating Ratio	**Debt Burden**	**Collection Rate**	**Other**	**Popula-tion Change**	**Wealth/ Growth**	**Structural Problems**
***NACWA 2013* METRIC**	• Projected Operational Revenue & Projected Operational Costs • Projected Misc/ Revenue	• Projected Net Revenue For Investments • Projected Debt Service	• Trends in bad accounts • Late and unpaid bills Permits			Income Distribution	• % Poverty + Trend • Local Unemploy-ment + Trend
JOSEPH KANE/ BROOKINGS	OP Revenue/OP Costs	Debt/ Asset			Pop Change 2005-2015	MHI Change 2005-2015	% Low-income Relative to Sample Average
MOODY's METRIC	• Cash + Liquid Assets/Operational Cost • Total OP Costs (Size Of System)	• Debt/Opera-tional Revenue • Net Revenue/Yearly Debt Service • Net Assets/Yearly Depreciation	Willing & Able to raise rates (Judgment)	Implement long-term (10 Year) Capital Plan		Local MHI/ National MHI	• Legal Limit On Net Revenue/ Yearly Debt Service • Reserve requirements

Figure 13. Financial Capability Indicator Alternatives (cont.)

Operational Efficiency

Operational efficiency is a critical determinant of the financial strength and health of the utility. Efficient operations enhance the ability of the utility to reduce operating costs and maintain, if not increase, operating revenues to help ensure that operating revenues can fund operating costs. Operating efficiency also improves the ability of the utility to respond to unanticipated emergencies thereby maintaining its financial health. As Moody's notes, "the financial health of a utility determines its flexibility to respond to contingencies, its resilience against potential short-term shocks, and its cushion against a long-term unfavorable trend."[61]

A common, simple measure of a utility's operational efficiency is its operating ratio (Operating Revenues/Operating Costs) or net profitability. An operating ratio greater than 1 (profitability) is a common normative standard that some have suggested be used for the threshold to determine potential financial burden issues. An operating ratio less than 1, indicating operating losses, would indicate possible economic stress for the utility. Alternative measures of utility operating efficiency include days of cash on hand and debt service coverage, which is net income available for debt service/annual debt service.[62]

Debt Burden

The FCI component in EPA's 1997 FCA Guidance acknowledged the importance of debt burden by including two metrics to assess the local jurisdiction's debt burden – its bond rating and its general obligation debt outstanding as a percent of its full market property value. However, as many stakeholders have noted, what is more pertinent is the debt burden of the utility, given the existing complex organizational structures and varying relationships between the utility and the local jurisdiction or jurisdictions it serves. Utility debt burden is one of the key elements used by Moody's and other rating agencies to develop revenue bond ratings for utilities. As Moody's notes, "a utility's debt profile determines its leverage and fixed costs. Systems that carry a lot of debt have less ability to reduce costs if demand shrinks… A greater debt burden may also prohibit a utility from funding necessary capital upgrades."[63]

Stakeholders have also proposed several ways to measure a utility's debt burden. Total long term debt can be compared to:

- the total value of assets;
- the number of ratepayers; or
- total revenues– a variant of the debt service coverage ratio.

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[61] Moody's Investor Service, *Rating Methodology: US Municipal Utility Revenue Debt*, December 15, 2014, p. 12.
[62] U.S. Environmental Protection Agency, Environmental Financial Advisory Board, *EFAB Analysis and Recommendations on: Draft Financial Capability Assessment Framework*, September 16, 2014, p. 12.
[63] Moody's op.cit. p. 14.

Some alternatives suggest using bond rating standards of rating agencies to establish debt burden threshold standards, while others have suggested comparing the debt burden ratio to some group average.

Management Effectiveness

In most instances, one would expect management effectiveness and operational efficiency to be highly correlated. Effective management should produce an operationally efficient utility. But there are circumstances when these two elements can diverge. Unforeseen contingencies can temporarily disrupt operational efficiency. Similarly, a new effective management team may need to be brought in to overcome current operational inefficiencies. In developing its utility revenue bond ratings, Moody's distinguishes explicitly between management effectiveness and the financial strength of the utility, "Utility management refers to the dynamics of setting rates, planning for capital spending, budgeting for annual expenditures, and complying with environmental regulations. The scorecard captures two crucial aspects of management: rate setting and capital planning."[64]

Unlike metrics for a utility's operating efficiency or debt burden, there is no obvious, simple metric to measure a utility's management effectiveness, but the Environmental Financial Advisory Board (EFAB) has suggested water bill delinquencies or collection rates. This assumes that a well-run utility is likely to have a higher than average water bill (willing and able to raise rates to cover costs) with a high collection rate and a positive trend or at least stable collection rates. Moody's relies on judgmental assessments about the utility management's ability to adjust rates periodically to maintain a stable, sufficient revenue stream and to develop and implement a long-term capital improvement plan to meet both its own investment needs and those required to achieve regulatory goals.

Community Demographic and Economic Conditions

There are a range of metrics suggested for community demographic and economic conditions that affect the utility's underlying market conditions. The most frequently proposed include population growth/decline; relative wealth; economic growth; and structural economic issues (e.g. extent of poverty, diversity of area employment or income sources). Population change will highlight declining areas with shrinking rate bases (e.g., rust belt urban areas with unique problems like excess capacity, infrastructure re-investment needs, and a declining rate base or smaller systems with a limited rate base initially).

Metrics proposed for relative wealth include using MHI or per capita income (PCI) relative to state, national, or other group averages (MHI/State MHI or PCI/State PCI).

Stakeholders have suggested various metrics for economic growth – usually changes in income (MHI or PCI) or total employment. Other measures include change in employment/population

[64] Ibid., p. 15.

ratio, change in unemployment rate, and relative unemployment rates – local area unemployment rates divided by state or national unemployment rates. Higher labor force participation rates (employment/population ratios) are assumed to indicate a stronger local economy that is better able to absorb rate increases; declining rates may indicate structural economic problems or an increasing dependency ratio, either of which suggests less ability to absorb rate increases. Again, several stakeholders suggest comparing a particular market area's economic growth to a group average [e.g state, regional, or national growth rates].

Many stakeholders argue for both a relative unemployment rate comparison and the trend in unemployment rates to be included. Structural economic issues can include high relative poverty rates, high relative unemployment rates, low relative labor force participation rates, or highly concentrated employment in a single employer or economic sector.

The FCI Options table compares the 1997 FCI metrics to several alternatives, including an EFAB suggestion. The EFAB and other stakeholder alternatives focus on data from the utility, except for the socioeconomic data. Some also include more trend data providing a more dynamic assessment of the utility's financial strength and health.

2.3.3 NAPA Recommended Changes to Improve EPA's FCA Guidance

The review of various alternative metrics proposed by stakeholders to improve the effectiveness of the RI and FCI components in identifying the potential financial and economic burdens imposed on utilities and their customers/users produced two observations. The first is the need to change the focus of the elements defining each component. For example, most stakeholders agree that the RI should include a broader set of water costs and focus on low-income user incomes. The second is the range of specific metrics available for those revised defining elements.

EPA's desire to provide flexibility to permittees in defining and identifying their potential financial and economic burdens while also assuring a common and consistent starting point for all permittees presents a difficult challenge. That challenge is compounded by the multiplicity of metrics available to improve the effectiveness of the RI and FCI components in EPA's 1997 FCA Guidance. One way to address that challenge and reconcile the need for consistency and flexibility is to establish standards or criteria for the metrics permittees use in developing a common starting point in the assessment of their financial and economic burdens.

Panel Recommendation #1

The Environmental Protection Agency (EPA) should improve the metrics used for the Residential Indicator and Financial Capability Indicator components in the 1997 Financial Capability Assessment Guidance if it wants to establish a common starting point for all permittees while still considering supplementary permittee data in assessing a permittee's burden in meeting its Clean Water Act goals.

Since there is no perfect way to measure affordability and financial capability, the metrics used should meet the following criteria:

1. Readily available from publicly available data sources;
2. Clearly defined and understood;
3. Simple, direct, and consistent;
4. Valid and reliable measures, according to conventional research standards; and
5. Applicable for comparative analyses among permittees.

Applying these standards or criteria to the metrics permittees use in developing revised and improved RI and FCI components to document the extent and severity of their economic and financial burdens should produce several useful outcomes. First, permittees will have some flexibility in selecting specific metrics for their RI and FCI components. Second, the metrics selected can be easily verified by regulatory enforcement staff and readily understood by both sides in the initial negotiations. Accessibility and simplicity should also ensure that the range of acceptable metrics does not exceed the capabilities and resources of all permittees.

The Panel believes that the current RI component can be improved to address many of its previously identified critical limitations.

Panel Recommendation #2

To improve the 1997 Residential Indicator component, the elements defining the current component should be revised to:

1. Include all water costs, not just selected clean water costs, to include all drinking water and clean water costs – Combined Sewer Overflow control costs, stormwater costs, other sewer costs – as well as planned water infrastructure investments and any deferred costs of system operations and maintenance, in the burden assessment;
2. Focus on the income of low-income users most vulnerable to rate increases rather than Median Household Income;
3. Identify the size of the vulnerable users relative to the utility's total rate payer base; and
4. Avoid arbitrary normative thresholds to determine relative burdens.

The specific metrics used for each of these revised or refocused elements can vary, so long as they meet the standards or criteria identified in Panel Recommendation #1. Thus, to expand the water costs included in the revised RI component, permittees can use average total water costs per household, average water bills paid, or average water bills paid by the segment of users identified as most vulnerable to water rate increases, if such detailed billing data are readily available. Planned water infrastructure investments and expenditures for any deferred maintenance in approved utility capital improvement plan may also be included in this expanded total water cost measure. Similarly, permittees can use various metrics to identify incomes of their most vulnerable users, including poverty level income, income of the lowest quintile or quartile, or some alternative income measure that meets the recommended standards/criteria.

These recommended improvements to the RI component ought to provide a more accurate assessment of the water affordability issues confronting the most vulnerable users. While this in turn may increase the number of permittees with a high burden, the extent of that impact is difficult to determine since we don't know the number of permittees currently designated as highly-burdened. The improved RI component may produce an increase in permittee requests to reopen existing consent decrees governing CSO controls. This increase in workload may be offset to some degree by a possible lower number of permittees needing to present more detailed and extensive data to document their critical low-income user water affordability issues.[65] The

[65] NAPA staff acknowledge that the recommendation to include a measure of the percent of the rate payer base considered most vulnerable to rate increases [e.g. the local poverty rate] in the RI component could increase workload slightly for some permittees, but the possible need for fewer permittees to submit substantial additional supplementary data to document excessive burden due to low-income affordability issues should provide some

change in the elements above would increase the focus of EPA regulatory relief through extended compliance schedules on communities with a disproportionate number of low income users, resulting in delayed environmental benefits for all residents in those communities. Further analysis of this potential tradeoff will need to take place.

The Panel also believes that the current FCI component in EPA's 1997 FCA Guidance can be improved or refocused to more accurately reflect the financial capabilities and limitations of the utility providing wastewater services.

Panel Recommendation #3

To improve the 1997 Financial Capability Indicator component, the current elements defining that component should be revised or refocused to:

1. Focus on the operational efficiency, debt burden, and managerial effectiveness of the utility supplying clean water services; and

2. Expand the socioeconomic components affecting the utility's market conditions to include trends in population, relative wealth, economic growth, and other economic structural problems in the community served by the utility.

Again, permittees have a range of specific metrics available for each of these revised or refocused defining elements of the FCI component. For example, utility debt burden metrics could include various debt ratios – debt per asset value, debt per ratepayer or user, and debt per total revenue. Any of these debt ratios would satisfy the Panel's recommended standards or criteria.

It is likely that the improved FCI component will increase the number of 'highly-burdened' permittees requiring some regulatory time schedule relief, but the extent of that increase is unclear. Any increase in the number of 'highly-burdened" permittees may also increase the need to reopen previous agreements on CSO controls and could delay the achievement of specific WQS goals. Likewise, such an increase should reduce the burden on permittees to document current water affordability issues and financial capability limitations.

2.4 Other Changes to Improve FCA Guidance Use

EPA's 1997 FCA Guidance has recognized the need to balance achieving CWA clean water goals for CSOs with the utility's and/or the community's financial capability to incur the additional costs required to meet them within a specified time frame. Stakeholders have supported the concept and need for an effective FCA guidance. Their concerns have focused

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workload reductions. The extent of those reductions is uncertain, since the number of permittees currently deemed high burdened remains unknown.

primarily on the inadequacy of the metrics used for the RI and FCI components. However, several stakeholders have raised two additional issues that need to be addressed once the FCA guidance metrics are improved as recommended:

1. Extending the improved FCA guidance to a broader range of EPA water regulatory actions; and

2. Ensuring that the improved FCA guidance is being applied consistently and equitably among EPA's regions.

2.4.1 Extending the FCA Guidance

To date, EPA has used the FCA guidance principally in its issuance of 828 active CSO permits to 746 communities/utilities (at the time of this report's publishing). Many of these permits are established through consent decrees rather than EPA's permitting process. In addition, EPA regional staff and headquarters enforcement staff have often been directly involved in many CSO consent decree negotiations, whereas EPA delegates regulatory review and permit approval to the states for other clean water regulatory actions. While CSO consent decrees impose additional costs on communities/utilities to meet required water quality standards (WQS) within specified time frames, utilities and communities also must bear the costs of meeting WQS TMDL obligations under NPDES permits issued by state regulatory staff for their point source discharge facilities (e.g., POTWs).

Academy stakeholder interviews revealed little awareness or use of the FCA guidance in issuing NPDES permits for POTWs. If a financially distressed utility has affordability issues and is unable to bear the additional costs required to meet its CSO WQS goals, it is likely to be similarly challenged in meeting its other clean water WQS goals. Indeed, if the financially distressed utility also provides drinking water services, it may confront similar affordability and financial capability issues in meeting its SDWA regulatory requirements.

In short, low-income user water affordability issues and utility financial capability limitations are not unique to only CSO WQS goals. Any additional costs imposed on utilities to meet other CWA clean water goals can raise similar affordability and financial capability issues. Additional costs required to meet drinking water requirements under the SDWA can also raise these same issues.[66] As noted earlier in this chapter, the SDWA explicitly acknowledged the need to

[66] EPA has had under review its National Level Affordability Criteria (NLAC) for determining whether treatment technologies for complying with drinking water regulations are available at a cost affordable for small drinking water systems – those serving 10,000 or fewer customers. The NLAC methodology was published by EPA in 1998.TheNLAC's current methodology uses Census data from representative communities served by small drinking water systems to determine its 'affordability threshold' of 2.5% of MHI. In two separate reports, EPA's Science Advisory Board (December 2002 report) and the National Drinking Water Advisory Council (July 2003 report) have recommended changes to that threshold involving either a different income measure, a different threshold percentage, or other approaches to improving the current system. To date, no small system has satisfied the NLAC threshold, since EPA has found affordable compliance technologies for small drinking water systems

consider financial limitations and capabilities in requiring utility/community compliance with SDWA rules.

Some of the recommended changes to improve the effectiveness of the RI and FCI components in EPA's 1997 FCA Guidance facilitate EPA's opportunity to apply this improved FCA framework to a broader range of water environmental issues than just CSO controls. In particular, the inclusion of all water costs in the improved RI component creates the possibility of using this improved FCA framework to address not only all CWA goals but SDWA goals as well.

Panel Recommendation #4

> The Environmental Protection Agency should consider using the improved Financial Capability Assessment framework, in all of its clean and drinking water regulatory decision processes consistent with current statutory requirements.

This recommendation for EPA to adopt a broader, more holistic perspective in pursuing all its water quality goals is consistent with the 'One-Water' concept advocated by a number of water industry stakeholders. Chapter 6 contains a more complete discussion of this 'One-Water' concept. Extending the improved FCA framework to a broader range of clean and drinking water regulatory issues would also reinforce the effectiveness and impact of EPA's efforts to encourage the use of local integrated planning to meet clean water WQS goals.

2.4.2 Consistent Use of Improved FCA Framework

As noted earlier in this chapter, there remains a persistent view among a number of stakeholders that many regional EPA enforcement staff and state regulatory staff continue to rely primarily on the RI component and its 2% MHI measure to assess permittee burden in CSO assessments. This inconsistency between stated EPA policy and policy implementation in the field is compounded by the lack of information on the number of CSO permittees found to have high burdens warranting some relief in compliance time frames and the amount of extended time schedule relief provided them, if any.

This basic information is essential for any assessment of the impact of the FCA framework on CSO regulatory decisions. The number of CSO permittees found to have a high burden can help determine whether the FCA framework is effective in identifying affordability and financial capability problems. If the FCA framework identifies no highly-burdened permittees, the metrics used may be inadequate, unless one believes that there are no water affordability issues or financial capability limitations. Similarly, if the framework identifies an excessive number of

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for all the drinking water regulations promulgated since 1986. In 2006 EPA issued a federal register notice seeking public comments on possible revisions to the NLAC small system threshold, but no action has yet been taken. There does not appear to be a similar affordability test for large drinking water systems.

highly burdened permittees, it is possible that the metrics are too lax. Such data would also reassure EPA HQ that the FCA framework is being applied consistently among all regions.

It is also impossible to evaluate the appropriateness of any compliance schedule relief that may be provided without information on the number of highly-burdened permittees identified by the FCA framework. In short, EPA HQ was not able to confirm whether compliance schedule decisions in the field reflect a consistent application of the FCA framework and an equitable resolution of scheduling issues among all permittees. The Panel recognizes that there are confidentiality requirements that apply to enforcement actions. However there was no clear identification of a management information system that captured this information.

During this review of the EPA FCA framework, efforts to determine how many permittees or utilities seeking to resolve CSO control issues were found to have high burdens under either the original 1997 FCA Guidance or the revised 2014 Framework were inconclusive. Without that basic information, it was impossible to determine what relief in regulatory time schedules EPA regional and state regulatory staff provided to highly-burdened permittees or utilities. The persistent stakeholder perception that the 1997 FCA Guidance is not being consistently applied in the field only reinforces the need for better communication of EPA policy and highlights the need for more effective follow-up by EPA HQ to monitor regulatory actions taken in the field.

Stakeholders have expressed concerns about inconsistent application of the FCA framework among and within its regions by regional and state regulatory and enforcement staff. This will require both:

- Improving EPA's communication strategy to convey revised EPA policies to permittees, other stakeholders, regional, and state regulatory staff; and,
- Expanding EPA's management information system to monitor how regional and state staffs implement the new policy and adjust regulatory implementation schedules to accommodate highly burdened permittees and utilities.

Panel Recommendation #5

The Environmental Protection Agency (EPA) should improve its two-way communication strategy with its regions, state regulators, and other stakeholders to assure formal, consistent, and clear messaging on policy changes, and effective monitoring and follow-up of clean water regulatory actions in the field.

Additionally, EPA should ensure that its management information system, at a minimum, provides the following information:

1. The number of permittees found to have high burdens;
2. The specific reasons for that finding; and
3. The degree of regulatory relief, in the form of lengthened compliance schedules, provided to those highly-burdened permittees.

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Chapter 3: Integrated Planning Process

Integrated Planning is a voluntary planning process designed to assist communities in meeting their Clean Water Act (CWA) obligations by prioritizing and sequencing stormwater and wastewater project activities. As stated in the "Integrated Municipal Stormwater and Wastewater Planning Approach Framework." (2012 IP Framework), it "will allow a municipality to balance CWA requirements in a manner that addresses the most pressing public health and environmental protection issues first." Its purpose is to allow communities to address those water quality issues that pose the greatest environmental impacts in the order of severity. This process also enables communities to optimize the value of limited infrastructure dollars and reflects a disciplined approach to decision making. It is important to clarify that integrated planning (IP) is not about exchanging or substituting one water quality objective for another. It provides a data-informed methodology for determining the optimal order for investing limited funds.

Some critical benefits of integrated planning are that it:

- allows for flexible sequencing and scheduling;
- has the capacity to meet requirements more efficiently, maximizing community resources;
- realizes greater environmental benefits more quickly;
- builds public and stakeholder support utilizing outreach and community input on priorities; and
- enables the use of more multi-benefit solutions.

3.1 Background on EPA 2012 IP Framework

EPA established the 2012 IP Framework[67] as a response to concerns that while EPA, states, and municipalities have achieved significant progress in implementing the CWA, there are still many factors stressing the implementation of key programs as currently, they often focus on each CWA requirement individually. Acknowledging that this may not be the ideal method for addressing these stressors and recognizing the unintended consequences of constraining a

[67] U.S. Environmental Protection Agency, *Integrated Municipal Stormwater and Wastewater Planning Approach Framework*, May 2012.

municipality from addressing its most serious water quality issues first, EPA published the 2012 IP Framework.

The 2012 IP Framework is written broadly to allow community-specific flexibility in the development and adoption of integrated plans, identifying key operation principles, and providing municipalities opportunities to pursue more innovative cost-saving solutions to managing stormwater and wastewater requirements. The Integrated Planning and the Financial Capability Assessment Frameworks are intended to be used in a coordinated fashion. The 2012 IP Framework also provides guidance regarding how the integrated plan should include proposed implementation schedules developed by the municipality and an assessment of the municipality's financial capability.

3.2 How Communities Have Used Integrated Planning

On October 10, 2014, EPA announced $335,000 in technical assistance (TA) for five communities to develop elements of integrated plans for municipal wastewater and stormwater management. The five communities selected are highlighted below.

3.2.1 Burlington, Vermont

When selected, the city of Burlington had begun developing community-based evaluation criteria using social, economic, and environmental factors to identify and prioritize potential wastewater, combined sewer system, and stormwater projects.

Burlington completed a community survey via an internal web format and discovered a number of valuable lessons for attempting to quantify benefits of environmental initiatives. They are also building a Geographic Information System (GIS) map identifying the locations in need of replacement or upgrade of water infrastructure. Key to integrating activities, the city will then overlay the road construction schedule map and other city operation maps to drive the "Dig Once" strategy. Burlington, like the other TA recipients, emphasized the importance of communicating to the community what their dollar was doing and how it was being stretched as far as possible, leading to better possibilities for more walkability and green space.

3.2.2 Durham, New Hampshire

The town of Durham and the University of New Hampshire have collaborated to create an integrated plan, or permit using information on pollution tracking and accounting systems to focus on cross-jurisdictional coordination and methods to credit point versus nonpoint pollution controls.

The Integrated Permit idea for the town of Durham began in 2010 in anticipation of an upcoming permit renewal for Durham's wastewater treatment facility (WWTF). When the Oyster River Integrated Watershed Plan for Nitrogen Load Reductions was derived in July 2014, it included collaboration and burden sharing between the town of Durham and the University of New Hampshire. The two entities collaborated by using information on pollution tracking and

accounting systems to focus on cross-jurisdictional coordination and methods to credit point versus nonpoint pollution controls for several reasons.

Both Durham and UNH share in the use and the operating costs of Durham's WWTF, which discharges to the tidal portion of the Oyster River and, having adjacent regulated urbanized areas, are subject to EPA's MS4 Stormwater General Permit. Another motivation for both entities to become involved in IP is because almost half (47 percent) of the estimated annual watershed load or approximately 17.3 tons is associated with sources located within the town and UNH's campus area.

The initial idea for an Integrated Plan in 2010 was to "trade one for the other." Instead of requiring 3 mg/l monthly average total nitrogen WWTP effluent limit, resources would be put into nonpoint source (NPS) pollution reduction. EPA's response indicated that both point source and NPS reductions need to occur to achieve state water quality standards; however, an I-Permit could provide more flexibility in how the Project Partners achieve their overall target reduction. Given the overlapping requirements between the two permit programs (i.e., wastewater and MS4), the Town and UNH decided that an Integrated Permit approach would result in greater economic and environmental benefits and eliminate duplication of efforts.

EPA and the New Hampshire Department of Environmental endorse Durham's and UNH's proposed I-Permit approach. However, EPA-Region 1 representatives indicated challenges due to the limited flexibility contained in the Clean Water Act (CWA). The Project Partners may be required to include a Limit of Technology (LOT) nitrogen effluent limit of 3 mg/L in the NPDES permit in order to meet the necessary combined point source and NPS nitrogen reduction target allocation for Durham and UNH regardless of whether NPS and stormwater control measures may be equally or even more effective than WWTP changes in reducing nitrogen loads. Having to meet this LOT requirement may reduce the Project Partner's incentive to pursue additional innovative and cost effective NPS and stormwater measures or to pursue an Integrated Permit as an alternative to separate WWTP and MS4 permits. Due to the possibility that meeting the overall nitrogen reduction goals for Durham/UNH may be less expensive if costs include pursuing limit of technology at the wastewater treatment plant, stakeholders are currently examining the Integrated Permit in this context.

3.2.3 Onondaga County, New York

The Onondaga County Department of Water Environment Protection is working with multiple municipal separate storm sewer systems (MS4s) and other stakeholders to develop priorities and evaluate proposed wastewater and stormwater projects. In 2009, Onondaga County received the go-ahead from a federal judge to forgo plans to build three sewage plants and instead reduce sewer overflows with trees, green roofs, permeable pavement, and underground overflow containment tanks that hold sewer overflows until they can be treated by existing treatment plants.

The Syracuse Environmental Finance Center has assembled a training manual for resiliency to include weather, climate, economic changes, and demographic changes. The county and city have engaged a variety of stakeholders within the community to collaboratively problem solve and have used green infrastructure (GI) as a vehicle for this. The *Save the Rain* program engaged the community to replace impermeable pavement, provide more useable green space, and to tackle challenges such as replacing sewer lines and efforts to more effectively and efficiently zone neighborhoods for infrastructure improvements. Onondaga has taken on bigger financing packages so that they could more effectively demonstrate benefit in the aggregate.

Onondaga has embraced the IP TA and worked to address the New York Smart Growth Public Infrastructure Policy Act which, in part, states:

Universal Citation: NY Env Cons L § 6-0105 (2016)

> 6-0105. State smart growth public infrastructure policy. It is the purpose of this article to augment the state's environmental policy by declaring a fiscally prudent state policy of maximizing the social, economic and environmental benefits from public infrastructure development through minimizing unnecessary costs of sprawl development including environmental degradation, disinvestment in urban and suburban communities and loss of open space induced by sprawl facilitated by the funding or development of new or expanded transportation, sewer and wastewater treatment, water, education, housing and other publicly supported infrastructure inconsistent with smart growth public infrastructure criteria.

3.2.4 Santa Maria, California

The city of Santa Maria continues to develop methods to identify, evaluate, and select water resource management projects that address multiple wastewater, stormwater, and other water quality issues, pursuing an Integrated Plan as a key driver.

Santa Maria's Integrated Plan and collaborative approach allowed them to allocate scarce resources (water, in this case) to places it would be most beneficial. A key example of this is a re-routing of nitrogen-rich water to be used for irrigation instead of treatment in an expensive plant. They have developed a secondary irrigation line system connected to high nitride wells to provide water for recreation purposes. This process also pulls the high nitride water out of the groundwater basin and puts it to use, recognizing that not all uses for water require the same treatment and that they care deeply about their water supply beyond the permits, requirements, and compliance.

3.2.5 Springfield, Missouri

The city of Springfield, Greene County, and City Utilities of Springfield are developing a benefits analysis of water resources to use for an Integrated Plan, spanning this across water, air, and solid waste concerns and requirements.

Springfield has practiced robust stakeholder engagement by employing the approach that "no news is bad news." Additionally, they used videos to help citizens understand what they were doing and why they were doing it. When engaging the public, Springfield utilized a variety of storytelling maps that displayed the interconnections of the infrastructure projects. In effect, they made a game out of the water system.

The city of Springfield has looked to a diverse group of community members to socialize the value of environmental vigilance including elementary education and local places of worship. Several successful outreach exercises that raised awareness were their stormwater mural program and the art reveal rain barrel contest.

While each of these communities differ from one another in a number of ways (e.g., population size, demographics, organization of local government and jurisdiction), they all have benefited from community outreach and engagement, the methodical and data-informed approach to identifying priorities, and determining how their constrained resources can go further. They all have articulated some level of challenges with coordinating across multiple water divisions (and, at times, other media) and could all benefit from additional guidance from the regulators that oversee their efforts.

For more information about each community, see Appendix E: Community Spreadsheet.

3.2.6 The City of Baltimore, Maryland

A number of communities have independently embarked on IP, taking different approaches to prioritizing and sequencing key activities to improve water quality and in some cases other environmental media as well. Baltimore, Maryland is one of the first communities to respond to the 2012 IP Framework by preparing an Integrated Plan to apply flexibility in addressing municipal governments' Clean Water Act obligations. The City's IP initiative was a joint effort of the Bureau of Water and Wastewater and the City's Program Management Team responsible for the City's Wet Weather Compliance Program, with contracting support from a joint venture of two water engineering firms, MWH Global and Louis Berger Water Services, Inc.

The City utilized what was eventually identified as a quadruple Triple Bottom Line (TBL) methodology to evaluate and prioritize capital improvement projects (adding a fourth category "Project Implementation and Efficacy" to the traditional TBL Environmental, Social and Economic categories) in order to identify a robust case for a modification of their 2002 Consent Decree and to enable the extension of compliance deadlines for SSO elimination and allowing for completion of improvements with greater environmental benefits.

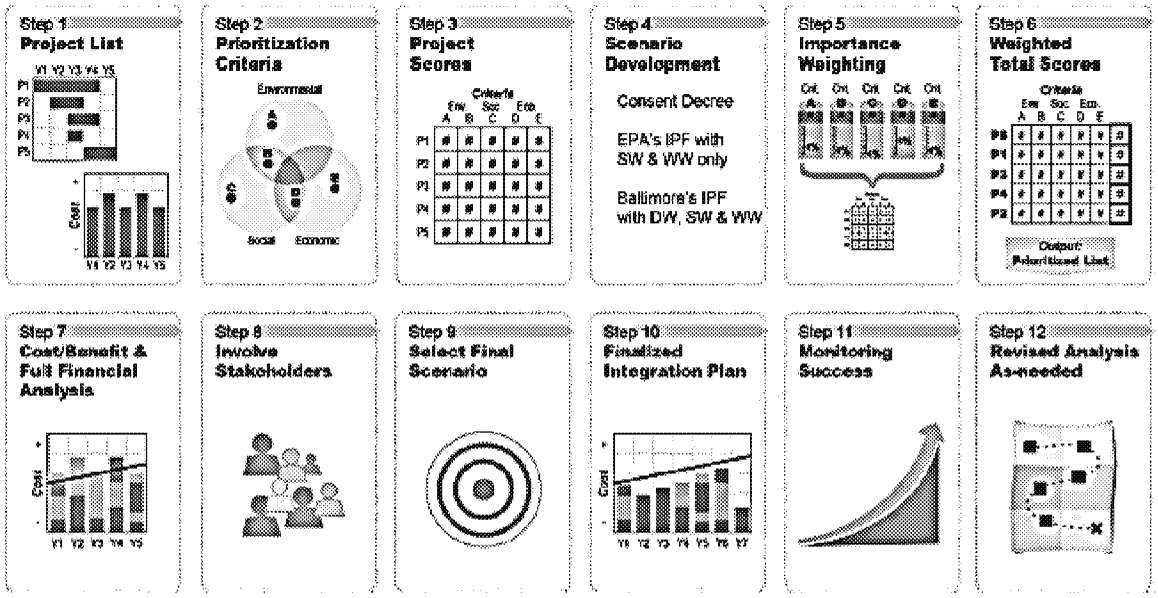

Figure 14. Baltimore's Integrated Planning Framework Process. Source: City of Baltimore Integrated Planning Framework presentation on August 28, 2013.

The above graphic reflects the framework for developing a consolidated list of Capital Improvement Plan (CIP) projects for the water, wastewater, and surface water divisions and the ongoing work to evaluate and reassess as necessary. The overall integrated planning CIP Project List currently totals 1,414 projects, which were grouped into 205 project bundles, with a total estimated cost of $7.9 billion, that could then be evaluated for benefits that included environmental, social, economic, and project efficacy criteria. This produces a master list, from which each of the three distinct utilities (water, wastewater and stormwater) develops their own prioritized list, because each of these must operate without profit or loss to other City funds. The City of Baltimore has been anxious to see an even greater level of integration in EPA's planning framework by folding together not just the needs related to the CWA, but also drinking water and water supply issues covered under the Safe Drinking Water Act ("SDWA").[68]

Weighted importance was calculated and then applied to three overall scenarios:

- Baltimore IP Unconstrained Scenario – Reflecting the City's preferred CIP projects, including water, wastewater, and surface water (i.e., stormwater) and is based on City-defined needs and budget constraint schedules.

- EPA IP Constrained Scenario – Reflecting a regulatory-driven CIP project selection and prioritization process for wastewater and stormwater projects only.

[68] Chow, R., Searles, S., Cardoch, L., McLamarrah J., *Baltimore Integrated Planning Framework Development,* 2012. Paper presented at the Water Environment Federation Technical Exhibition and Conference.

- Current Situation Scenario – Reflecting the baseline scenario as it is modeled to reflect current conditions where regulatory considerations substantially drive project prioritization to the exclusion of other considerations.

As a result of this process, two funding scenarios were developed to address schedule requirements and considerations:

- All-in: All projects are completed based on current schedule requirements and considerations.
  - Projects cumulative water rate increases of over 260%; over 130% between FY 2013, FY 2014.
- Alternative financial analysis: held rate increases at a constant of 9%, reaching cumulative increases of 180% by FY 2024.
  - This would require a time extension to December 31, 2024 for initiation of the last project under initial prioritization order and would require modification of the consent decree.

Although work on the Integrated Plan informed negotiations, and EPA determined that it was appropriate to spread costs over a longer period of time in light of affordability considerations, it was not actually used in the proposed modification of the 2002 consent decree that was announced in June of 2016 by EPA, DOJ, and MDE, and filed in federal court in September 2017. The proposed modification includes two phases. The Phase I work anticipates reducing wet weather overflows by 83% within five years. Baltimore will then assess the performance of the completed projects and monitor rainfall and flow in its collection system to develop a Phase II plan, which will be due by December 2022. The modified consent decree requires that Phase II must be completed by December 2030. [69]

Baltimore also found that the IP process is effective for ongoing evaluation of infrastructure investments and has established an iterative process of reevaluating the criteria and importance weighting as a basis for selection of projects for the capital budget. As a resuylt of the process, the City also established an Office of Asset management in 2013, to conduct strategic planning over the infrastructure lifecycle, which has developed a model to assess infrastructure conditions and criticality. This model has enabled proactive repairs that avoided pipe ruptures and disruption of service, as well as preventive maintenance.[70]

In the spring of 2017, Baltimore was completing an $800 million upgrade of its largest sewage treatment plant and, simultaneously, beginning a $160 million project to retrofit a drinking water

[69] U.S. Environmental Protection Agency, *News Release: Agreement Requires Baltimore City to Address Sanitary Sewer Overflows*, September 6, 2017, https://www.epa.gov/newsreleases/agreement-requires-baltimore-city-address-sanitary-sewer-overflows

[70] City of Baltimore, Department of Public Works, *[reply to] NAPA Request for Information*, September 8, 2017.

reservoir and of realigning a critical section of its sewer system. As the city was looking to IP to play a part in addressing affordability challenges by giving weight to the most pressing public health impacts and providing systematic evaluation tools, the Director of Public Works for Baltimore City, Rudolph Chow, testified before the Senate Committee on Environment and Public Works and shared his perspective on this initiative.[71] He stated that "Local jurisdictions understand their holistic system needs better than anyone." He reiterated the need to identify the most urgent needs of the community and referred to then Mayor Stephanie Rawlings-Blake's sentiment that "when everything is a priority, nothing is a priority."

While many communities have assessed the role of IP and found it to be a useful approach to addressing complex regulatory and environmental challenges, not every community has determined that it is the appropriate fit. For example, the small town of Bangor, Maine has a population of approximately 33,000 residents and a MHI of $36,013, as of 2014. Bangor has had CSOs under consent decree for decades and also has several wastewater-system needs that are not under the CDs. These include MS4 control measures, a treatment plant, and pump station operation & maintenance. Bangor considered IP and established a potential vision for implementing, to which EPA and DOJ were open. However, the compliance schedule in the CD would be expanded to make the MS4, the treatment plant, and other CWA activities subject to stipulated penalties. This led leaders in Bangor to eschew the use of an Integrated Plan to avoid the risk of adding projects to the CD and potential financial penalties.

3.2.7 Other Integrated Planning Approaches

Other communities are utilizing an IP approach in order to better prioritize and manage resources more effectively. For example, Portland, Oregon has been developing a system plan for all stormwater management using a risk-based approach to assess conditions and identify high priority areas where the consequences and likelihood of failure can be reduced. It is guided by their Watershed Plan, which was developed in 2005 and provides guidance for identifying projects that can meet multiple regulatory requirements in an integrated way.[72] Similarly, a group of MS4 communities in York County, Pennsylvania, have combined efforts under the umbrella of a county-level planning commission to develop a single plan and prioritize projects, which enables them to reduce planning costs. Their Integrated Water Resources Plan was created to develop a long-range integrated water resources planning document that can be used by the entities who share watershed boundaries within and around the County. The plan ties together the issues that are related to water resources, provides a usable and understandable process which

[71] City of Baltimore, *Testimony of Rudolph S. Chow, P.E., before the Committee on Environment and Public Works, U.S. Senate*, April 7, 2016.

[72] City of Portland, Oregon, *Citywide Systems Plan: Proposed Draft,* July 2014, https://www.portlandoregon.gov/bps/article/497435

incorporates existing laws, data, reports, plans, and organizations, as well as providing the user with data and analysis concerning the future of York County water resources.[73]

Some states are utilizing a similar approach to manage water resources throughout the state. The North Carolina Water and Wastewater Infrastructure Master Plan, although it is not titled an Integrated Plan, takes a similar approach to planning the state's strategy for maximizing the impact of their investments and enabling continued viability of the state's water infrastructure. Specifically, the infrastructure management component involves long-term master planning which includes:

- knowing the risks of failure of key water infrastructure components;
- taking proactive approaches and making informed decisions to construct, operate, maintain, and renew/replace infrastructure that will minimize long-term costs; and
- having funding in place so that the right investments are made at the right time.[74]

The graphic below illustrates the interrelationship between infrastructure, organizational and financial management, and the nexus that reflects a path for viable water and wastewater utility systems. North Carolina recognizes the importance of this approach at a state level.

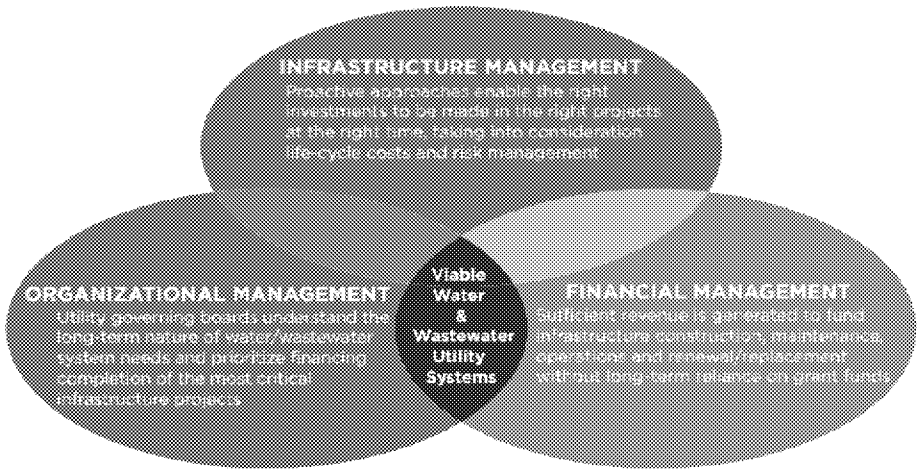

Figure 15. North Carolina Department of Environmental Quality, State Water Infrastructure Authority, *North Carolina's Statewide Water and Wastewater Infrastructure Master Plan: The Road to Viability*, 2017, p. 15.

3.3 Assessment of EPA Use of Integrated Planning

While the intention of the 2012 IP Framework was to provide communities with flexibility to prioritize and sequence needed water infrastructure investments so that limited public dollars can

[73] York County Planning Commission, Pennsylvania, *Integrated Water Resources Plan*, March 2011.
[74] North Carolina Department of Environmental Quality, State Water Infrastructure Authority, *North Carolina's Statewide Water and Wastewater Infrastructure Master Plan: The Road to Viability*, 2017.

be invested in ways that each municipality finds most valuable, there has been a lack of clarity on a number of issues, including EPA and state regulatory roles in reviewing and approving or recommending changes to locally-developed integrated plans. EPA shared that the voluntary Integrated Planning process is a helpful planning tool for municipalities, and that integrated plans (or elements of an integrated plan) can be incorporated into enforceable mechanisms such as NPDES permits or CWA settlements. EPA has approved modifications to existing consent decrees to incorporate elements of integrated plans that have been voluntarily developed by municipalities.

EPA and local governments have clashed over the agency's reliance on administrative orders or judicially approved consent decrees to codify integrated pollution reduction plans, rather than through modification of CWA permits. City and town officials say that they would prefer the compliance flexibility afforded through permits, rather than to legally-binding consent decrees (and penalties) that result from the noncompliance with CWA requirements. EPA has stated that both enforcement and permits are necessary, depending on individual circumstances.[75]

3.4 Stakeholder Proposed Reforms

On January 12, 2017, the Water Quality Improvement Act – H.R. 465 was introduced with a goal of allowing local governments to work with their state and EPA to prioritize investment in wet weather overflows and flooding collectively, rather than individually. The bill directs that the Administrator shall establish a comprehensive and flexible IP process and permitting process for municipal wastewater and stormwater management that will help municipalities comply with the requirements of this Act by enabling municipalities to identify the most cost-effective and protective approaches to comply with such requirements, and prioritize their investments in addressing such requirements.

Local leadership (e.g., membership in National League of Cities and National Association of Counties) has expressed support for this bill because it would enable the codification of various EPA memorandums on water tools and affordability. It also provides additional support for local governments that undertake IP to incorporate green infrastructure components into municipal stormwater, combined sewer overflow (CSO), and other water plans in a more cost effective way.

In written testimony to the House Transportation and Infrastructure Committee Subcommittee on Water Resources & Environment May 18, 2017, Pete Buttigieg, Mayor of South Bend Indiana highlighted the potential value of legislation to address the issue of identifying a path forward (other than civil penalties) for "local governments who develop an integrated plan and put good faith efforts and reasonable further progress into improving their water."

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[75] U.S. Library of Congress, Congressional Research Service, *EPA Policies Concerning Integrated Planning and Affordability of Water Infrastructure*, March 14, 2017. By J. Ramseur.

This bill reflects an interest in expanding the role of IP, but also articulates the concern of many that there is currently not a collaborative model that assists local, state, and federal partnership in evaluating the most effective use of funds to address the most urgent environmental concerns. The bill is the most recent example of efforts to assist municipalities in addressing the challenge of prioritizing wastewater infrastructure needs and correlated compliance issues. In 2015, the Clean Water Compliance and Ratepayer Affordability Act was introduced and proposed that the Administrator "carry out a pilot program to work with municipalities that are seeking to develop and implement integrated plans to meet their wastewater and stormwater obligations under the Federal Water Pollution Control Act, and for other purposes."

3.5 Integrating Water

The Panel recognizes that EPA's 2012 Integrated Planning Framework does adopt an integrated water approach to some, limited extent. EPA highlights the fact that drinking water needs and costs may be considered under the 1997 FCA Guidance and 2014 FCA Framework and may be relevant to schedule development, and EPA stated that it is open to considering a Drinking Water Investment Plan to complement the 2012 Integrated Planning Framework.[76] The Framework further states that a municipality's environmental compliance costs related to all environmental media, and, indeed, any kinds of financial burdens faced by the community, may be relevant to schedule development. The 2014 FCA Framework explains that municipalities can submit additional information that may be relevant to schedule development, including data on the municipality's "other costs or financial obligations, such as those that relate to drinking water or other infrastructure, that significantly affect a permittee's ability to raise revenue."

The 2012 IP Framework explains that "NPDES requirements for separate sanitary sewer systems, combined sewer systems, municipal separate storm sewer systems and at wastewater treatment plants may be included in an integrated plan.... In addition, integrated plans may address source water protection efforts that protect surface water supplies, and/or nonpoint source control through proposed trading approaches or other mechanisms." The 2012 IP Framework does not address the question of whether or how a community's financial capability or overall financial health might be taken into account in setting implementation schedules under the Safe Drinking Water Act or under any other environmental statute, and whether such non-CWA implementation schedules might be incorporated into the same Integrated Plan. A broader discussion of a One Water policy is discussed in Chapter 6 as some stakeholders have proposed that, if a community could set priorities and schedules for satisfying Safe Drinking Water Act requirements as well as CWA requirements in the same integrated plan, such a One Water approach would offer opportunities to address a range of regulatory requirements, provide multiple water quality benefits, and make strategic capital investments to maintain, repair, and build infrastructure.

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[76] U.S. Environmental Protection Agency, *Integrated Municipal Stormwater and Wastewater Planning: Frequently Asked Questions*, July 15, 2013, p. 4.

3.6 Panel Recommendations

The 2012 IP Framework (as well as subsequent communications from EPA) established a compelling case for IP. Communities pursuing an Integrated Plan have articulated a need for a more holistic approach to address water (and at times additional environmental media) in order to prioritize investments and consolidate planning. The 2012 IP Framework provides information in four areas: Background, Principles, Elements of an Integrated Plan, and Implementation. The majority of the document builds the case for IP and answers *why* a community should consider this innovative and holistic approach. It does not provide detail regarding *how* to implement the plan and navigate obstacles.

A common sentiment that was heard from stakeholders within communities that embraced the process is that they are currently struggling with coordinating their approach. The "stovepiped" organizational structures and bureaucracies that do not enable coordination of planning initiatives across CWA and at times, SDWA requirements, that exist both at the local and state levels as well as with EPA regional and headquarters offices. Input from IP communities suggests that the front-line regulators (this can be a state or regional environmental organization) often are unclear about how to assist communities to implement or monitor IP efforts. One community discussed the enthusiasm its regional overseer had for an Integrated Plan, but when the development plan was submitted, there was no clear path forward. In essence, the regulatory authority "did not know what to do with the plan."

Panel Recommendation #6

The Environmental Protection Agency (EPA) should develop additional guidance that articulates expectations for implementation and maps out the "how" for both the communities as well as the front-line regulators. This guidance could include a centralized repository of lessons learned and technical assistance that municipalities could access in order to inform their own integrated planning implementation strategies. Making information that the five technical assistance recipients acquired available to all interested communities expands the value of that assistance and further demonstrates the value of EPA's investment. EPA should use both the recently developed Water Finance Clearinghouse and possibly a new website/portal to share this information. Similar to the Clearinghouse, any new site should allow approved contributors to submit information. Some key areas in which to provide information should include:

1. Case studies (both technical assistance recipients and other successful Integrated Planning efforts);
2. Information on availability of grants, loans, and technical assistance, as well as a community's local in-kind or cash match contribution to water-related projects (this information is currently in EPA's Water Finance Clearinghouse and may be linked to in a new site);
3. Links to other organization's resources for focused and specific Integrated Planning implementation guidance; and
4. The ability for communities to interact and share information with one another.

EPA will need to direct financial resources to support the Water Finance Clearinghouse and the development of any new information portal. Support for human capital to manage and monitor the information and participant engagement is important as well.

A key obstacle to pursuing and implementing IP has been the conflict with coordinating regulations. The Water Environment Research Foundation (WERF) conducted a Survey of Community Insights on Integrated Planning (December 2016 WERF Survey) and the most common obstacle encountered by those respondents who have previously or are currently pursuing IP was regulatory issues.[77] While the IP approach is an "analytical and data-informed process" that allows municipalities to sequence stormwater and wastewater projects in a way that prioritizes the most significant human health and environmental needs first, the 2016 WERF

[77] Rexhausen, Jeff, *Slideshow: 2016 Survey on Community Insights on Integrated Planning*, Economics Center of University of Cincinnati, Water Environment Research Foundation, December 2016.

Survey respondents listed "concerns of additional obligations" as a barrier to integration, suggesting that there are opportunities to improve the coordination of regulatory requirements.

Currently, a common concern that has been articulated by multiple interviewees is that although there is support for the concept of Integrated Planning, inconsistent flexibility has been provided to allow for reprioritizing activities in order to sequence activities that will result in the biggest environmental impact. The 2016 WERF Survey also found that over 85% of respondents felt that regulators were unwilling to balance CWA requirements with other environmental issues.[78] While it is mentioned in the 2012 IP Framework that "sufficient flexibility should be provided in enforcement orders to allow for adaptive management approaches" there is no other reference to the need for flexibility in addressing integrated needs of the CWA and other human health efforts. While EPA has approved modifications to existing consent decrees to incorporate IP, stakeholders have reported diverse perceptions of willingness by all parties involved (e.g., the Department of Justice, the state) to make the modification.

Panel Recommendation #7

The Environmental Protection Agency (EPA) should establish guidelines for developing flexibilities that allow compliance with Clean Water Act and Safe Drinking Water Act requirements within a timeframe that correlates with well-defined prioritization of community objectives, statutory and regulatory requirements, and integrated planning activities.

1. Much like the Ombudsman concept reflected in proposed Senate Bill 692 – Water Infrastructure Flexibility Act, this liaison between Headquarters and Regional EPA offices, states, and municipalities would provide a mechanism for aligning Water Quality Standards with the concerns and priorities of the local residents to optimize the value of each dollar of investment. This resource would also provide additional guidance to state and regional environmental oversight in order to ensure consistent application of flexibilities.
2. EPA will need to provide a consolidated review of the proposed Integrated Plan for consideration, which includes those impacted components.
3. An additional consideration is to use the Supplemental Environmental Projects policy, which currently provides accommodations for Integrated Planning activities in enforcement actions.

IP is a programmatic approach to reducing burden, focusing the efforts on the outcomes, and creating an opportunity for communities to design those outcomes for themselves. The IP

[78] Ibid.

approach does not remove the obligation to comply with the CWA, nor does it reduce regulatory or permitting standards. Under the integrated planning approach, the outcome is always the same (compliance with the CWA). The integrated planning approach does not remove the obligation to comply with the CWA, nor does it reduce regulatory or permitting standards. Rather, the integrated planning approach allows municipalities to identify efficacies and maximize resources by looking at their stormwater and wastewater obligations under the CWA holistically. It also shifts some of the responsibility and accountability on the performers – those who are making the implementation decisions as opposed to the regulators. With established priorities and sequenced actions designed to meet regulatory requirements, address infrastructure investments, and achieve high levels of water quality and safety, communities will move toward these goals as rapidly as they can in order to meet the objectives that they have set for themselves. A community's motivation to do this might be to avoid perceived constraints of a consent decree, should the goals not be met within the agreed-upon time frame.

Panel Recommendation #8

An Environmental Protection Agency (EPA) effort to expand Integrated Planning guidelines should require that each Integrated Plan provide established criteria and a formalized agreement between the community and appropriate governmental authorities to guide communities toward compliance and shared responsibility for achieving both compliance and Water Quality Standards.

This Framework would require that each Integrated Plan include a set of requirements outlining responsible parties, deadlines for meeting requirements, and a clear identification of each stakeholder's responsibilities. Each Integrated Plan must be accompanied by a funding plan when submitted to regulators. In addition to the flexibility that Integrated Planning affords, additional incentives may include technical and planning support, and funding.

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Chapter 4: Measuring and Considering Benefits and Costs

In the development and approval of control measures for combined sewer overflows (CSOs) and for other pollution sources considered together in an integrated process, the proponents of a control plan and the regulators reviewing it will take account of benefits and costs at several points in the process. Such consideration is called for both by regulatory requirements and policies and by governmental decision-making practices of plan proponents. These stages will be briefly described in section 4.1, in order to illustrate the nature and importance of such benefit and cost considerations.

Following that review, section 4.2 will identify several general principles and practices that may be applicable and useful in measuring and presenting benefits and costs for such decisions. This discussion will ascertain such practices and principles by reviewing applicable guidance from federal agencies, as well as by reviewing several selected studies of the benefits and costs associated with major federal environmental regulations.

Finally, section 4.3 will discuss how the increasing flexibility and complexity of applicable EPA policy makes greater demands on the effort and resources both of the proponents of control plans and integrated plans and of the front-line regulators who must review and evaluate those proposed plans.

4.1 The Role of Benefits and Costs in making decisions under the Community Affordability Guidance and the Integrated Planning (IP) Process

EPA's guidance on community affordability and on integrated planning describes ways in which benefits and costs should be assessed and taken into account at three stages in the process: in selecting CSO control measures, in establishing an implementation schedule for such measures, and in selecting and prioritizing control initiatives to be part of an integrated plan. In addition, when governmental entities build or back major infrastructure projects to control water pollution, they must generally consider benefits and costs, particularly those involving environmental impacts of the project, under federal, state, or local environmental policy statutes.

4.1.1 Selecting CSO controls

When municipalities propose measures to control CSOs, states EPA's guidance, one consideration should be an evaluation of costs and performance.[79] The evaluation should generally identify the point of diminishing returns, which EPA refers to as the "knee of the

[79] U.S. Environmental Protection Agency, Office of Water, *Combined Sewer Overflows: Guidance for Long-Term Control Plan*, EPA-832-B-95-002, September 1995, at pages 3-31 to 3-42, 3-49 to 3-79, https://www3.epa.gov/npdes/pubs/owm0272.pdf. See also, EPA, "Combined Sewer Overflow (CSO) Control Policy: Notice," 59 Fed. Reg. 18688, 18693 (April 19, 1994), section II.C.5.

curve." EPA's guidance also says that, under some circumstances, the evaluation would include more formal benefit-cost analysis with dollar values assigned to environmental impacts.

EPA also encourages municipalities to use green infrastructure as part of the control plan and EPA advises that, in this context, a benefit-cost analysis, rather than just an analysis of cost, may be particularly useful because green infrastructure may yield a variety of environmental, public-health, and social benefits at relatively low cost.[80]

4.1.2 Establishing an Implementation Schedule

As discussed earlier, municipalities that are obligated to control CSOs, but that have limited financial capability, may seek approval of a phased or extended implementation schedule. In such situations, EPA's guidance explains, the schedule is established through a negotiation process involving the permittee and EPA and state NPDES authorities, and the negotiation will involve several kinds of costs and benefits that may result from the choice between expeditious versus phased or extended implementation.[81] Generally, according to this guidance from EPA, the base-line time period for the implementation schedule would be defined by "the time required for normal engineering and construction practices."[82] Since implementation in a more expedited manner than the "normal" practices would generally be expected to sharply raise implementation costs, an initial cost-related consideration would be to ascertain the length of time required to complete the work using normal engineering and construction practices.

Starting with this baseline, however, EPA's guidance explained that "environmental and financial considerations can influence the time allowed to complete the CSO controls." To extend implementation timing beyond the baseline, "schedules can lengthen by phasing construction of the CSO controls when financial considerations create a financial burden. The primary financial consideration which usually results in an extended implementation schedule with passed construction is the financial capability consideration." Thus, the costs of expeditious implementation of the project, and the reduced costs expected to result from a phased or extended implementation schedule), would generally be measured in terms of the community's financial capability, as discussed in detail earlier.

On the other side of the negotiation are the environmental benefits of expeditious implementation. As EPA stated in its February 1997 FCA Guidance, "The implementation schedule would always give high priority to addressing the environmental considerations involving discharges to sensitive areas and use-impaired water bodies. The CSO controls for

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[80] U.S. Environmental Protection Agency, Green Infrastructure, *Green Infrastructure Cost-Benefit Resources*, https://www.epa.gov/green-infrastructure/green-infrastructure-cost-benefit-resources.

[81] U.S. Environmental Protection Agency, Office of Water, Office of Wastewater Management, *Combined Sewer Overflows–Guidance for Financial Capability Assessment and Schedule Development*, EPA-832-B-97-004, February 1997 (1997 FCA Guidance), https://www3.epa.gov/npdes/pubs/csofc.pdf.

[82] Ibid., 48.

these discharges would be constructed as expeditiously as possible."[83] (According to EPA, sensitive areas are identified by the NPDES permitting authorities and include locales with swimming or other primary-contact recreation, shellfish beds, drinking water supplies, and waters with threatened and endangered species and their habitats.[84] Areas are considered use-impaired if water quality standards are not being met resulting in recurring adverse impacts on aquatic life, human health, or aesthetics.[85]) In other words, EPA established a rule-of-thumb that the benefits of expeditious implementation are particularly compelling in cases of discharge to sensitive areas or to use-impaired water bodies, and such situations support requiring compliance as expeditiously as possible.

4.1.3 Integrated Planning

As discussed previously, EPA recommends that municipalities consider addressing the Clean Water Act requirements in a region through a single integrated plan. EPA has issued this guidance in the form of a memorandum issued October 27, 2011;[86] a Framework dated May 2012 and circulated June 5, 2012;[87] and a set of Frequently Asked Questions (FAQs) dated July 15, 2013.[88] This guidance instructs that benefits and costs be considered that are similar to, but more varied than, those specified in the earlier guidance on establishing CSO implementation schedules.

As for the relative costs of expeditious implementation of various components of an integrated plan, the Framework and FAQs advise that the plan should include a financial strategy and capability assessment for each entity participating in a plan, and that the 1997 FCA Guidance and other relevant EPA and state tools be used as guides; but the 2012 IP Framework further advises that a plan should "[m]aximize the effectiveness of funds through analysis of alternatives and the selection and sequencing of actions." The 2012 IP Framework also calls for the

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[83] Ibid., 43.

[84] Ibid., 44; U.S. Environmental Protection Agency, Watershed Academy Web, *Introduction to the Clean Water Act*, p. 50, https://cfpub.epa.gov/watertrain/pdf/modules/introtocwa.pdf.

[85] EPA's 1997 guidance on financial capability and schedule development, above, at pages 44-45; U.S. Environmental Protection Agency, *Water Quality Standards: Regulations and Resources, Supplemental Module: Listing Impaired Waters and Developing TMDLs*, https://www.epa.gov/wqs-tech/supplemental-module-listing-impaired-waters-and-developing-tmdls.

[86] U.S. Environmental Protection Agency, Office of Water and Office of Enforcement and Compliance Assistance, *Achieving Water Quality Through Integrated Municipal Stormwater and Wastewater Plans*, Memorandum, October 27, 2011, https://www.epa.gov/sites/production/files/2015-10/documents/memointegratedmunicipalplans_0.pdf.

[87] U.S. Environmental Protection Agency, Office of Water and Office of Enforcement and Compliance Assistance, *Integrated Municipal Stormwater and Wastewater Planning Approach Framework*, Memorandum, June 5, 2012, distributing U.S. Environmental Protection Agency, *Integrated Municipal Stormwater and Wastewater Planning Approach Framework*, May 2012, https://www.epa.gov/sites/production/files/2015-10/documents/integrated_planning_framework.pdf.

[88] U.S. Environmental Protection Agency, *Integrated Municipal Stormwater and Wastewater Planning: Frequently Asked Questions*, July 15, 2013, https://www.epa.gov/sites/production/files/2015-10/documents/sw_integratedmunicipal_planning_faq.pdf.

consideration of "disproportionate burdens on portions of the community," the risk of which would seem to increase in plans that encompass broader geographical areas covering several regulated entities and several pollution sources. The FAQs also specify that, in comparing alternative control measures, total life-cycle costs, not just construction costs, should be considered.

As for the benefits of expeditious implementation of various plan components, the integrated-planning guidance documents advise that the 1997 FCA Guidance remains relevant, thereby reiterating the importance of the two high-priority situations (i.e., discharge to sensitive areas and discharge to use-impaired water bodies). But the documents also call for the consideration of the range of environmental and public-health benefits. The Integrated Planning Framework advises that, in selecting alternatives and proposing implementation schedules, the integrated plan should address "projected pollution reductions, benefits to receiving waters and other environmental and public health benefits associated with each alternative."

The FAQs also advise that a plan may incorporate investments needed to implement final and anticipated TMDLs, in order to facilitate appropriate investment. Moreover, the 2012 IP Framework mentions that, in enforcement actions, an integrated plan might include measures that support EPA's mission, even if not otherwise mandatory – such as children's health, environmental justice, innovative technology, and a number of other priorities – that may be taken into account by the regulator in exercising enforcement discretion.[89]

4.1.4 Governmental Projects Impacting the Environment

Development and approval of major pollution-control projects, like other major governmental projects, must generally include consideration of benefits and costs and sometimes must include a rigorous analysis of the benefits and costs of the proposal and of alternatives. In the case of governmental actions or projects that significantly affect the environment, a focused analysis of the environmental impacts may be required under the federal National Environmental Policy Act (NEPA), under similar state or local environmental policy statutes, or both.

Many CSO and other Clean Water Act control measures that have federal funding or loan guarantees or that require new-source NPDES permits or require other federal approvals would be considered federal actions under NEPA.[90] In addition, a substantial number of state and local

[89] At the end of the Framework, EPA cites the agency's Supplemental Environmental Projects Policy, the latest version of which was issued attached to a memorandum dated March 10, 2015. https://www.epa.gov/sites/production/files/2015-04/documents/sepupdatedpolicy15.pdf.

[90] See, e.g., Environmental assessment for the DC's Clean Water Project: https://www.dcwater.com/sites/default/files/ART_EA.pdf. See, generally, JT Maughan, *Environmental Impact Analysis: Process and Methods*. CRC Press, the Taylor & Francis Group, LLC. 2014. P. 244-245 (available at Google Books, https://books.google.com).

jurisdictions have similar state or local environmental policy statutes that may apply to measures to control CSOs or otherwise to meet CWA requirements.[91]

The regulations of the Council on Environmental Quality (CEQ) implementing NEPA specify that a wide range of environmental consequences must be considered in an Environmental Impact Statement (EIS) for both the proposed action and alternatives, including both direct and indirect effects of the project and including impacts on energy use, depletable resources and conservation, urban quality, and historic and cultural resources.[92] To determine whether a proposed project would have a substantial impact on the environment, an environmental assessment should likewise address a wide range of possible kinds of consequences, to ascertain whether any of them would be significant.

The proposal and alternatives, including measures to mitigate any impacts, must be considered in sufficient detail that "reviewers may evaluate their comparative merits."[93] The requirements under state or local environmental policy laws may vary; for example, the California Environmental Quality program requires the agency to show that each environmental effect has been mitigated, if feasible; and, if any significant effects remain, the agency must explain why the benefits of the project "outweigh" the remaining significant effects.[94]

The CEQ regulations caution against undue reliance on monetary costs and benefits, including estimations of the monetary value of costs and benefits that are not ordinarily expressed in monetary terms. In an EIS, "the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations."[95] Indeed, when a cost-benefit analysis is prepared, which would emphasize monetized or otherwise quantified values, then the EIS must "discuss the relationship between that analysis and any analyses of unquantified environmental impacts, values and amenities." Furthermore, the EIS "should at least indicate those considerations, including those not related to environmental quality, which are likely to be relevant and important to a decision."[96]

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[91] CEQ, "State and Local Jurisdictions with NEPA-like Environmental Planning Requirements," https://ceq.doe.gov/laws-regulations/states.html; CEQ, *Nepa and CEQA: Integrating Federal and State Environmental Reviews* (February 2014), https://ceq.doe.gov/docs/ceq-publications/NEPA_CEQA_Handbook_Feb2014.pdf. See, e.g., Seattle final EIS under state SEPA: https://books.google.com/books?id=bfA0AQAAMAAJ&pg=PA38&lpg=PA38&dq=costs+benefits+cso&source=bl&ots=o4FOeujB1c&sig=tV-7zi3mSAjkx86c1Kadfb_EVPI&hl=en&sa=X&ved=0ahUKEwj2hZiSu-7UAhXFFz4KHR_RABoQ6AEIYDAI#v=onepage&q=costs%20benefits%20 cso&f=false.

[92] 40 CFR §1502.16.

[93] 40 CFR §1502.14(b).

[94] California Code of Regulations, title 14, §§15093, 15126.

[95] 40 C.F.R. §1502.23.

[96] Ibid.

4.2 Applicable principles and practices for estimating and considering benefits and costs

The provision in the Senate Appropriations Committee's report that mandated this study included an instruction for the Academy to, among other things –

> [R]eview existing studies of the costs and benefits associated with major regulations under such laws as the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, the Comprehensive Environmental Response, Compensation, and Liability Act, and the Resource Conservation and Recovery Act . . . .[97]

Accordingly, the Panel has reviewed several such studies of the benefits and costs of major regulations under these statutes,[98] as well as government-wide guidance on how federal agencies should conduct such studies. (The term "major regulation" was not defined in the committee's report and does not have a commonly understood definition, but OMB uses the term "major rule" to refer to proposed or final rules that have an impact of $100 million or more annually or meet certain other thresholds triggering a more rigorous analysis of the regulatory impacts.[99])

From the review of these studies and this guidance material, as well as academic articles and other expert opinions on the subject, the Panel has identified several general principles and practices that may warrant consideration as being particularly applicable and useful for the

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[97] Senate Report No. 114-70, June 23, 2015 (page 54).

[98] The Panel reviewed studies associated with major regulations under the following environmental statutes:

- Under the Clean Air Act (CAA): EPA, Office of Air Quality Planning and Standards, "Regulatory Impact Analysis: Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units," February 2011, https://www.regulations.gov/document?D=EPA-HQ-OAR-2003-0119-2493; associated with rule at 76 *Fed.Reg.*15704 (March 21, 2011).
- Under the Clean Water Act (CWA): EPA, Office of Water, "Benefit and Cost Analysis for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category," EPA-821-R-15-005 September 2015, https://www.epa.gov/sites/production/files/2015-10/documents/steam-electric_benefit-cost-analysis_09-29-2015.pdf, associated with rule at 80 *Fed.Reg.* 67838 (Nov. 3, 2015).
- Under the Safe Drinking Water Act (SDWA): EPA, Office of Water, "Economic and Supporting Analyses: Short-Term Regulatory Changes to the Lead and Copper Rule," EPA-815-R0-7022, September 2007, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100150Y.txt, associated with rule at 72 *Fed.Reg.* 57782 (Oct. 10, 2007).
- Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): EPA does not promulgate major regulations to implement CERCLA.
- Under the Resource Conservation and Recovery Act (RCRA): Prepared for EPA, Office of Underground Storage Tanks, "Assessment of the Potential Costs, Benefits, And Other Impacts Of The Final Revisions To EPA's Underground Storage Tank Regulations," April 2015, https://www.epa.gov/sites/production/files/2015-07/documents/regs2015-ria.pdf, associated with rule at 80 *Fed.Reg.* 41566 (July 15, 2015).

[99] OMB uses this definition of "major rule" in its annual "Report to Congress on the Benefits and Costs of Federal Regulations and Agency Compliance with the Unfunded Mandates Reform Act." See, *e.g.*, the 2016 draft report, at page 1, https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/legislative_reports/draft_2016_cost_benefit_report_12_14_2016_2.pdf. The term "major rule" is also defined in the Congressional Review Act, 5 U.S.C. § 804(2), and OMB's definition encompasses rules that meet that statutory definition.

estimation and consideration of benefits and costs of proposed controls within the Community Affordability Framework and the IP Process. These key principles will be described in the following discussion.

4.2.1 Principle of Proportionality

Designing a study of benefits and costs, gathering the data, and then analyzing and presenting the results all require time and resources; and the amount of time and resources should not be out of proportion to the expected benefit of the additional information. For the development of federal regulations, national law and policy establish two-tier systems that require agencies to commit far greater amounts of time and resources above certain thresholds of regulatory importance. Major rules, which, as noted above, are generally defined as having an annual impact of $100 million or more, generally may be proposed or finalized only after the agency has prepared and issued rigorous assessments of regulatory impacts, including benefits and costs.[100]

Agencies issuing regulations that do not meet the threshold still must assess and consider the benefits and costs, but the assessments need not be so rigorous. Likewise, as discussed above, NEPA and some similar state and local environmental policy statutes also establish two-tiered systems, under which governmental actions or projects that have a significant environmental effect must be supported by detailed analysis of the effects, and efforts to mitigate the effects, for the proposal and reasonable alternatives.

A general "principle of proportionality," which is far more nuanced than the two-tier distinction between major rules and non-major rules, has been applied for the assessment of benefits and costs of proposed regulations and other governmental actions. To help federal agencies meet a variety of analytic requirements for their proposed and final rules, OMB has issued a body of "best practices," including the general principle that –

> the amount of analysis (whether scientific, statistical, or economic) that a particular issue requires depends on the need for more thorough analysis because of the importance and complexity of the issue, the need for expedition, the nature of the statutory language and the extent of statutory discretion, and the sensitivity of the net benefits to the choice of regulatory alternatives.[101]

EPA restated this general principle of proportionality in a comprehensive set of guidelines for preparing economic analyses generally, and EPA recommended adherence to this principle "in

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[100] Similar $100-million-dollar per year thresholds are established under Executive Order 12866, "Regulatory Planning and Review," September 30, 1993, published at 58 Federal Register 51735 (October 4, 1993); the Unfunded Mandates Reform Act, 2 U.S.C. §1532; and Subtitle E of the Small Business Regulatory Enforcement Fairness Act of 1996, 5 USC §804(2).

[101] Office of Management and Budget, *Economic Analysis of Federal Regulations Under Executive Order No. 12866*, Memorandum for members of the Regulatory Working Group, January 11, 1996, https://www.whitehouse.gov/omb/memoranda_rwgmemo.

all cases."[102] In academic writing, this principle has also been expressed in the most general terms, that the expenditure of effort and resources should reflect the expected value of the information to be garnered, taking account of such factors as the size of the initiative under consideration, the extent to which information might affect outcomes, and the context and relevance of the affected outcomes.[103]

4.2.2 Sufficiency of Cost Effectiveness

For selecting a control measure for a single CSO, consideration of cost effectiveness should generally be sufficient, without additional evaluation of the benefits. Determining the "knee of the curve," as mentioned above, is a relatively straight-forward form of cost effectiveness analysis, for which EPA has provided detailed guidance because this method is often well-suited to selecting CSO controls.[104] For a site where storage technology has been selected for CSO control, the cost will generally increase relatively uniformly as size increases, until limits on space or other constraints impose an upper limit on maximum size. EPA's guidance promoting this straight-forward analytic approach of "knee of the curve" applies an accepted engineering strategy for getting the "best bang for the buck."[105]

The policy decision to control CSOs has been established by Congress in the Clean Water Act and EPA in its implementing regulations; and, under general principles of benefit and cost analysis, an assessment of cost effectiveness should usually be sufficient when all that's left is to determine an efficient means of meeting a pre-determined goal.[106] In its 2003 guidance to federal agencies on assessing the costs and benefits of proposed major regulations, OMB likewise identified cost effectiveness analysis as a methodology "designed to compare a set of regulatory actions with the same primary outcome."[107]

OMB's policy also calls upon agencies to conduct a cost-benefit analysis for major rules, in addition to a cost effectiveness analysis, whenever possible. But that approach, which OMB makes applicable to major regulations, does not seem appropriate for site-specific decisions regarding control measures for CWA requirements and integrated planning. A major rule with a

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[102] U.S. Environmental Protection Agency, Office of Policy, National Center for Environmental Economics, *Guidelines for Preparing Economic Analyses*, December 17, 2010, updated May 2014, p. 1-2 to 1-3, https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses.

[103] Richard O. Zerbe, Jr., et al. *Toward Principles and Standards in the Use of benefit-Cost Analysis: A summary of work,* November 10, 2010. https://evans.uw.edu/sites/default/files/public/Final-Principles-and%20Standards-Report.pdf.

[104] U.S. Environmental Protection Agency, *Manual: Combined Sewer Overflow Control*, EPA-625-R-93-007, September 1993, p. 21-22.

[105] H. Eisner, *Systems Engineering: Building Successful Systems*, Morgan & Claypool Publishers, 2011, p. 48-50 (cited pages available at https://books.google.com).

[106] Zerbe, above, at page 35, explained that, in situations where the fundamental the policy choice is already made, cost-effectiveness analysis is generally an appropriate methodology to help decide how that chosen policy should be achieved.

[107] Office of Management and Budget, Circular A-4, *Regulatory Analysis*, September 17, 2003 (part D), https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4.

$100-million annual effect is of a far larger scale than such site-specific projects and, therefore, a far greater analytic effort may generally be justified for the rule than for the project. In addition, a key reason for OMB's requirement that major rules be supported by both a cost-benefit analysis and cost effectiveness analysis is "the larger objective of analytical consistency in estimating benefits and costs across regulations and agencies" and such an effort to achieve consistency across regulations and across agencies is not needed or appropriate for the various decentralized project-decisions needed for individual control measures and integrated control plans.

4.2.3 Additional Analysis of Benefits and Costs Where Appropriate

Though the assessment of benefits and costs needed for the selection of conventional control measures for a CSO situation may be relatively straightforward, a more extensive assessment of benefits and costs may be needed for development of a plan involving a large or complex infrastructure project or the integration of several pollution sources and controls into a single plan. When NEPA or a similar state or local law applies to a proposal, an assessment or analysis of a wide variety of environmental impacts must be developed and presented, often including evaluation of the anticipated impact-reductions from various mitigation options, as well as evaluation of the advantages and disadvantages of reasonable alternatives to the proposed action. For example, DC Water is seeking approval of a complex system of tunnels, diversion sewers, and overflow facilities to address CSO outflows to the Anacostia River and, incidentally, to control persistent street floods and basement sewer backups in the affected part of the city. Because much of the proposed facilities would be on or affecting federal agencies' lands, those agencies and DC Water prepared an extensive environmental assessment describing the environmental impacts of the proposal, including consideration of alternatives to the proposed project and ways to mitigate the adverse impacts.[108] The assessment addresses the effects on water quality, of course, and also on soils, vegetation, wildlife, wetlands, land use, human health and safety, cultural resources, aesthetics, the use and experience of visitors and residents, and National Park Service resources.

For a plan that sets implementation priorities for the control of more than one source, some assessment of benefits is needed. EPA's 1997 FCA Guidance for scheduling the control of CSOs offered a relatively simple rule-of-thumb: because of the relatively large harm to the environment from CSOs that discharge to sensitive water bodies or to use-impaired waters, expeditious implementation of those controls must be the highest priority. For other CSOs, depending on a municipality's financial capability, the municipality may be able to justify a more extended implementation schedule.[109]

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[108] U.S. Department of the Interior, National Park Service, *Environmental Assessment for the District of Columbia Water and Sewer Authority's Anacostia River Projects*, May 12, 2010, https://www.dcwater.com/sites/default/files/ART_EA.pdf.

[109] EPA's 1997 Guidance, note [52] above, p. 57

Especially for integrated planning, municipalities may find it helpful to conduct more sophisticated analysis of the benefits to be gained from various options. EPA's 2012 IP Framework states that, in choosing among alternatives, the plan should consider the "benefits to receiving waters and other environmental and public health benefits associated with each alternative."[110]

For characterizing the benefits from Clean Water Act compliance, a number of methodologies have been developed to attribute a dollar value to achieving improved water quality – such as by estimating consumption costs for water-based recreation as a proxy for the value of a recreational-water resource; by comparing the market value of houses as the measure of the value of neighboring water ecosystems; or by conducting a survey to ask people how much they would be willing to pay for cleaner water. Municipalities can refer to the extensive work that has been done in academia,[111] as well as by EPA,[112] for help in estimating the benefits of various control options under consideration in the development and justification of an integrated plan.

4.2.4 Distributional Effects

Distributional effects may also be important. EPA's May 2012 Integrated Planning Framework specifically provides that the implementation schedules in a plan should address "potential disproportionate burdens on portions of the community." It may often be important for a community to understand the disparate impacts of a plan more broadly – "how both benefits and costs are distributed among populations of particular interest," including, if distributional impacts are important, a description of "the magnitude, likelihood, and severity of impacts on particular groups." Distributional impacts, especially those that disproportionately affect racial or ethnic minorities or economically disadvantaged populations, can implicate values and can have social consequences above and beyond any monetary costs and benefits.

Distributional effects on human health are often assessed separately for children and the elderly, as well as for minorities and disadvantaged populations. Economic effects on employment and on small businesses are also often singled out. (Subsistence fisheries could be a population of particular concern.) Among potential environmental benefits and adverse impacts, the need to protect endangered species often receives particular attention.

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[110] Framework, June 5, 2012.

[111] For example, Chris Moore et al., "Valuing Ecological Improvements in the Chesapeake Bay and the Importance of Ancillary Benefits," *Journal of Benefit-Cost Analysis*, June 15, 2017, https://doi.org/10.1017/bca.2017.9; B. Keeler and others, "Linking Water Quality and Well-Being for Improved Assessment and Valuation of Ecosystem Services," Proceedings of the National Academy of Sciences, vol. 109, page 18619 (Nov. 6, 2012), http://www.pnas.org/cgi/doi/10.1073/pnas.1215991109; M. Wilson and S. Carpenter, "Economic Valuation of Freshwater Ecosystem Services in the United States: 1971 – 1997," *Ecological Applications,* vol. 9, page 772 (1999).

[112] Study for CWA Electric Power Generator rule [see note 102 above]; U.S. Environmental Protection Agency, Office of Policy, *Guidelines for Preparing Economic Analyses*, December 17, 2010, updated May 2014, chap. 7, https://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf.

4.2.5 Ancillary Benefits and Countervailing Risks

Ancillary benefits and countervailing risks may be significant and should be considered. The government-wide policies on preparation of major federal regulations call upon agencies to take account of not only the direct benefits and costs (i.e., the intended benefits and the costs of compliance), but also the ancillary benefits (i.e., favorable impacts other than the intended benefit) and countervailing risks (i.e., adverse consequences other than the costs of compliance). EPA's guidance likewise calls for consideration of ancillary benefits and countervailing risks (though without using those terms.) For example, EPA's guidance on green infrastructure encourages the use of cost-benefit analysis to highlight the variety of environmental, economic, and community benefits.

Likewise, EPA's Integrated Planning Framework provides that a plan, in identifying costs and benefits associated with each alternative, should include not only costs and projected pollution reductions and receiving-water benefits, but also other environmental and public health benefits, as well as any potential disproportionate burdens on portions of the community. Indeed, ancillary benefits can constitute a substantial portion of the beneficial effects of reducing water pollution. For example, states containing part of the Chesapeake Bay Watershed must implement pollution-control plans to protect the Bay, but about half of the measured benefits arise from improvement in freshwater lakes throughout the watershed, which are not the intended purpose of the plans.

Guidance for development of major federal regulations also calls for agencies to estimate the monetary value of ancillary benefits and countervailing risks and to consolidate those amounts in a single estimate of total net benefits. This estimate, along with any other benefits that are not monetized, would then be compared to the costs in the agency's determination whether the benefits justify the costs.

However, to monetize ancillary benefits and countervailing risks, and consolidate them in a single estimate of net benefits may not generally be an appropriate requirement for decisions under EPA's Community Affordability Guidance and the 2012 IP Framework. For example, among the examples of cost-benefit analyses of green infrastructure that EPA presented to assist communities in their decision-making, EPA included one that does not monetize a range of environmental, social, and public health benefits, but that applies a "triple bottom line" approach.

As explained in the study referenced by EPA, a TBL approach reflects the fact that the relevant public institutions are intended to serve values "beyond the traditional financial bottom line," and the analysis therefore provides a "perspective that reflects all three bottom lines: financial, social, and environmental." The consistent cost-benefit approach that OMB policy applies for major federal regulations do not seem appropriate for such site-specific projects, for the reasons expressed above.

4.2.6 Timing of Implementation

The timing of implementation can substantially affect the magnitude of benefits and costs. Agencies' decisions in setting the compliance dates for proposed major federal regulations is frequently a matter of controversy, and OMB's government-wide guidance explains that the selection of such dates can have a very large effect on both the benefits and the costs resulting from the regulation: "Benefits may vary significantly with different compliance dates where a delay in implementation may result in substantial loss in future benefits (e.g., a delay in implementation could result in a significant reduction in spawning stock and jeopardize a fishery). Similarly, the cost of a regulation may vary substantially with different compliance dates for an industry that requires a year or more to plan its production runs."[113] This hypothetical example in the context of major federal regulations is also instructive to the scheduling of Clean Water Act controls. An extended implementation schedule might defer the environmental and public-health benefits of the pollution control, and could, under certain circumstance, result in irreparable harm to a body of water or human health; but, on the other hand, an implementation schedule that allows inadequate lead-time could add substantially to the cost of engineering and construction and of financing, and can conflict with the funding of other, higher-priority needs of the community.

As discussed above, the benefits arising to a community from improved water quality can be very substantial, and can often be measured in monetary terms if the circumstances warrant the investment of analytical resources to conduct the analysis. Accordingly, an extended implementation schedule for discharge controls may result in reduced benefits to the community, which may be measured in terms of time period when during which the community will not reap the benefits of clean water.

Moreover, if discharge of contaminated wastewater causes harm to human health, an extended implementation schedule can result in substantial losses measured in terms of both the monetary and human costs of disease. For example, several studies have shown that discharge of untreated urban runoff onto public beaches, or other sources of pathogen contamination in swimmable waters, are linked to a number of adverse health effects, such as gastrointestinal illness, respiratory illness, and eye and ear ailments.[114] In addition to the harm to businesses and members of the public from curtailed recreational activities, the public health costs can be substantial. For example, a study a few years ago found that illnesses associated with coastal water pollution at two California beaches imposed a public health burden of $3.3 million per

[113] Office of Management and Budget, Circular A-4, *Regulatory Analysis,* September 17, 2003.

[114] Dwight, R.H., D.B. Baker, et al., *Health effects associated with recreational coastal water use: Urban versus rural California*, American Journal of Public Health, vol. 94(4), p. 565-567, 2004, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448299.

year.[115] Sewer backups into homes and neighborhoods are also of special concern due to the risk of illness that can result from human exposure to raw sewerage, in addition to the cost and disruption from the damage to buildings and other facilities.[116]

Even if an extended compliance schedule does not cause harm to public health or irreparable harm to the environment, benefits provided sooner are generally more valuable to people than benefits provided later. This effect can be represented mathematically, by attributing a dollar value to the benefit and then applying a discount rate to calculate a reduction, or it can be described in non-monetary terms. Likewise, even if expeditious funding of control measures is not impracticable, costs incurred earlier are more of a burden that costs incurred later. Especially if costs are spread out over an extended implementation period, and if environmental benefits only occur upon completion, the net effect of the delay will tend to be negative. Moreover, due to demographic change over time, extending an implementation schedule will tend to alter which individuals would bear the cost and enjoy the benefits of the control measures and might affect disparate impacts.

4.2.7 Retrospective Review of Benefit and Cost Assessments

Retrospectively reviewing benefit and cost assessments can be valuable. Assessments of benefits and costs prepared to develop or support a proposed regulation or proposed pollution-control measures are, of course, prepared prospectively, estimating what the benefits and costs will be after future implementation. However, academic writing, expert commentary, and government-wide policy are giving increasing attention to the value of retrospective review – looking back after implementation – of benefits and costs.

Retrospective review of regulations is seen as offering related benefits. A regulation that is not yielding the benefits anticipated or that is costing more than expected may be appropriately considered for revision or repeal. Also, patterns ascertained about discrepancies between the estimates of benefits before, versus after, implementation, may suggest ways that future prospective estimation methods could be improved.

Some have proposed that new regulations should include provisions for generation and collection of data that would facilitate eventual retrospective review of the regulation. Some expert commentary raises concerns about requiring agencies to conduct retrospective review of existing regulations. For example, due to the very tight budgets of regulatory agencies, some argue that the resources for retrospective review would detract from the agencies' ability to address other pressing priorities.

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[115] Dwight, R.H., L.M. Fernandez, et al., *Estimating the economic burden from illnesses associated with recreational coastal water pollution – a case study in Orange County, California*, American Journal of Public Health, vol. 76(2), p. 95-103, 2005, http://www.sccoos.org/docs/ScienceDirect-JofEnv.pdf.

[116] U.S. Environmental Protection Agency, Office of Civil Enforcement, *EPA Enforcement: Preventing Backup of Municipal Sewerage into Basements, Enforcement Alert*, EPA-325-N-06-001, September 2006, https://www.epa.gov/sites/production/files/documents/enfpreventingbackups-basement0609.pdf.

With respect to control plans under the Clean Water Act, EPA's current Integrated Planning Framework requires that integrated plans make provision for retrospective review. Each plan should have processes for evaluating the performance of planned projects, including monitoring the effectiveness of controls and other aspects of the plan, and for developing updates and improvements for the plan. Retrospective review of a plan's performance can provide essential information for effective adaptive management, by enabling the plan to be adjusted iteratively and more information becomes available.[117] These requirements seem appropriate to seek the benefits of retrospective review, though the corresponding demand on the resources of both the communities and the front-line regulators must be acknowledged.

Based on a review of applicable EPA guidance, of existing studies of the costs and benefits associated with several major environmental regulations, of requirements and guidance applicable to federal agencies conducting such studies, and of other academic and expert literature, several general principles can be identified that plan proponents and regulators should consider for the preparation and review of successful Integrated Plans.

Panel Recommendation #9

In estimating and evaluating benefits and costs relevant to the development and consideration of control plans and integrated plans, the following principles should be considered:

1. Analytical effort should be commensurate with the issue's importance.
2. Simple cost effectiveness analysis should suffice for most individual Combined Sewer Overflow control issues.
3. More complex Integrated Plans may benefit from more extensive assessment of benefits and costs.
4. Distribution of benefits and costs among various populations should be considered.
5. Ancillary benefits and countervailing risks are often important and should be considered.
6. The impact of an extended implementation schedule on benefits and on costs, including any effect on how benefits and costs affect various groups differently, should be considered.

[117] Adaptive management is a strategy "that aims to create flexible resource management policies that can be adjusted as project outcomes are better understood and as stakeholder preferences change." National Academies of Sciences, Engineering, and Medicine, *Adaptive Management for Water Resources Project Planning*, 2002, Chapter 1, Report Purpose and Scope, https://www.nap.edu/read/10972/chapter/3#13.

4.3 Increasing Complexity and the Commensurate Need for Greater Technical Resources and Assistance

EPA's early 1994 CSO Control Policy and 1995 Interim Economic Guidance allowed for decisions based on relatively simple and straightforward assessments of benefits and costs. The appropriate control could often be selected through a "knee of the curve" cost effectiveness analysis; a municipality could seek to demonstrate its need for an extended implementation schedule by demonstrating a lack of financial capability; and, on the other side of the negotiation, EPA's 1995 Interim Economic Guidance offered two high environmental priority situations – discharges to a sensitive area or to a use-impaired body of water – that the front-line regulator from EPA's regional office or a state NPDES agency could cite in arguing that expeditious implementation was necessary.

However, as applicable EPA policies become more flexible and sophisticated – for example, with the emphasis on IP– the amount of analytic effort and resources needed to fully take advantage of that flexibility increase. For example, for a municipality to include green infrastructure in its control plan, EPA recommends that the value of such infrastructure can best be presented by an analysis of both the costs and benefits. IP involves comparative assessments of the environmental and other benefits, the direct and indirect costs (such as potentially disproportionate burdens), and the relative affordability concerns for control measures to address more than one violation and potentially involving more than one community. The processes for measuring success and working toward improvements, as required in EPA's 2012 IP Framework for integrated planning, would require ongoing effort and resources.

Indeed, the implementation of the recommendations in this report, while intended to make EPA's policies even more flexible and efficient, may also increase the amount of analytic effort and resources needed by permittees and regulators to take advantage of that flexibility and efficiency. (As later discussed, in Chapter 5, the Panel makes a recommendation that EPA develop standard methods to collect data that can be used to account for benefits and costs of green infrastructure and the distribution of those benefits and costs, and a standard approach to making comparisons between green and gray options.)

Especially in light of the tight budgets faced by many local governments, financial constraints may impose significant limits on the ability of municipalities to take advantage of the flexibilities offered. The situation faced by front-line regulators in EPA's regional offices and in state NPDES agencies is also particularly problematic, because they also face severe budgetary constraints, but cannot control the timing and amount of analytic material presented to them by permittees for review and approval.

EPA has taken certain steps to make information available to help permittees and front-line regulators manage the preparation and review of benefit and cost assessments. For example, to help communities identify useful analytic methodologies, EPA has published on its website

samplings of cost analyses and cost-benefit analyses used by communities in support of their use of green infrastructure.[118] EPA has also partnered with the International City/County Management Association to establish a "one stop shop" for local governments called the Local Government Environmental Assistance Network (LGEAN). The LGEAN website references resources in a range of environmental subject areas including wastewater, stormwater, and drinking water; and, for each of these areas, the LGEAN website includes cross references to various state, local, and non-governmental organizations.[119] Stakeholder organizations such as these,[120] as well as educational, research, and policy institutes,[121] can also collect, develop, and share information resources to facilitate use and review of the available flexibilities. Making information and other support in this area available for both permittees and front-line regulators would be important to help put into practice the flexibilities and efficiencies offered by EPA's policy.

As the applicable EPA policies become more flexible and sophisticated, and as the proponents of control plans and front-line regulators need to deploy more analytic effort and resources to take advantage of that greater flexibility, the need for technical information and assistance from EPA headquarters and others will continue to grow.

Panel Recommendation #10

The Environmental Protection Agency (EPA) should build on its existing efforts to make informational resources and other support and assistance available that would help both plan proponents and front-line regulators develop, review, and, eventually, agree on the assessments of costs and benefits needed to establish long-term control plans and integrated plans making best use of the flexibilities and opportunities offered under EPA's policies.

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[118] U.S. Environmental Protection Agency, Green Infrastructure, *Green Infrastructure Cost-Benefit Resources*, https://www.epa.gov/green-infrastructure/green-infrastructure-cost-benefit-resources.

[119] Local Government Environmental Assistance Network, About LGEAN, http://www.lgean.org/index.cfm.

[120] See, e.g., resource organizations referenced by LGEAN in the areas of wastewater, stormwater, and drinking water (http://www.lgean.org/water/wastewater.htm#orgs, http://www.lgean.org/water/stormwater.htm#orgs, http://www.lgean.org/water/drinking.htm#orgs).

[121] See, e.g., the Center for State, Local, and Regional Environmental Programs of the Environmental Law Institute, https://www.eli.org/center-state-local-and-regional-environmental-programs; the program on "Developing Resilient Urban Water Systems" at the Wheeler Water Institute of Berkeley Law School, https://www.law.berkeley.edu/research/clee/research/wheeler/developing-resilient-urban-water-systems/; the project on "Smart Grid Water Technology" at the Nicholas Institute for Environmental Policy Solutions of Duke University, https://nicholasinstitute.duke.edu/focal-areas/smart-water-grid-technology; the Hydroinformatics Research Group at Oregon State University, http://research.engr.oregonstate.edu/hydroinformatics/current-projects.

Chapter 5: Other Innovative Solutions and Smart Practices

Costs of regulatory compliance and deferred maintenance, as well as the need to replace and upgrade aging water infrastructure, are driving the development of innovative solutions and adoption of smart management practices that can lower costs. This situation provides an opportunity to consider the next generation of water infrastructure along with new approaches that might equitably deliver clean and affordable water, while also delivering social, economic, and other environmental or Triple Bottom Line (TBL) co-benefits.

However, the adoption of new and innovative practices can also present significant financial and public health risks.[122] Although EPA's authority is limited to enforcement of the Clean Water Act (CWA), EPA, along with other government agencies at all levels, can play important enabling roles in addressing these challenges. Innovative practices can, in turn, help to reconcile the tension between often competing CWA goals of providing both clean and affordable water.

Technical approaches or paradigms for managing stormwater and wastewater have progressed as existing technologies were found to be no longer adequate, and then, in response to their unintended consequences and new policies. These polices (such as the CWA) often reflect changes in social values. Wastewater and stormwater management has evolved from moving the water offsite via ditches and pipes, (combined and untreated to rivers and streams) toward moving sewage to treatment plants, and the development of separate pipes that route stormwater to streams. However, raw sewage continues to reach rivers in overflow events from the older combined sewers. Stormwater, which remains a growing source of pollution, is beginning to be reduced by managing it at the source, using onsite innovative stormwater management practices, commonly referred to as "green infrastructure", that leverage the functionality or "services" provided by ecosystems - to filter and regulate the flow of water, along with more integrated watershed management approaches.[123] Use of smart technologies also reduces overflow events by optimizing the use of storage capacity in existing gray infrastructure systems and can enable proactive maintenance through early detection of leaks. However, legacy systems remain and existing approaches to managing storm and wastewater stitch together all of the above approaches.

Finance mechanisms are also moving toward greater emphasis on providing performance-based incentives for pollution reduction and the development of new business models that reduce the cost of innovation. Notable examples of these are Community-Based Public-Private Partnerships

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[122] Hawkins, G., *How to Drive Innovation in Water. Or, it's the 3Ps, not P3!,* 2017, www.georgehawkins.net/moonshot.

[123] Reese, A., *Stormwater Paradigms: An expert takes an irreverent look at how our ideas about stormwater have changed,* 2001, http://foresternetwork.com/daily/water/stormwater-management/stormwater-paradigms/; Reese, A., *Ten Emerging Stormwater Best Practices,* Stormwater vol. 17(5), July 2016, http://foresternetwork.com/stormwater-magazine/sw-water/sw-stormwater/ten-emerging-stormwater-management-best-practices/.

(CBP3s), a modification of the Public-Private Partnership (P3) approach that is intended to leverage operational efficiencies of the private sector in meeting regulatory requirements in ways that support economic development, improve the quality of life in local communities, and drive innovation. Although definitions of traditional P3s vary widely, a key distinction of a P3 is that it can bundle construction, operation, and maintenance, thereby providing the contractor with an incentive to consider and minimize lifecycle costs.[124] While in theory a common sense approach, in practice it has been a challenge to align interests and incentives among all partners and manage the process so as to assure that the right projects are selected for the right purpose.[125]

One utility is beginning to recover investments in innovation through a new business model that enables it to share new practices with other utilities, thereby reducing costs of innovation that would otherwise be prohibitive for smaller utilities. Among new practices used to recover costs of providing clean water is the use of resource recovery technologies to generate energy. But, these new approaches do not eliminate the need for new investments, and exist side-by-side with existing rate structures. These place low-income populations at an increasing disadvantage as the cost of service rises and becomes less affordable for greater numbers of water users who face shut-offs.

The types of approaches considered in this chapter include technological innovations, trading, incentive programs, asset management, new business models, and finance mechanisms. Given rising costs and constraints on rate-payers, the chapter also considers experiences in providing low-income assistance. The discussion draws on case studies (included in full in Appendix F) that illustrate particular challenges and various types of creative and innovative solutions that have worked for particular communities. Many of these cases also reflect various forms of institutional innovation through the adoption of smart practices which are consistent with generally-accepted planning principles and which are not necessarily new but that have faced a variety of barriers to adoption.

5.1 Technological Innovation

5.1.1 Green Stormwater Infrastructure

Innovative stormwater management practices, commonly known as "Green Stormwater Infrastructure" (GSI), represents a paradigm shift from moving stormwater away from the built environment via ditches and pipes, to controlling it at the source, where it can instead provide a variety of benefits. In addition to providing clean water, GSI can reduce urban heat island effects and air pollution, recharge groundwater, provide recreational and aesthetic benefits, increase

[124] Engel, E., Fischer R., and Galetovic A., *Public-Private Partnerships to Revamp U.S. Infrastructure*, 2011. Discussion Paper 2011-02, The Hamilton Project, The Brookings Institution.
[125] Chase, B., *Public Private Partnerships in the United States: Evolving Market and New Opportunities*, 2011. Working Paper #53 Collaboratory for Research on Global Projects, Stanford CA.

property values, and drive economic development. In other words, these practices may be designed to also provide a TBL return on investment.

In urban areas, at the scale of individual lots, GSI involves the use of practices that mimic or take advantage of natural systems by enabling water to either infiltrate the soil, be intercepted by vegetation prior to reaching the ground – from which it evaporates— or be captured and released slowly from various types of natural or built retention structures that regulate flow. At a somewhat larger scale, these practices may also include restoration of floodplains and wetlands for their ability to store floodwater. At a landscape scale, it may also include protection of strategically selected natural areas where anticipated development could lead to increases in stormwater runoff, flooding, and other impacts, as well as to higher costs of providing water infrastructure and treatment, and that may help to meet other objectives such as protection of endangered species, and recreational and aesthetic values. This is consistent with a broader definition of green infrastructure, not limited to stormwater management, as: "a strategically planned and managed network of wilderness, parks, greenways, conservation easements, and working lands with conservation value that supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for America's communities and people."[126]

In developed urban areas, use of GSI practices tends to be driven by the cost of compliance with water quality standards and/or in response to basement sewage backups and repetitive flooding. When used as a complement to the more conventional or "gray" infrastructure it reduces the volume of stormwater entering Combined Sewer Systems (CSSs), and in at least some cases, has enabled the use of smaller pipes in Combined Sewer Overflow (CSO) Long Term Control Plans (LTCP), thereby reducing capital costs. Examples include: Portland OR, Philadelphia, Syracuse, and Cincinnati. In Washington DC, it did not actually reduce total costs but enabled the city to negotiate a five-year extension of the compliance schedule and lower rate increases. Given that green infrastructure consists of smaller projects that can be completed more quickly than deep underground tunnels, it also begins to provide more immediate benefits that increase incrementally, as the projects are built.[127] In Separate Storm Sewer System (MS4) areas, green infrastructure reduces the erosion of streams and helps to maintain water quality.

Challenges

Green infrastructure practices are diverse, and there are a number of challenges associated with their adoption. Therefore, a key consideration is in the selection of practices that are appropriate

[126] Benedict, Mark A., and Edward T. McMahon, *Green Infrastructure: Linking Landscapes and Communities*, 2006 2nd edition, Washington, DC: Island Press.

[127] DC Water 2015, Clean Rivers Project *https://www.dcwater.com/clean-rivers-project*; and Long-Term Control Plan Modification for Green Infrastructure. Executive Summary. https://www.dcwater.com/sites/default/files/green-infrastructure-exec-summary.pdf

in a particular place. Special challenges associated with green infrastructure, which are addressed in the chapter recommendations, are as follows.

Demonstrating benefits:

There is a lack of standard practices for evaluating and comparing gray and green infrastructure and for quantifying their co-benefits, particularly the role of GSI in stimulating long-term economic development. Utilities may find it difficult to justify the use of water-related revenue to quantify benefits and monitor outcomes that are beyond the scope of their management objectives, and cannot invest in green infrastructure in places where it is not a priority for stormwater management. However, as illustrated in the Portland case study, co-benefits can make it possible to establish partnerships and to leverage funding from entities that may have an interest in accounting for benefits beyond water quality, and to thereby adopt a more holistic watershed approach. It is also in the interest of local governments to understand and monitor long-term economic development benefits of these activities.

An economic analysis of environmental, social, and economic, or TBL, benefits was significant in making the case for Philadelphia's ambitious Green City Clean Waters (GCCW) program, but is not granular enough to use to support ongoing project planning and siting decisions. A more granular approach is used by the city of Portland where the use of cost-benefit analysis to compare green and gray options has become standard practice in evaluating public infrastructure projects.

The TBL analysis for Philadelphia compared the costs and benefits of capturing runoff from 50% of impervious surfaces using green infrastructure to a 30-foot diameter tunnel option, and estimated a net benefit of $2846.4 million for green infrastructure, compared with $122 million for gray.[128] Expected benefits included employment in green jobs (approximately 250 people/year), increases in recreational opportunities and property values, a reduction of heat-related fatalities that is attributed to shade, reduction of heat-absorbing pavement and rooftops, and water vapor emissions, health benefits of improved air quality, energy savings, and water quality and habitat improvements. The analysis also found a higher willingness-to-pay per household for the additional water quality and habitat improvements that would not be provided by the tunnel option.[129]

An analysis of the economic benefits of the first five years of the program by the Sustainable Business Network of Greater Philadelphia (SBN) found that the program has in fact delivered

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[128] Stratus Consulting, *Final Report: A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds*, 2009, Prepared for Howard M. Neukrug, Director, Office of Watersheds, City of Philadelphia Water Department, under contract to Camp Dresser and McKee.

[129] Ibid.

many of these benefits.[130] For example, stormwater management regulations for development were found to have helped catalyze a best-in-class GSI industry cluster for which annual growth was estimated at 13.8% from 2013-2014. Estimated economic impacts were almost $60 million, generating nearly $1 million in local tax revenue, and supporting 430 local jobs. The study also found positive impacts on nearby property values – which had an aggregate gain of $1.3 billion, resulting in annual property tax increase of $18 million, significant reductions in violence and criminal activity, improved physical health as a result of increased recreational opportunities, and improvements in social equity. The environmental benefit of green space was estimated at $10.5 million per year as a result of water quality improvement, aquatic habitat enhancement, wetlands enhancement and creation, and air pollutant removal.

In Portland Oregon, in the "Tabor to the River" program, which is addressing sewer system deficiencies and basement sewer backups in a neighborhood served by the combined sewer system, cost-benefit analysis demonstrated that costs could be reduced by $63 million (from $144 to $81 million) by combining green infrastructure with traditional (pipe) solutions.[131] Co-benefits of green infrastructure projects have enabled the Bureau of Environmental Service (BES) to build partnerships and leverage additional sources of funding. For example, in the Foster Floodplain project, BES received a FEMA Pre-Disaster Mitigation grant for disaster avoidance and collaborated with Portland Parks and Recreation to buy out repeatedly flooded properties for floodplain restoration, and make the natural area an amenity for the neighborhood. Since the housing is affordable in this area, and federal flood insurance rates are going up, they are also engaging in a broader collaborative effort with the Portland Housing Bureau, Prosper Portland (the City's economic development office), and other agencies and community groups to take a holistic approach to floodplain-related issues that are impacting the area north of the floodplain. In the short-term, the group is working to stabilize households threatened by the rising cost of flood insurance. The group is also developing a long-term strategy to add floodplain storage that reduces the footprint of the 100-year flood on scarce commercial/industrial land and historic residential neighborhoods.

The Crystal Springs restoration project is another example of the ability to attract other partners because of co-benefits. In this case, the replacement of culverts not only provided better stormwater conveyance but also enabled fish passage. Therefore, additional funding was leveraged from several partners including the USACE and Portland Parks and Recreation, enabling BES to take a holistic watershed approach. They have often done cost shares with Parks and Recreation to provide amenity values.

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[130] Sustainable Business Network of Greater Philadelphia, Green Stormwater Infrastructure Partners, *The Economic Impact of Green City, Clean Waters: The First Five Years*, 2016.

[131] Portland, Oregon, Bureau of Environmental Services, *Tabor to the River Program*, www.portlandoregon.gov/bes/47591 (accessed 6-21-2017).

These co-benefits demonstrate the importance of partnerships and their ability to leverage additional, non-rate funding for activities that protect water quality. In particular, they illustrate the importance of combining stormwater and flood management, and building infrastructure that is resilient to more intense and less predictable storms. An analysis by NRDC suggests that reforms to the National Flood Insurance Program to enable routine buyouts of low value "Severe Repetitive Loss Properties" (SRLPs) to restore floodplains, rather than routine repair and rebuilding of these 30,000 properties, at an estimated cost of $5.5 billion since the program's inception in 1978 through 2015, could be a significant source of funding for managing stormwater and maintaining water quality.[132]

Although cost savings and additional co-benefits have been demonstrated in several cities, at least one jurisdiction found that, when including operations and maintenance, the costs of green infrastructure would be the same as for gray and the Integrated Plan suggests that upfront costs are higher.[133]

Early stakeholder engagement

Early engagement of stakeholders is critical to enable them to understand the purpose of green infrastructure and to enable them to have meaningful input in planning, design, and decision-making. As is illustrated in the Portland case study, this may require a change in the project funding cycle so that funds for community engagement are available well in advance.

The Green Streets Steward program was developed to engage volunteers to help with more regular maintenance of green street facilities and reduce city costs. To date, volunteers have adopted more than 400 green streets throughout the city. In typical capital improvement projects, BES invests 1% of the total budget in public involvement beginning 6 months in advance of a project. For Tabor to the River projects, the bureau directed up to 3% of the capital budget toward public involvement and started outreach efforts 18 months in advance of construction. In this case, they asked for 3% for public involvement and started outreach efforts 18 months in advance of construction. This expanded outreach was critical to project success because of the visibility of the green infrastructure and impacts – such as parking and aesthetics – to the neighborhood. BES plans to apply this early more comprehensive engagement approach in other project areas that integrated green infrastructure and deliver multi-benefit projects.

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[132] Moore, R., *Seeking Higher Ground: How to break the cycle of repeated flooding with climate-smart flood insurance reforms*, 2017, https://www.nrdc.org/experts/rob-moore/seeking-higher-ground-climate-smart-solutions-flooding.

[133] Akron, Ohio, *Integrated Plan,* http://www.akronwaterwaysrenewed.com/documents/integrated-plan.aspx.

Project siting

Project siting challenges vary across public and private property. For example, some specific challenges for siting projects in New York City include: street conditions, subsurface conditions, contaminated soils, utility conflicts, and other construction, either in the public right of way or on adjacent property. Some of these can be overcome through good planning, with improved coordination of activities between different government entities and utilities. One approach to addressing siting challenges is a participatory assessment and planning process developed by the Rutgers Cooperative Extension Service Water Resources Program in which the goal is to identify shovel-ready projects, appropriate to a particular location, that has neighborhood champions, and can attract funding or investment.[134] A key challenge to siting projects on private property is identification of lowest cost opportunities and engaging property owners. This is typically done through various types of incentive programs. The DC Stormwater Retention Credit Trading program also provides opportunities for third party project developers who can achieve economies of scale by engaging large or multiple property owners and aggregating projects which is discussed further in section 5.2.1.

Inflexible and outdated policies and regulations

Adoption of green infrastructure has typically been harder for the early adopters, in part due to lack of experience to build and because of outdated policies and regulations at all levels of government. Many stakeholders also report a lack of flexibility in enforcement procedures where the preference has been for pipes and tunnels, which are believed to provide more certainty than green infrastructure with respect to performance.

Because of the resources and effort required to negotiate consent decrees in the enforcement process, it is also difficult and time-consuming to reopen and modify them if more cost-effective approaches are developed. For example, Washington DC invested $14 million in exploring the potential for green infrastructure, which then enabled them to modify a 2005 consent decree to a hybrid approach that was finally approved in 2015. Success was attributed to being stubborn and persistent (as well the ability to fund the exploration of potential).

Faced with a lawsuit in 1991, Portland OR may have been the earliest to propose and adopt green infrastructure to reduce the costs of CSO control. Although EPA did not initially approve a proposal for smaller interceptor sewer pipes in conjunction with green infrastructure, the Portland BES adopted a proactive experimental approach during the planning process for their National Pollutant Discharge Elimination System (NPDES) permit applications – with emphasis on research, modeling, monitoring, and evaluation of pilot projects to identify more effective ways to manage stormwater using innovative green technologies. By implementing these on public properties they were also able to demonstrate their effectiveness prior to city-wide

[134] Rutgers Cooperative Extension Service Water Resources Program, *Keep the Rain from the Drain*, http://www.water.rutgers.edu/Projects/NJFuture/NJFuture.html.

implementation. The initial plan identified a set of cornerstone projects that were designed to remove significant amounts of stormwater from the combined sewer system prior to constructing the tunnels.[135] Key among these was the disconnection of residential downspouts. At a cost of $13 million, this project alone reduced the volume of stormwater by 20% (1.2 billion gallons per year), reducing capital costs of CSO construction by $300 million. Other cornerstone projects were the installation of stormwater sumps and sedimentation manholes to collect and infiltrate street runoff and trap sediment; stream diversion from the CS area, removing 165 million gallons; and sewer separation in some areas.

A common problem with many local stormwater management regulations is that they are inflexible and outdated because they simply require water to be removed from roadways as quickly as possible. Reviewing and updating development codes and standards enables appropriate flexibility in design and can lead to greater private investment in green infrastructure in the process of development and redevelopment. In Philadelphia, which has an estimated redevelopment rate of 1%, the City estimates that 5,000 to 6,000 acres will be greened over the course of the GCCW program just through redevelopment.

Portland developed a Stormwater Management Manual in 1999, which provides policy and design requirements for stormwater management throughout the city. The requirements in the manual apply to all development, redevelopment, and improvement projects within the city on private and public property impacting over 500 square feet of impervious surface, and prioritized the use of green (vegetated) facilities. The manual is periodically updated to incorporate innovations and build on experience, with the next major revisions expected in 2019. It reflects what have now become standard practices for development and redevelopment and is part of a broader asset management strategy.

Among the innovations added to Portland's stormwater management toolbox are different configurations of green streets. Portland was among the early developers of green streets, initially working with private developers to find creative solutions for managing stormwater runoff. With $7 million in funding through EPA's Innovative Wet Weather program, in 2003, Portland began piloting evaluating new configurations of green streets. For example, the city developed green streets for industrial areas designed to reduce conflicts with bike lanes, and maximize parking. After demonstrating these would work, green streets became a standard practice, and there are now close to 2000 throughout the city.

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[135] Water Environment Research Foundation, *Case Study: Portland Oregon – Building a Nationally Recognized Program Through Innovation and Research*, 2009, https://www.werf.org/liveablecommunities/studies_port_or.htm.

Addressing environmental justice and equity concerns,

As part of a good planning process, it is important to identify, evaluate, and consider the consequences of targeted infrastructure improvements that can potentially facilitate economic and social conditions that adversely affect low-income rate payers. Environmental Justice (EJ) challenges were evident in several cases during the Study Team's research. Among the stakeholder observations was that persistent flooding, infrastructure needs, and lack of access to potable safe drinking water often overlap with persistent aspects of segregation. Wealth and population factors are strongly tied to infrastructure need and completed improvements. Four factors (taxable property, taxable sales, income, and population fluctuation) stand out in relation to both needs and the ability to meet those needs.

An example is Freeport, Illinois where persistent flooding from stormwater and a rising river has disproportionate effects on a marginalized and historically segregated community. The city is under a consent decree, and decided to follow community recommendations to make this the first point of investment. Portland, Oregon is also addressing recurrent flooding in poor and minority neighborhoods and is aware of concerns with the potential for green infrastructure as a potential driver of gentrification, and is applying an equity lens to its forthcoming Stormwater System Plan, which will guide future bureau investments. However, because the CSS is mostly confined to the historic inner city neighborhoods, which also tend to be relatively affluent, many green investments have been made in economically privileged and rapidly gentrifying neighborhoods. The bureau is concentrating some green investments, such as tree planting, in traditionally underserved communities, where stormwater management and socioeconomic needs overlap. Although further green investments need to serve stormwater management and risk-based priorities, community partnerships are helping the bureau work beyond its traditional scope and develop projects that have multiple benefits.

In Syracuse, green infrastructure was driven by Environmental Justice concerns, as it was first adopted as an alternative to end of the pipe treatment plants to manage CSO outfalls in poor and minority neighborhoods. And in Philadelphia, an important component of the GCCW program is ensuring city-wide access to green spaces for all citizens through the Green 2015 Action Plan, for which the goal is to add 500 acres of parkland by transforming vacant and underused land, and to have a patch of parkland within a 10-minute walk from anywhere in the city [136] An additional key component of the program is a partnership with PowerCorpsPHL, an AmeriCorps program, through which the City trains at-risk youth and provides opportunities for them to gain

[136] Hogan, Dianna M., Carl D. Shapiro, David N. Karp, and Susan M. Wachter, *Urban Ecosystem Services and Decision Making for a Green Philadelphia,* U.S. Geological Survey, 2014. http://dx.doi.org/10.3133/ofr20141155.

work experience and job placement support. As of the fifth year of the program, 24 individuals were reported to have gained permanent employment through the PowerCorpsPHL program.[137]

Proactive asset management

Another challenge highlighted in the Study Team's research was that the costs of regulatory compliance are in addition to those of a backlog of deferred maintenance of aging infrastructure, suggesting the need to build greater capacity for a proactive, asset management approach that considers lifecycle costs of infrastructure and to prioritize activities based on an assessment of risk. The planning process should also include evaluation of opportunities for investment in natural infrastructure so as to prevent increases in stormwater runoff and increase resilience of the water infrastructure system. Examples of these approaches are found in the Portland and Washington DC case studies, and elsewhere.

Portland is currently developing a Stormwater System Plan for all stormwater management using a risk-based approach to assess conditions and identify high priority areas where the consequences and likelihood of failure can be reduced. It is guided by the Portland Watershed Management Plan developed in 2005, which provides guidance for identifying projects that can meet multiple regulatory requirements in an integrated way.

Portland's approach also includes investment in multiple-benefit natural infrastructure projects (i.e., property acquisition) where this enables them to reduce repetitive flooding as well as avoid higher costs of development in areas where land is not suitable for it. For example, the 63-acre Foster Floodplain Natural Area project, acquired properties from 60 families over 15 years through its Willing Seller Acquisition Program in a previously rural-residential neighborhood that was flooded an average of every other year by nearby Johnson Creek. Buildings and roads were removed from the floodplain, along with 50,000 cubic yards of soil and other material. More than 80,000 native plants were brought in and the creek was restored to a more natural state, providing 140 acre feet of flood storage, which is expected to reduce flooding to once every 6-8 years. Since completion, the project area has not flooded following flood stage storms that normally would have flooded Foster Road.

Another program that engages in property acquisition to store floodwaters and improve water quality is Greenseams, a partnership between the Milwaukee Metropolitan Sewer District and the Conservation Fund that was started in 2001, in response to damages from back-to-back storms in 1997 and 1998. To date, 3,511 acres have been acquired from 106 willing sellers in areas

[137] Philadelphia Parks and Recreation, *Green 2015: An Action Plan for the First 500 Acres*, 2011, http://planphilly.com/green2015.

expected to have major growth. The goal is to increase flood storage capacity by 1.3 billion gallons, thereby protecting Milwaukee Metropolitan Sewer District structural flood management projects. Conservation and amenity values have made it possible for the program to attract over $10 million in additional partner and grant funding.[138]

DC Water reduced a 300-year replacement cycle for water infrastructure to a 100-year cycle, at a cost of $40 million a year, by adding a fixed monthly Water System Replacement Fee to customers' bills in 2016. The residential fee ranges from $6.30 to $9.67 per month depending on meter size and average flow, with higher rates for larger meters in multi-family and non-residential buildings.[139]

Managing risk:

An ultimate challenge is that of managing risk in the context of complexity. As for other types of infrastructure, green infrastructure is "coupled" in that it relies on complex interactions among technological, social, economic, and environmental systems. Being distributed in small projects on public and private property adds an additional layer of complexity that has implications for how it is managed and suggests the need for institutional innovation. In addition to engineering aspects involved in designing and building a project, GI also involves siting on various types of public and private property, planning, maintenance, monitoring, and finance, all of which add more elements of uncertainty and risk.

As part of a one water approach, Philadelphia has established partnerships and is sharing knowledge and experience related to stormwater management with smaller upstream jurisdictions that are a significant source of wastewater effluent and stormwater runoff.[140] In the course of this review, the team also became aware of a number of learning networks, such as the Green Infrastructure Leadership Exchange, and the Urban Waters Learning Network, which play important roles in sharing knowledge associated with green infrastructure development. Government can play an important role in enabling innovation by sharing risks that are associated with it and supporting capacity-building through these types of learning networks.

5.1.2 Smart Technologies

Some jurisdictions are looking for ways to reduce costs using new smart technologies. Prominent examples are Syracuse, New York and South Bend, Indiana, which have used sensor technologies in two different ways.

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[138] Milwaukee Metropolitan Sewer District, Greenseams, 2017, https://www.mmsd.com/what-we-do/flood-management/greenseams.

[139] DC Water, *Water System Replacement Fee*, https://dcwater.com/system-replacement-fee (accessed 7-11-2017)

[140] Couillard, E., M.D. Hesson, K. Anderson, C. Crockett, and M.E. McCarty, *Philadelphia's One-Water Approach Starts with Source Water Protection*, Journal AWWA 107(4), 2015, p. 62–71.

In South Bend, sensors in pipes enable real-time monitoring of flows so that they can be redirected for storage in areas where there is excess capacity, thereby optimizing the capacity of the existing system and reducing the need for expansion. An investment of $6 million in this system, "CSOnet", has enabled the city to avoid costs of $20 million for conventional civil engineering projects to separate sewer lines. [141]

In Syracuse, which faces a backlog of deferred maintenance, water main sensors, along with testing and replacement of non-functioning valves, enable more proactive management of old pipes by detecting leaks before they become breaks. This minimizes disruption as well as cost in repairing water main breaks. In addition, data science and predictive modeling to assign risk scores provide the basis for an early warning system that enables potential breaks to be addressed proactively and prevented. Lastly, following the "dig once" approach, better construction coordination of repair work among utilities also reduces costs and disruption. [142]

Panel Recommendation #11

The Environmental Protection Agency (EPA) should continue to strengthen efforts to engage stakeholders and collaborate in the development of tools, standard methods, and policies that can foster better understanding of the benefits of innovative Stormwater Management practices, and in the ongoing review of lessons learned from their application, as a basis for updating these. Better understanding of these benefits can also provide the basis for partnerships and the ability to funding from additional sources.

[141] City of South Bend, CSOnet, https://www.southbendin.gov/government/content/csonet.
[142] City of Syracuse, Innovation Team, *Infrastructure Final Report*, August 2016, http://www.innovatesyracuse.com/infrastructure.

Panel Recommendation #12

The Environmental Protection Agency (EPA) should support innovation in water infrastructure management by working with communities to encourage and enable the use of practices that are consistent with generally accepted principles of good planning, and by institutionalizing the process of adaptive management in enforcement and permitting, as well as in planning. This is a process that involves monitoring, evaluation, learning from outcomes, and building on experience, thereby incentivizing innovation and the development of new capacities. The process should be supported through:

1. Financial assistance for planning and development activities, should be made available for early and comprehensive public engagement in these activities, so that stakeholders have an opportunity to gain understanding of the purpose of Green Stormwater Infrastructure and the importance of stewardship. This early engagement will also enable them to provide meaningful input into planning, design, and decision-making.

2. Use of place-based assessment, with stakeholder input, to identify appropriate locations for effective and implementable projects, as well as the potential for innovation and barriers to it that may need to be addressed.

3. Identification of opportunities to improve equity in the distribution of benefits by addressing Environmental Justice concerns.

4. Building capacity for proactive asset management including the evaluation of opportunities for investment in natural infrastructure to prevent increases in stormwater runoff and flooding.

5.2 Trading

5.2.1 Stormwater Retention Credit Trading

Per NRDC, the most common and straightforward way for cities to capture benefits from Green Infrastructure on private property is by mandating on-site stormwater retention as a condition for construction permit approval for certain projects.[143] This is the context in which the term "stormwater credit trading" usually arises. The credit trading programs allow property owners who are subject to the aforementioned on-site retention mandate to meet a portion of their requirement by purchasing stormwater "credits" from other property owners rather than building

[143] National Resource Defense Council, *Issue Brief: Stormwater Credit Trading Programs,* February 2016, https://www.nrdc.org/sites/default/files/stormwater-credit-trading-programs-ib.pdf.

all of the GI needed to meet the requirement on their own property. These programs are becoming increasingly popular because of the inherent flexibility a trading program provides. NRDC argues that when designed properly, these programs can "create equal or better water quality outcomes than a simple on-site retention requirement."[144] They also create opportunities for third parties who can identify project opportunities and develop credits that can then be sold to developers to meet their obligations, thereby also bringing investments to the more vulnerable and economically challenged communities, which have lower property values and provide the lower cost opportunities for green infrastructure projects.

An example of stormwater credit trading is the Washington DC Stormwater Retention Credit Trading Program, which has evolved to become a hybrid program that combines trading with incentives and also enables a type of Performance-Based P3. This program enables regulated developers, whose projects disturb over 5000 square feet, to meet up to half of their obligation, meeting a 1.2-inch retention standard, through the purchase of Stormwater Retention Credits (SRC). These are credits generated by other owners who are able to go above and beyond the retention standard at a lower cost.[145] SRCs must be certified and inspected by the DC Department of Energy and Environment (DDOE), to ascertain that they adhere to specified best management practices, that they are consistent with an approved stormwater management plan, and that there is a maintenance agreement or contract in place. In the past year, 78,731 credits were traded at an average price of $2.04 per gallon. Alternatively, developers may pay a higher in-lieu fee, currently $3.61, that is used by DDOE to fund GI projects, and which is based on average costs to DDOE for the full range of project types.[146] Through an SRC Purchase Agreement program, DOEE also allows third party developers who are able to generate these at a lower cost, to sell credits directly to DOEE, thereby establishing a price floor that leverages private investment by increasing investor confidence. In effect, this establishes a Performance-Based Public Private Partnership with multiple service providers.[147]

Each SRC represents 1 gallon of offsite retention volume and may be traded and used to meet retention obligations anywhere in the District, with the exception of the Anacostia Waterfront Development Zone, where 1.25 SRCs are required to offset one gallon stormwater runoff elsewhere in the city. In addition to lowering costs to developers, trading in SRCs is expected to shift retention projects from regulated sites with high retention costs, typically located in the

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[144] Ibid., 3.

[145] District of Columbia, Department of Energy and Environment, Stormwater Retention Credit Trading Program, https://doee.dc.gov/src.

[146] Branosky, E., *From Gray to Green: Stormwater Trading in Washington DC. River Network River Voices*, 2016. https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/DC%20SRC%20trading_July%202015%20River%20Voices.pdf; Van Wye, B., *Making stormwater retrofits pay,* August 2012, http://chesapeakestormwater.net/wp-content/uploads/downloads/2012/08/Making-stormwater-retrofits-pay-Aug12.pdf.

[147] DC Department of Energy and Environment, *DOEE Announces $12,750,000 for Innovative Program to Incentivize Cost-Effective Green Infrastructure*, 2016, https://doee.dc.gov/node/1160582.

downtown core areas of the city that drain to tidal areas of the Anacostia and Potomac rivers, to less densely developed sites in the tributary watersheds which are often not covered by stormwater regulations because they tend to be below the size threshold that triggers regulatory requirements. This will provide more water quality protection for tributaries in the MS4 permit areas not served by tunnels being built to capture CSOs, as well as bring aesthetic benefits of green infrastructure to less affluent areas.[148] It is also expected to incentivize the identification of least cost projects on private properties, and could enable the City to lower its own costs by purchasing SRCs on the market.

A key constraint on this approach is the limited supply of credits, which may require real estate developers to acquire credits year-by-year or pay higher in-lieu fees, and to sell properties at a depressed price due to ongoing compliance obligations. This is because property owners do not always have the knowledge, space, or capacity to undertake the projects needed to generate them. However, the requirement for on-site stormwater retention for new development and redevelopment, combined with stormwater fees or drainage charges on existing properties, creates an opportunity for third party project developers. Project developers can aggregate small projects or seek out opportunities to partner with large property owners to achieve economies of scale and generate larger quantities of credits. They can then sell to real estate developers with banked credits sufficient to pre-comply the property for 30 years. This also transfers financial risk to the third project developer, which is responsible for maintaining the project. Owners of land where projects are sited benefit from reduced stormwater fees. Depending on their agreement with the project developer, they may also receive a share of revenues or royalties from the sale of credits.

One such third-party initiative is the establishment of District Stormwater LLC, a new collaborative entity established and managed by Naturevest and Encourage Capital. With an initial investment of $1.7 million in impact investment funds by Prudential Financial, this entity identifies owners of large properties that are not subject to the new on-site stormwater retention requirement who would have an interest in such projects. A proof-of-concept project currently underway is with an urban cemetery that has high fees for stormwater runoff – when completed, The Nature Conservancy expects to be the largest provider of credits in this market.

Another third party initiative is the Anacostia Waterfront Trust Rainpay program, which partnered with the Progressive National Baptist Convention (PBNC) to build a raingarden at the site of their headquarters, which is located on a tributary of the Anacostia, Watts Branch, which is also vulnerable to increases in flooding, and is in an MS4 area. The site also hosts a school, thereby providing opportunities for education and outreach to PNBC–affiliated churches that collectively represent over 2.5 million Baptists. The rain garden retains stormwater runoff in a

[148] Van Wye, 2012.

storm of up to 1.7 inches, from a roof, parking lot, and driveway, generating 11,165 credits a year and was certified by DDOE in May 2017. [149]

As the concept is proved, it is expected to become a blueprint for a number of other cities who have already expressed interest.[150] However, there appears to be a need for guidance and assistance in setting up these kinds of market structures and in doing the kinds of analysis needed to determine if it is appropriate in a particular city as it will depend on the level of development activity.

5.2.2 Water Quality Trading

Water quality trading (WQT) efforts are included within the potential scope of an integrated plan. Although WQT offers the potential for significant cost-savings, and for multiple benefits as well as to provide an incentive for the voluntary participation of the non-point source agricultural sector (which is not regulated under the CWA), these efforts are nascent, especially with respect to inclusion of the stormwater sector. However, it is of high interest to stakeholders because the costs of Best Management Practices (BMPs) for urban stormwater are significantly higher than those for agriculture and WWTPs.

For example, in the integrated plan considered by stakeholders in Onondaga County (discussed in Chapter 3), WQT was among the options considered because of the potential for significant cost savings for meeting requirements of the phosphorus TMDL for Lake Onondaga. In this case, agriculture accounts for 24% of phosphorus compared with 19% from MS4 and 8% from CSO areas. Available funding for agricultural BMPs, through the Onondaga County Soil and Water Conservation District is $165 million annually, compared with $3 million needed over a five-year period to address agricultural non-point source runoff, and a current project backlog of $1 million. Costs for agricultural and forestry BMPs range from $12 to $126 per pound, compared with $742 to $8,764 per pound for stormwater management BMPs, and $500 to $800 per pound for additional phosphorus removal at WWTPs. However, there is no New York state statute that enables trading.

A set of case studies by World Research Institute and Chesapeake Bay Project[151] examined the inclusion of stormwater in trading efforts in three different jurisdictions in Maryland and Virginia, within the Chesapeake Bay watershed, where the stormwater sector accounts for 67% of the estimated $28 billion cost of TMDL compliance, while contributing 16% of the Nitrogen

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[149] District of Columbia, Department of Energy and Environment, *SRC Case Study: Rainpay's SRC – Generating Rain Garden Project at the Progressive Baptist National Convention Headquarters*, 2017, https://doee.dc.gov/node/1260111.

[150] Leatherman, C., *Interview: Kahlil Kettering*, 2017, The Nature Conservancy Magazine. https://www.nature.org/magazine/archives/kahlil-kettering.xml.

[151] Jones, C., McGee B., Epstein L., Fisher E., Sanner P., and Gray E. 2017, *Nutrient trading by municipal stormwater programs in Maryland and Virginia: Three case studies*. Working Paper. Washington, DC: World Resources Institute, http://www.wri.org/publication/nutrient-trading.

and 17% of the Phosphorus load. The only active trading program among these is in Virginia, which has an established state-wide trading program and began to allow the MS4 sector to engage in trading in 2012 for credits generated from non-point sources. Maryland announced the intent to include MS4s in a planned WQT program to help Phase I communities meet the requirement to retrofit 20% of existing impervious cover. The jurisdictions examined in the case study were Arlington County in Virginia, and Montgomery and Queen Anne's Counties in Maryland.

The nascence of these efforts hinges on a host of significant obstacles that prevent programs from gaining traction. Officially, EPA considers WQT an option for compliance with water quality based effluent limitation in a National Pollutant Discharge Elimination System (NPDES) permit. EPA suggests that "WQT can provide greater flexibility on the timing and level of technology a facility might install, reduce overall compliance costs, and encourage voluntary participation of non-point sources within the watershed. Trading can provide ancillary environmental benefits such as carbon sinks, flood retention, riparian improvement, and habitat."[152] The official EPA trading policy is from 2003, when EPA issued the Water Quality Trading Policy to "provide guidance to states, interstate agencies, and tribes to assist them in developing trading programs."[153]

For stormwater management, it may be difficult in practice to meet required conditions, such as that it not contribute to the impairment of local water quality and provide benefits that are in addition to existing practices. For example, trading between MS4 permittees and WWTPs that have already been upgraded would not pass the additionality test. However, in the aforementioned case study of Arlington County in Virginia, the study sees merit in the approach due to specific local circumstances:[154]

- Arlington County is predominantly urbanized and has no opportunity for trading with the agricultural sector within or near the county;
- Arlington County only wants to use credits as a temporal bank as they cannot achieve compliance in the required time-frame but is committed to achieving on-the-ground reductions with urban BMPs; and
- the point source facility is performing at double what is required by the standard.

[152] U.S. Environmental Protection Agency, *Overview on Water Quality Trading*, https://www.epa.gov/npdes/water-quality-trading.
[153] U.S. Environmental Protection Agency, *Frequently Asked Questions about Water Quality Trading*, https://www.epa.gov/npdes/frequently-asked-questions-about-water-quality-trading.
[154] Jones, et al, 2017.

A key trade-off is between market size and geographic specificity. As a general rule, markets are more efficient with more buyers and sellers who use a common and well-defined unit of trade. Among the challenges is that unless credits are purchased within a watershed upstream from a particular urban area, local water quality can be affected and those paying for the credits will not directly benefit, which may limit particular markets to relatively small areas. Credits within the watershed would also have to be available for all of the pollutants covered in the TMDL. Agricultural BMPs typically generate credits for Nitrogen, Phosphorus and Total Suspended Solids, and would not offset discharges of toxic substances or bacteria – a key concern associated with CSOs. In the Arlington County case study, the proposed trade would only be for nutrients, and would not address the County's sediment reduction requirements.[155] MS4 permits, which are typically technology-based, would have to incorporate numerical units and be consistent. In Montgomery County, the case study suggests merit in trading because agricultural credits are available upstream from the urbanized area and it can help to achieve more restrictive bay-wide TMDL targets.[156] A major obstacle is the need for numerical targets in the MS4 permit, which currently only specifies reduction targets in terms of a percentage of impervious surface to be retrofitted.

Other obstacles to WQT include programmatic costs and complexity associated with implementing and maintaining practices, and activities associated with the development, certification and marketing of credits. These activities include the development of protocols for verification and monitoring, and the establishment of credit registries and trading platforms. An example of an important initiative in this area is the Conservation Innovation Grants (CIG), made available as part of the United States Department of Agriculture (USDA) Natural Resources Conservation Service's Environmental Quality Incentives Program (EQIP). This initiative leverages matching funds and has been a significant source of support for projects that engage agricultural producers and other stakeholders in the development of new and more cost-effective ways to protect water quality, as well as in the development of the market infrastructure needed to enable WQT. Given the multiple benefits of practices that protect water quality (such as carbon sequestration, and habitat conservation and increased agricultural productivity with reduced costs through more efficient use of fertilizers) they offer the potential to attract additional partners and funding sources.

One particularly innovative WQT project made possible by grants from EPA and USDA, which were more than matched by project partners, is the Ohio River Basin (ORB) Trading Project, which was initiated by the Electric Power Research Institute in 2007. This is an interstate program that has engaged three states - Ohio, Indiana and Kentucky, and has the potential for future expansion to other states in the ORB. In addition to federal and state agencies, it has also engaged farmers, electric power plants, wastewater treatment plants, and agricultural and

[155] Jones, et al, 2017.
[156] Jones, et al, 2017.

environmental organizations. As of the most recent project update in early 2016, accomplishments included the development of a program framework and trading plan that was agreed to by the three states, the installation of conservation practices in 30 projects, the establishment of an online credit registry, and the sale of initial credits in pilot trades which generated revenue that was reinvested in conservation projects. The credits were used to meet corporate sustainability goals and retired rather than to meet compliance obligations because EPRI is a non-profit research institution, and would need to transfer the pilot effort to an appropriate organization that could sell credits for compliance purposes. While use of credits for compliance is an option, more stringent numeric nutrient criteria are needed to drive demand sufficient to justify the effort. Stormwater credits have not been pursued because they would require rule changes and, to date, there has not been a clear demand from permit holders in the basin. With current funding, the project is now integrating forestry BMPs into the initiative, and pilot testing "stacked" credits for water quality and greenhouse gas reduction benefits, which result from reduced fertilizer application.

Panel Recommendation #13

Markets for Stormwater Retention Credits (SRCs) are promising for growing cities with active real estate markets. The Environmental Protection Agency (EPA) should facilitate the adoption of these SRCs in other cities by providing guidance, technical assistance, and start-up grants to cities to enable them to build their capacity to develop and manage a credit market.

Inclusion of stormwater in water quality trading has the potential for significant cost savings and is worth considering where certain conditions can be met. EPA should work with states to identify places where these conditions can be met, (i.e., where there are opportunities for trading, upstream from impaired urban water bodies and water intakes, that can contribute to meeting their National Pollutant Discharge Elimination System permit and Total Maximum Daily Load requirements as well as protect drinking water) and determine what enabling legislation or regulations may be needed to support trading in these conditions. In addition to protecting water quality, agricultural best management practices can also allow for other economic and environmental co-benefits that provide the basis for partnerships and opportunities for additional funding.

5.3 Incentive Programs

In the face of increasing urban development, municipalities are forced to innovate and reduce the stormwater impact of impervious surfaces but are only able to develop projects on public

properties.[157] Various forms of incentive programs have therefore been established to drive the adoption of green infrastructure practices on private properties. Among these are stormwater utility fee structures, which many jurisdictions have adopted to finance stormwater management, and which often include discounts or rebates for customers who implement specific practices.[158] These incentive programs also enable cities to build and use stormwater controls on new and existing properties that are not covered by stormwater requirements. The programs are particularly useful when used to target specific locations to reduce CSOs, or MS4 areas that are not served by tunnels built to capture CSOs that discharge other types of pollution associated with stormwater runoff. Another important aspect of incentive programs is that they involve the community and engage the recipients of stormwater infrastructure.

EPA identifies five primary types of incentive programs:

- Development incentives;
- Grants;
- Rebates and installation financing;
- Awards and recognition programs; and
- Stormwater utility fee discounts.

An additional type of incentive program includes the Public-Private Partnership (P3) and the Community-Based P3 (CBP3), which offer incentives through various forms of performance-based contracting, and which are further discussed in the next section on new business models. According to the Water Environment Federation, development incentives include expedited permitting, decreased fees, zoning upgrades, reduced stormwater requirements, and other benefits to developers planning to use green infrastructure.

One example of development incentives is in Philadelphia where "projects with 95% or more of the impervious area disconnected from the combined or separate storm sewer can qualify for a fast track review process in which the stormwater management section of the project will be reviewed within five days of submittal. This option provides time and costs savings for the project and comes at low or no costs for the city."[159]

Grant-based incentive programs aim to promote green infrastructure practices through low-impact development competitions and by funding projects on private property directly. One

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[157] Water Environment Research Foundation, *Livable Communities Toolbox*, https://www.werf.org/liveablecommunities/toolbox/incentives.htm.
[158] U.S. Environmental Protection Agency, *Getting to Green: Paying for Green Infrastructure*, EPA 842-R-14-005, December 2014.
[159] Water Environment Research Foundation, *Livable Communities Toolbox*, https://www.werf.org/liveablecommunities/toolbox/incentives.htm.

notable example of a grant-based incentive program is the Green Improvement Fund in Onondaga County, NY. This fund "provides grant funding to commercial properties that install green infrastructure practices in specific sewer districts."[160] Through this initiative, the County has provided new green roofs and refurbished dilapidated parking lots, thereby improving properties where owners could not afford to do this. It is part of a broader CSO abatement initiative that seeks to eliminate 946,353 meters^3 (250 million gallons) of CSOs by 2018.

Rebate and installation financing programs are incentive programs that "include funding, tax credits, and reimbursements to property owners who install green infrastructure."[161] These programs usually supply a pre-determined list of installation options like cisterns, permeable pavement, or green roofs.[162] One example is in Montgomery County, Maryland, which runs the RainScapes Rewards program. This is "funded by the county's Water Quality Protection Charge (a stormwater utility fee charged to property owners) and issues rebates up to $2,500 for residential projects and $10,000 for commercial, multi-family, or institutional projects that meet specific design criteria."[163]

Stormwater utility fees charged to property owners can provide a dedicated stream of revenue that can be used to finance stormwater management activities. If tied to an area of impervious surface or some measure of the amount of stormwater generated, consistent with a user-pays principle, they are more equitable than flat fees and rate structures that do not separate stormwater from other wastewater charges. Discounts or rebates on the fee, in exchange for managing stormwater onsite, are often used to provide incentives for doing this on private property. Examples of the use of these types of fee discounts as incentives include the Portland Clean River Rewards program, which provides a discount of up to 100% of the charge for managing on-site stormwater runoff.[164] In Philadelphia, up to 80% credit is provided for management of 1" of stormwater onsite, which would reduce the fee on a one-acre parcel from $5600/year to as low as $1100. The Stormwater Management Incentives Program (SMIP) provides grants of up to $100,000 per acre for projects on non-residential private properties. To encourage more green infrastructure projects on private property, which have a lower cost, in 2014 the City also established the Green Acre Retrofit Program (GARP) as a way to identify the lowest-cost opportunities for these projects by enabling private contractors to identify and bundle projects, and compete for public grants to fund them.[165] A review of the program by NRDC

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[160] Ibid.
[161] Ibid.
[162] Water Environment Federation and Seattle Public Utilities, and King County Wastewater Treatment Division offer this.
[163] U.S. Environmental Protection Agency, *Getting to Green: Paying for Green Infrastructure*, EPA 842-R-14-005, December 2014.
[164] City of Portland, Bureau of Environmental Services, *Clean River Rewards Program Overview*, https://www.portlandoregon.gov/bes/article/390568.
[165] City of Philadelphia, Water Department, *Stormwater Grants*, http://www.phila.gov/water/wu/stormwater/Pages/Grants.aspx.

found that contractors also have difficulty identifying these opportunities and resulted in recommendations to develop a platform through which they can connect with interested property owners.[166]

A 2016 survey by Western Kentucky University[167] identifies 1,600 utilities across the US, with 100 or more stormwater utilities within seven states. Of these,

- 739 were based on the average amount of impervious surface for a single family residential parcel, or Equivalent Residential Unit (ERU);
- 231 used a flat fee; and
- 228 used tier fees - a single fee for a range of impervious area.

In at least some states, there is no enabling legislation for these to be adopted. The WKU survey shows that 10 states have no fee programs, and singles out five of these that have been among the hardest hit by flooding, where a fee could help support flood mitigation projects: Louisiana, Mississippi, New York, New Jersey, and Connecticut.

Establishment of these fees has encountered significant vocal opposition, along with legal challenges.[168] In at least some cases, such as in Maryland, these fees have been branded as a "rain tax". However, a statewide poll by OpinionWorks LLC, Annapolis MD found that, after being provided with basic facts about the fee and its purpose, support doubled from 23% to 46%, and outweighed the opposition, which dropped from 40% to 35%, with the remainder having no opinion.[169] These findings underscore the importance of public outreach to demonstrate the need for the fee, which should be supported by a cost-of-service study, with a clear explanation of its purpose and benefits.

As such fees may entail a large shift in costs to businesses and other non-residential properties with large parking lots for which they do not pay water bills, it is important to couple these fees with programs that provide grants, loans, and technical assistance for upfront costs that can enable them to manage stormwater onsite and reduce their fees. In locations with active real-estate markets, these types of properties may also be ideal for generating credits that can be

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[166] Valderrama, A., *Spurring Entrepreneurship and Innovation in Stormwater Markets,* 2016. Natural Resources Defense Council, Washington DC. https://www.nrdc.org/resources/spurring-entrepreneurship-and-innovation-stormwater-markets

[167] Campbell, C.W., Dymond R.L. and Dritschel A., *Western Kentucky University Stormwater Utility Survey 2016,* 2016, https://www.wku.edu/engineering/civil/fpm/swusurvey/swusurvey-2016draft11-7-2016hq.pdf.

[168] National Association of Clean Water Agencies, *Navigating Litigation Floodwaters: Legal Considerations for Funding Municipal Stormwater Programs*, 2014, http://stormwater.wef.org/2015/01/nacwa-releases-analysis-legal-challenges-stormwater-fees/.

[169] Water Environment Federation, *Negative framing of "Rain Tax" Sways Public Opinion, Stormwater Report*, April 27, 2015, http://stormwater.wef.org/2015/04/negative-framing-rain-tax-sways-public-opinion/.

traded and produce a revenue stream. This is being done by third party green infrastructure project developers in the DC Stormwater Retention Credit Trading Program, who can reduce costs through economies of scale.

A report from a workshop of the National Network on Water Quality Trading identified several obstacles to incentive-based approaches:

- Sufficient participation;
- Sufficient financial incentive to cover installation, opportunity cost, and maintenance;
- Sufficient funding; and
- Political/statutory barriers to raising fees.

There are several ways the report suggests these can potentially be overcome, including:

- Layer on other incentives such as technical assistance;
- Reduce barriers to participation by streamlining burdensome administrative processes;
- Market the program in relation to interests of the property owner, (e.g., reduced localized flooding);
- Conduct outreach that builds awareness of impacts and a culture of stewardship; and
- Provide upfront capital for low-cost financing and include robust maintenance agreements.

Panel Recommendation #14

Local governments should improve communication about stormwater management, and the value of the user fee as a more equitable approach to paying for it, highlighting ways the fee has been successfully used to recover as well as reduce costs of managing stormwater and to mitigate repetitive flooding.

Because user fees can be significant, they need to be coupled with incentive programs that enable property owners to reduce stormwater fees in exchange for the adoption of green infrastructure practices. Local governments should also consider combining these types of fees with grants or loans for upfront costs on large non-residential properties. Since not all local governments have the authority from their states to charge these fees, enabling legislation should be considered in those states that do not have it.

5.4 New Business Models

Recognizing that the status quo is untenable, and in response to changing conditions, utilities are actively seeking new and transformative business models, that enable innovation and support their role as clean water agencies. In a vision for a "Water Resources Utility of the Future"[170] that encompasses many of the types of initiatives discussed in this chapter, utilities see themselves as managers of valuable resources and partners in local economic development by providing multiple TBL benefits.

Among these new business models is one that enables utilities to share innovative practices with other utilities, enabling them to recover at least some of their investments in innovation, and reducing costs and risks of innovation for other utilities for which the upfront costs would have otherwise been prohibitive. DC Water formed "Blue Drop" a non-profit and stand-alone affiliate in which DC Water is the only member and enables them to generate non-ratepayer revenue. Blue Drop markets consulting services to other utilities. In addition to providing a return to DC Water, this lowers the significant upfront costs of innovation to the smaller less efficient utilities and enables all utilities to share in upfront costs for work that would be duplicative.[171]

Activities of Blue Drop include providing consulting services to other utilities for setting up green infrastructure programs, based on experience developing the National Green Infrastructure Certification program, which was developed by DC Water in partnership with Water Environment Federation (WEF), by awarding them a $1 million contract to develop and launch it. The initial focus of the program was on certification for entry-level jobs in green infrastructure construction, maintenance, and inspections; to fulfill a need for employees with the new skill sets required for GI and provide them with a career path. In addition to DC Water, 14 other communities supported the development and launch of the program who each paid $50,000, of which $40,000 was paid back to DC Water for having fronted the initial cost to develop the program with the contract to WEF. In the long-term, the intention is for it to be led by a third party. The initiative now has 14 partners – as a result, DC Water has been reimbursed for over half of the upfront costs. The national scope provides an additional benefit to participants in that it gives them a more portable skill, enabling them to work in participating cities. Additional certification levels for higher-level positions are being considered. So far, 108 people have completed 35 hours of training and passed the certification exam to be awarded certifications. The program aims to be connected to the job market through contractor requirements to hire from the program and meet hiring goals.

Among the innovative practices being adopted by several utilities is the use of resource recovery technologies to generate energy, which can account for up to 40% of an average sewer bill, and

[170] National Association of Clean Water Agencies, Water Environment Research Foundation, Water Environment Federation, *Water Resources Utility of the Future: A Blueprint for Action*, August 2016.
[171] Blue Drop Performance Soil, https://www.bluedrop.com/.

create products such as fertilizers, all of which help to recover or reduce costs of providing clean water. For example, "Bloom Soil" is produced by DC Water from biosolids recovered from the Blue Plains Resource Recovery Facility, and then marketed by Blue Drop.[172] In New Jersey, the Camden County Municipal Utilities Authority (CCMUA) is taking several steps toward becoming a net-zero facility, and to be able to operate off-grid by 2020. These include energy conservation measures, upgrades to more energy efficient technologies, a combined heat and power system that uses sewage heat recovery and converts sludge to biogas that is then converted to electricity that will provide 60% of the plant's energy budget. Solar panels provide an additional 10%. In addition, removal of stormwater from the system using green infrastructure reduces pumping costs.[173] The Gresham, Oregon wastewater treatment plant achieved net zero emissions in 2015 and now produces more energy than it consumes, providing a savings of $500,000 a year in avoided electricity costs. Methane from digesters is burned in a cogeneration facility that produces thermal and electric energy. FOG (Fats Oils and Greases) collected from area restaurants that would have had to pay to have it hauled away, boosts the generation of biogases by 55% and solar panels provide 8% of energy generation.[174]

A number of local governments are exploring ways to leverage investment and efficiencies of the private sector for project delivery, and have established new forms of P3s. Traditional Public Private Partnerships, or "P3s" include performance-based contracts that may enable public entities to leverage efficiencies of the private sector in financing, delivery, long term operations and maintenance of public infrastructure. By bundling these into a single contract, the contractor also has an incentive to consider and minimize lifecycle costs. Key challenges identified include the need for better processes of identifying, evaluating, prioritizing, selecting, and structuring suitable investment-ready projects that support a broader strategic plan as well as management of the entire process to ensure that objectives of the Partnership are met.[175]

EPA evaluated these and proposed modifications to better meet requirements of the Clean Water Act, in a Community-Based P3 (CBP3). As discussed in the beginning of the chapter, the key distinguishing features of a CBP3 are a focus on driving investment in green infrastructure in ways that support local economic growth and improved quality of life in urban and under-served communities. According to EPA estimates, this approach can bring the cost of retrofits from an

[172] Bloom Soil, www.bloomsoil.com.
[173] Camden County Municipal Utilities Authority, *Energy Self-Sufficiency*, http://www.ccmua.org/?page_id=3247.
[174] City of Gresham Oregon, *Wastewater Treatment Plant*, https://greshamoregon.gov/Wastewater-Treatment-Plant/.
[175] World Economic Forum and The Boston Consulting Group, *Strategic Infrastructure Steps to Prepare and Accelerate Public-Private Partnerships*, May 2013.

average of $150,000 down to $80,000 per acre treated and shorten the implementation timeline by up to 40%.[176]

The Prince George's County Clean Water Partnership (CWP) is the most prominent and pioneering example of the CBP3 approach.[177] The structure of the partnership is defined in a 30-year performance-based master agreement between the County and the private entity, Corvias LLC, that is designed to meet the TMDL and MS4 permit requirements by developing green infrastructure projects in ways that also provide benefits for economic development, engage the community, and provide educational opportunities.[178]

Recognizing the challenge of affordability, and that the risks associated with maintaining the status quo had exceeded those of innovation, the County selected this approach in order to be able to leverage the operational efficiencies and flexibility of the private sector, as well as share risk and reduce costs. Following a "Design-Build-Operate-Maintain" business model, rather than issuing separate contracts for each of these phases, the contractor is responsible for maintenance of the projects for a 30-year period, which is roughly the anticipated life of green infrastructure assets. The contract also provides performance based incentives, and expands the amount of acres to be retrofitted if specific performance metrics are achieved. Metrics used to measure success in economic development include local small business participation, employment of county residents, and mentoring and incubation of existing and small businesses who are engaged in the project as subcontractors. The County oversees the contract and funds it with revenue from the "Clean Water Fee" – a stormwater utility fee adopted by the County in 2013.[179]

The Clean Water Partnership is reported to have realized costs between $40,000 and $60,000 per acre treated, a significant reduction compared to traditional costs.[180] As a relatively new initiative that started in 2015, these costs may reflect the least cost opportunities that tend to be prioritized. The initiative has improved efficiency in procurement and project delivery, and has played an important role in developing the local work force. However, it has received mixed reviews from civic watershed organizations, who have found it challenging to coordinate their efforts with the

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[176] U.S. Environmental Protection Agency, U.S. EPA Region 3, Water Protection Division, *Community Based Public-Private Partnerships (CBP3s) and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure: A Guide for Local Governments*, April 2015.

[177] The Prince George's County Clean Water Partnership. https://thecleanwaterpartnership.com/

[178] *Master Program Agreement for the Urban Stormwater Retrofit Program Public-Private Partnership Between Prince George's County, Maryland and Corvias Prince George's County Stormwater Partners, LLC*, March 2015, https://thecleanwaterpartnership.com/wp-content/uploads/2016/08/Master-Program-Agreement-MPA.pdf.

[179] Prince George's County Department of the Environment, *Prince George's County's Approach to Meeting Regulatory Stormwater Management Requirements Using a Community-Based Public-Private Partnership Business Model*, 2016, https://thecleanwaterpartnership.com/wp-content/uploads/2016/06/PGC-CBP3-Clean-Water-Partnership.pdf.

[180] Lueckenhoff, D. and Brown S., *Public-Private Partnerships Beneficial for Implementing Green Infrastructure*, 2015. Bloomberg BNA: Water Law & Policy Monitor. Bureau of National Affairs. http://stormandstream.com/wp-content/uploads/2014/01/CBP3_BNA_Insights_Article_July_2015.pdf.

partnership, and who have concerns with respect to transparency, and a need for a strategic plan that guides project selection. The project is expected to provide a basis for learning as it matures and can be more fully evaluated.

More generally, and in addition to EPA's work in developing and promoting the CBP3 approach to funding stormwater management programs,[181] EPA offers information and technical assistance to communities that may be interested in a variety of different kinds of public and private partnerships that can be used for procuring needed water infrastructure.[182] For example, EPA's Water Finance Center collaborated with the University of North Carolina (UNC) Environmental Finance Center to explore a number of alternative models by which communities can use public-private partnerships for water infrastructure. UNC's published report provides an in-depth examination of nine such projects,[183] and, based on UNC's work, EPA issued a summary document.[184] As explained there and in other resource materials,[185] under these arrangements the government sponsor retains ownership of the infrastructure asset, while the private sector assumes some substantial amount or responsibility and risk in delivering and managing the asset. Although the contract price would generally be higher, the arrangement may be desirable if the contractor is better able to manage or mitigate the risk. EPA, in its explanatory document, identified the four most common varieties of partnership used for water infrastructure: Design Build (Construction Manager at Risk); Design Build Finance; Design Build Operate Maintain; and Design Build Finance Operate Maintain.[186] (CBP3 arrangements, discussed above,

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[181] U.S. Environmental Protection Agency, U.S. EPA Region 3, Water Protection Division, *Community Based Public-Private Partnerships (CBP3s) and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure: A Guide for Local Governments*, April 2015.

[182] U.S. Environmental Protection Agency, *Leading Edge Financing for Water Infrastructure*, https://www.epa.gov/waterfinancecenter/leading-edge-financing-water-infrastructure.

[183] University of North Carolina, School of Government, Environmental Finance Center, *The Financial Impacts of Alternative Water Project Delivery Models: A Closer Look at Nine Communities,* March 2017, https://efc.sog.unc.edu/reslib/item/financial-impacts-alternative-water-project-delivery-models-closer-look-nine-communities.

[184] U.S. Environmental Protection Agency, Water Infrastructure and Resiliency Finance Center, *Perspective: 'The Financial Impact of Alternative Water Project Delivery Models' in the Water Sector*, February 2017, https://www.epa.gov/sites/production/files/2017-03/documents/epa_p3_perspective_final_2.24.17.pdf.

[185] See U.S. Department of the Treasury, Office of Economic Policy, *An Economic Framework for Comparing Public-Private Partnerships and Conventional Procurement*, May 2016, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2784728; A.A. Boardman et al., *Comparative Analysis of Infrastructure Public-Private Partnerships*, Journal of Comparative Policy Analysis: Research and Practice, vol 17, p. 441-447, November 2016, http://dx.doi.org/10.1080/13876988.2015.1052611; Organization for Economic Cooperation and Development, *Recommendation of the Council on Principles for Public Governance of Public-Private Partnerships*, May 2012, https://www.oecd.org/governance/budgeting/PPP-Recommendation.pdf.

[186] U.S. Environmental Protection Agency, Water Infrastructure and Resiliency Finance Center, *Perspective: 'The Financial Impact of Alternative Water Project Delivery Models' in the Water Sector*, February 2017, p. 3, EPA described these arrangements:

- Design Build (Construction Manager at Risk) – the construction manager is obligated to deliver the project at the bid cost and thereby absorbs the construction risk.
- Design Build Finance – not only weds the design and build phases together as one deliverable, but also includes privately sourced financing, which may be useful if the sponsor faces capital-access constraints.

would come within the latter two categories, as the contractor is responsible for the entire life-cycle of the project.) EPA also notes that public-private partnerships frequently involve alternative revenue models, such as -- standard user fee (the service provider sets and collects fees), revenue-sharing (revenues are shared with the contractor), availability payment (the fee to the contractor is paid only if the assets meet contracted quality and performance standards), and profit- or risk-sharing (caps on the contractor's return on investment, or limits contractor's receipts based on productivity, or receipt by the sponsor of a share of the contractor's profit, etc.).[187] The use of such various models for infrastructure procurement can substantially affect the community's debt burden and the utility's rate structure, and operating efficiency, and may thereby affect the factors that are part of a financial capability assessment of the community.

Panel Recommendation #10

> New business models such as Community-Based Public Private Partnerships (CBP3s) are promising. The Environmental Protection Agency (EPA) should encourage the carefully structured and appropriate experimentation with CBP3s through knowledge sharing activities that build critical government capacity to manage the process, and for strategic planning to guide project selection.

5.5 Finance Mechanisms

Finance mechanisms can help communities and utilities meet the affordability challenge they face in meeting their CWA goals by lowering the costs of financing long-term investments or providing access to broader capital markets to secure financing that may not currently be available. In assessing the effectiveness of existing or proposed finance mechanisms, it is important to consider not only their relative costs, but the distribution of those costs among communities, water users, and other entities (e.g., different levels of government).

5.5.1 The Role and Evolution of State Revolving Funds (SRFs)

In 1987, amendments to the CWA created the Clean Water State Revolving Fund (CWSRF) program to replace the terminated EPA municipal wastewater treatment plant construction grant program that had provided federal support for local clean water infrastructure needs. Then, in 1996, amendments to the SDWA created the Drinking Water State Revolving Fund program

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- Design Build Operate Maintain – the contractor delivers the project design and the project, and operates and maintains the facility as well. EPA notes that, "[s]ince the contract establishes the parameters by which the service provider will be compensated, the design of the project should fully factor in future operating and maintenance costs and efficiencies."
- Design Build Finance Operate Maintain – the purpose of this model is to incentivize the contractor that is responsible for delivering the entire lifecycle of the project, including the finance component.

[187] Ibid. See also, U.S. Department of the Treasury, Office of Economic Policy, *Expanding the Market for Infrastructure Public Private Partnerships*, April 2015, p. 10-26.

(DWSRF) to replicate the CWSRF and provide federal support through the states for local drinking water infrastructure needs.

Since the end of EPA's construction grant program, these state revolving fund (SRF) programs have been the major source of federal and state financial support for meeting community and utility water infrastructure investment needs throughout the nation. Both of the SRF programs have received annual EPA grants, with a 20% state match, to capitalize state revolving loan funds that use the proceeds to make loans to local utilities to help fund their water infrastructure investment needs. Through capitalizing these SRFs, the expectation was that they would provide a permanent source of funding support independent of future federal grant support.[188] The SRFs would retain the interest and loan payments from their outstanding loans and use those funds to make new loans.

Since 1988, federal grants have contributed about $41 billion of capitalization to the CWSRFs, with the 20% state match accounting for another $7.6 billion in capitalization funds. Total capitalization of the CWSRFs through 2016 is almost $49 billion. The DWSRFs have received total capitalization funds of $21.8 billion through 2016 (with $18.4 billion in federal and $3.4 billion in state funds).

The allocation of federal capitalization grant funds to the states differs for the DWSRF and CWSRF. For the DWSRF, the federal allocation of funds reflects the relative investment need of each state based on EPA's latest quadrennial survey of drinking water infrastructure investment needs. The federal allocation of funds to support CWSRF capitalization grants to the states involves some combination of population and need factors, but as the EPA 2016 Report to Congress notes, "the weighting and factors that were used to establish the formula for the original (1988) allotment are not known."[189] This same report noted that the allotment formula had not been changed in 30 years and, given the changes in population and infrastructure investment needs over that period, concluded that "most states do not currently receive appropriated funds in proportion to their reported needs or population." [190]

While the bulk of these SRF funds are to be used to provide loans to localities and utilities in order to meet the water infrastructure investment needs, primarily those needed to meet CWA and SDWA goals, there are some set-asides established. Many of the DWSRF set-asides are established by statute in the SDWA[191]. However, subsequent appropriations acts have adjusted

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[188] The CWA contained this intent explicitly.

[189] U.S. Environmental Protection Agency, *Report to Congress: Review of the Allotment of the Clean Water State Revolving Fund*, EPA-830-R16-001, May 2016, p. 1.

[190] Ibid.

[191] The principal set- asides include the following:

- There is a set aside (the higher of 2% or $20 million) of federal DWSRF grants for Indian tribes and Alaskan Natives, and a minimum allocation of 1% of DWSRF funds for each state, including D.C.

some of these DWSRF set-asides. For the CWSRFs, the set-asides have been primarily established in appropriation acts.

A key financial set-aside for both SRFs is the authority to provide 'additional subsidies' primarily through loan forgiveness to help economically disadvantaged communities. The SDWA authorized states to use up to 30% of their DWSRF funds to provide 'additional subsidies' but subsequent appropriations acts have varied the amounts available for DWSRF 'additional subsidies.' Since 2009 the ARRA and subsequent individual appropriations acts have provided CWSRFs different amounts for 'additional subsidies,' For FY 2016 and FY 2017, CWSRFs had to allocate at least 10% of their federal capitalization grants for 'additional subsidies' but could also allocate up to an additional 30% for that purpose. States are also authorized to transfer up to 33% of their annual allotments between the two SRFs. Cumulative transfers between the two funds produced a net transfer of $360.4 million to the DWSRF as of 2016.

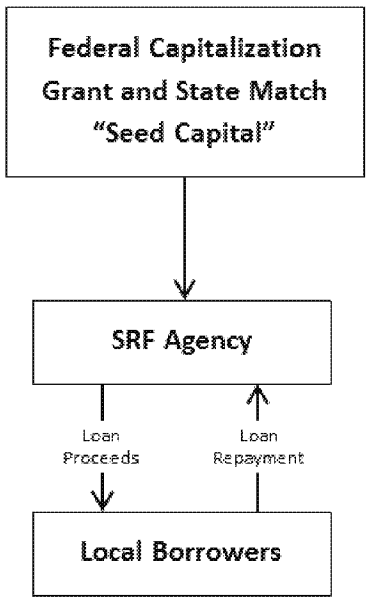

Figure 16. SRFs and the Direct Loan Approach. Source: CIFA (2002) p.71.

5.5.2 Current SRF Operations

The federal statutes establishing the SRF programs provided states flexibility and latitude in how they choose to structure and manage these programs. As the Council of Infrastructure Financing Authorities (CIFA) has noted "no one state SRF program is identical to the other. Each has unique characteristics,

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- EPA must also set-aside $2 million of DWSRF funds to monitor certain contaminants in small and medium systems.
- Recent CWSRF appropriations have included statutory language setting aside 2% or $30 million for direct grants to Indian tribes.
- EPA may set-aside up to $30 million for state training and certification reimbursements and up to 2% of annual funds ($15 million cap) for technical assistance to small systems, but these have not been used in recent years, because other funding sources were available.
- States must make 15% of their annual DWSRF loans to small systems serving 10,000 or fewer persons to the extent they have applied,
- States may also use the higher of up to 4% of DWSRF allotments, $400,000, or 1/5th of 1% of the net position for their fund for their administrative expenses and up to another 10% for training, technical assistance, and personnel development activities.
  States may use up to 2% of their DWSRF grants for small systems technical assistance and up to 15% for assistance to systems for capacity development and source water protection activities.

either in its financial structure or its administration, allowing [it] to adapt to the state's individual needs and administrative characteristics."[192]

In addition to differing financial structures, states have pursued different financial strategies and operating procedures for their SRF programs. The majority of states (29) have opted to leverage their capitalization grants by using tax exempt bond proceeds to support their lending activity, while 21 have chosen the more conservative direct loan approach.

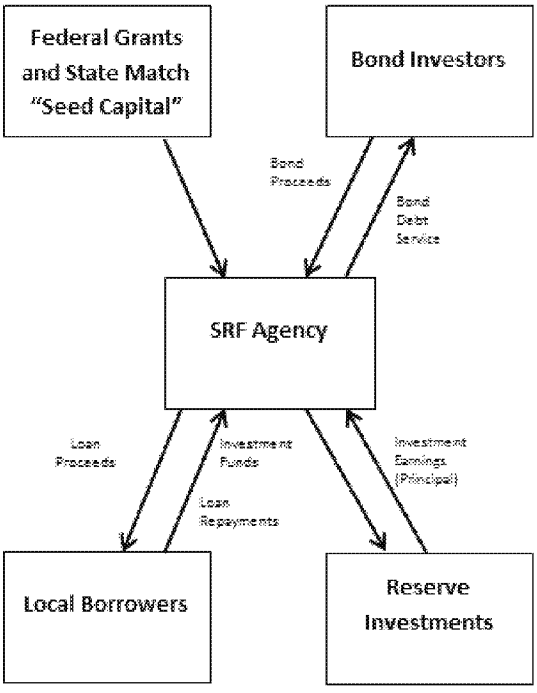

Figure 17. SRF's and the 'Leveraging' Approach. Source: CIFA, (2002) p. 73.

Figure 16 depicts the general financial activities for SRFs following the direct loan approach. The SRF makes the annual federal and state funding (capitalization grants) available as loans to local borrowers. The interest rate on many of these loans is set at below-market-rates to attract borrowers and to lower their costs in undertaking infrastructure investments to meet water quality goals. Principal and interest repayments from outstanding loans are returned to the SRF and become available for future loans.

The deeper the interest rate subsidy, the smaller the repayment flows to the SRF from the loans issued and hence the fewer the number of additional loans that can be made in future years from the original capitalization grants. Deep subsidization – for example, zero interest loans and/or principle forgiveness – will sharply curtail, if not totally eliminate, loan repayments for those specific loans. On the other hand, EPA staff believe interest rate subsidies are needed to encourage local utilities and communities to seek SRF loans for critical environmental protection projects.

Figure 17 depicts the general financial activities for SRFs choosing a "leveraging" strategy. The SRF undertakes two separate actions before issuing any loans to local borrowers (communities or utilities). First, they invest the capitalization grant funds in safe instruments to collateralize the

[192] Council of Infrastructure Financing Authorities and U.S. Environmental Protection Agency, *State Revolving Fund: Training Manual*, September 2002, p. 47.

tax exempt bonds they will issue. Then they will issue tax exempt bonds (TEBs) and use those proceeds to make loans to local communities and utilities. Both additional actions will incur additional administrative costs, especially bond issuance fees and other bond administrative expenses. Interest income from the invested capitalization grants assures bond holders that bonds will be repaid and allows the SRF to issue some loans with interest rates below the TEB rates.[193]

5.5.3 Summary Financial Data

The tables on the following pages present a national summary of annual operating revenues, expenses, and net worth for the CWSRFs and DWSRFs in 2015 and 2016 plus the amount of outstanding loans, cumulative federal and state capitalization funds, and additional subsidies provided through 2016.

In 2016, the CWSRFs in the aggregate had net operating revenues of $127 million.

[193] Some state CWSRFs now have sufficient retained earnings from prior loan originations to use those resources to invest in safe instruments to collateralize tax exempt bonds and can allocate some or all of their capitalization grants to new direct loans. In these instances, those SRFs are using a blended lending strategy.

NATIONAL AGGREGATE SRF INCOME STATEMENT				
	[$ in MILLIONS]			
	CWSRF		DWSRF *	
	FY 2015	FY2016	FY 2015	FY2016
Operating Revenue				
Investment interest	296.3	250.3	67.3	60.1
Loan interest	997.1	1004.9	294	293.8
Total	1293.3	1255.1	361.3	353.9
Operating Expenses				
Bond Interest	915.8	874.5	150.3	141.3
Net Refunding			38.4	61.2
Bond Fees	21.8	19.9	6.9	7
Administration	55	58.4		
Additional Subsidy	130.5	175	193.2	208.6
Principle Forgiveness	103.9	133.4	193.2	208.6
Negative Interest	0	0		
Grants	26.5	41.6		
Total	1123.1	1127.8	388.8	418.1
Net Operating Income	170.2	127.3	-27.5	-64.2
Net Income				
Federal Grants	1715.7	1505.7	951.7	1039
State Match	150	162.2	86.8	118.5
Net SRF Transfers	7.6	-7.9	-7.6	7.9
Total	1873.2	1660	1030.9	1165.4
Change in Net Assets	2043.4	1787.3	1003.4	1101.2
		0		
Net Assets	46421.5	48208.8	15932.3	17033.5

Figure 18. National Aggregate SRF Income Statement[194]

[194] CWSRF data from: U.S. Environmental Protection Agency, *2016 Annual Report: Clean Water State Revolving Fund Programs*, tables on p. 12-15. DWSRF data from: U.S. Environmental Protection Agency, 2016 DWSRF National Summary Data, and National and State Data Roll-up Tables, and data from EPA staff. *DWSRF data do not include activities in separate DWSRF funds for set aside activities. (e.g, Administrative costs of $35.3M in 2015 and $34M in 2016 included in separate funds). Annual fee income of $51.1M in 2015 and $54.7M in 2016 included in separate funds.

Total operating revenues were $1255.1 million, with $1005 million from interest on outstanding loans and $250.3 million from interest on investments. Total operating expenses were $1127.8 million from the following items:

- $874 million from bond interest expenses (includes both "leveraging" TEBs and state TEBs used to pay their 20% match);
- $175 million in additional subsidies – primarily principle forgiveness ($133.4 million) for disadvantaged communities;
- $58.4 million for administration; and
- $19.9 million for bond fees.

The total net assets of CWSRF programs increased $1787.3 million to $48.2 billion in 2016. This increase reflected net operating income of $127.3 million plus additional federal capitalization grants and state matching funds of $1667.9 million in 2016.

Total assets for the CWSRF programs in 2016 were $67.6 billion. Outstanding loans to local utilities and communities accounted for $50.3 billion, while investments for bond collateral and working capital accounted for another $17 billion. Total CWSRF liabilities in 2016 were $19.4 billion – $18.8 billion in "leveraged' bonds and $0.6 billion in state match bonds. Net worth (net assets) was $48.2 billion, the difference between the two.

Given their shorter history, DWSRF programs have much smaller operating revenues, expenses, and net assets or net worth than CWSRFs. Likewise, the EPA capitalization grants for the DWSRFs are much smaller than for CWSRFs. Despite their smaller overall size, the DWSRF programs have provided higher levels of additional subsidy – primarily principal forgiveness – than the CWSRFs. This may reflect both the higher level of additional subsidy payments authorized for DWSRFs and the greater number of very small drinking water utilities compared to the number of utilities providing sewer, stormwater, and other clean water services. In addition, CWSRF's were not authorized to provide additional subsidies (e.g. loan forgiveness) until 2009.

The DWSRFs incurred net operating losses in both 2015 and 2016, with losses increasing to $64 million in 2016. These DWSRF net operating losses reflect two basic differences from CWSRF operations. First, due to accounting differences, not all operating revenues are included in this DWSRF loan fund. Second, and most important, DWSRF additional subsidies are much larger both in absolute amounts and relative to federal capitalization grants than CWSRF additional subsidies. Net assets for DWSRFs in 2016 were $17 billion[195] – about 1/3 the level of CWSRF

[195] EPA accounting for the DWSRFs differs from the CWSRFs because of the multiple set-asides for DWSRFs. There are other funds that account for these set-aside activities and these funds have additional net assets derived

net assets. For both SRFs, cumulative federal capitalization grants accounted for the majority of the SRFs net assets.

NATIONAL AGGREGATE SRF BALANCE SHEET				
	[$ in MILLIONS]			
	CWSRF		DWSRF*	
	FY 2015	FY2016	FY 2015	FY2016
ASSETS				
Cash & Investments	12424.6	12960.4	4886.4	4967.6
Bond Reserve Investments	4389.9	4035.6	803.6	751.9
Loans Outstanding	48956.2	50322.5	14820.2	15797.3
Unamortized Bond Fees	254.3	248.6	72.4	69.3
Total Assets	65665	67567	20582.7	21586
LIABILITIES				
State Bonds Outstanding	598.8	604.5	243	235.1
"Leveraged" Bonds Outstanding	18644.8	18753.8	4407.4	4317.5
Total Liabilities	19243.6	19358.3	4650.4	4552.6
NET WORTH/NET ASSETS	46421.4	48208.7	15932.3	17033.5
Federal Grants	37743.5	39249.2	14004.9	15043.9
State Match Funds	5329.4	5491.6	2468.7	2587.2
Retained Earnings [Net Income]	3860.5	3987.8		
Net SRF Transfers	-511.9	-519.8	352.5	360.4
Other Net Assets			-893.8	-958

Figure 19. National Aggregate SRF Balance Sheet[196]

5.5.4 Need for Continued, If Not Increased Federal Support

EPA and a range of stakeholders have cited the success of the SRF programs as an effective intergovernmental model for meeting local infrastructure investment needs while also addressing national water quality goals. As noted in chapter 2, EPA surveys indicate these clean and

from the federal and state capitalization grants allocated to them. For example, total federal capitalization grants amount to 18.4B of which only $17B appear in the DWSRF loan fund.

[196] CWSRF data from: U.S. Environmental Protection Agency, *2016 Annual Report: Clean Water State Revolving Fund Programs*, tables on p. 12-15. DWSRF data from: U.S. Environmental Protection Agency, 2016 DWSRF National Summary Data and National and State Data Roll-up Tables. *DWSRF data do not include activities in separate DWSRF funds for set aside activities. Cumulative Federal Grant contributions were $17517.5M in 2015 and $18352.4 in 2016. Cumulative State Grant Contributions were $3293.8M in 2015 and $3449.7 in 2016. Cumulative net income of $1700.1M in 2015 and $1867.4M in 2016 in other DWSRF funds.

drinking water infrastructure investments needs amount to $271 billion for clean water and $384.1 billion for drinking water infrastructure investment needs over the next 20 years. These substantial remaining water infrastructure investment needs among U.S. communities and their water service providers (utilities), including the costs required to meet CWA and SDWA water quality goals, will require continued federal and state funding for the SRF.

Annual SRF net revenues are not yet sufficient to sustain annual lending activities at current levels, much less increase them to meet these substantial remaining investment needs. Although annual federal funding levels have declined from their peak levels in the 2009-2011 period, in 2017 federal capitalization grants for both the CWSRF and DWSRF programs was $2.3 billion. Continued federal fiscal stress and budgetary pressure for domestic discretionary spending reductions may jeopardize even this level of federal support. While the proposed 2017 budget maintained capitalization grant support for both the CWSRFs and the DWSRFs, future funding levels may depend upon Administration infrastructure spending proposals and the form such initiatives might take.

5.5.5 Water Infrastructure Finance and Innovation Act

Borrowing to pay for long-term water infrastructure investments makes both economic and financial sense. Borrowing to fund long-term investments satisfies a basic public finance principle – pay as you use – to ensure that future users (beneficiaries) contribute to some of the costs of long-lived assets that they will use. Some other benefits include:

- Borrowing allows future users to bear some of the costs of the infrastructure investments they will be using, thereby providing some intergenerational equity among water users.
- SRFs already recognize these economic and financial advantages by issuing loans to utilities to fund their infrastructure investments.
- Those SRFs using the "leveraging" model also rely on borrowed funds (TEBs) to fund local utility loans.
- Many states meet their 20% SRF match requirement using bond proceeds rather than cash.

Financing long-termed assets with borrowing makes eminent economic sense, especially in the current historically low interest-rate environment. Not only are current real interest costs low (nominal rates adjusted for inflation), but these financing costs may be even less burdensome in the future if inflation and interest rates increase. As Figure 20 documents, long-term borrowing rates (Treasury 30 year rates) have been below 4% since 2010 and are currently 2.84% (June 2017), levels that haven't been approached in the last 35 years.

Figure 20. 30-Year Constant Maturity Treasury Rates. Source: Federal Reserve Economic Data

The Water Infrastructure Finance and Innovation Act (WIFIA) of 2014 authorized a new federal program to provide direct federal loans to help finance water-related infrastructure of national or regional significance. Congress provided a $30 million appropriation in 2017 to initiate the program. EPA has created an office to administer the program and applications for these federal loans have already been received. These direct federal loans are intended to supplement, not replace, SRF loans for local clean and drinking water infrastructure investments. EPA plans to use $5 million of the appropriation for administrative expenses and the remaining $25 million as a "federal credit subsidy" to support between $2.5 and $5 billion in new loans. This estimated range of new loans reflects WIFIA's cost-sharing requirement for its federal loans. By statute, WIFIA loans can only support 49% of the total project cost; the remaining 51% is the required matching investment. This distinction between the amount of direct loans provided – $2.5-$5 billion – and the federal appropriation required for that level of activity – $25 million – reflects the change in federal budgeting for direct loan programs due to the Federal Credit Reform Act of 1990 (FCRA). Under the FCRA, the federal budget provides only a "credit subsidy"—essentially a loan loss reserve – for the new loans to be made. This credit subsidy thus reflects the expected defaults from the loans issued the estimated recovery from any defaults, and any explicit interest subsidy below the Treasury borrowing rate provided with these direct loans. This distinction between the loan program level and the federal appropriation required is critically important in the current constrained federal budget environment.

The current WIFIA credit subsidy estimates do not include any assumed explicit interest rate subsidies. Thus, these federal direct loans are expected to be provided at the Treasury borrowing rate. The WIFIA "cost-sharing" provision –WIFIA contribution limited to 49% of project costs—is expected to improve program performance and produce lower default rates, since the project's other sources of financing will share the risk of any potential default. Although intended to support local investment needs directly, discussion at the CIFA Federal Policy Conference in April 2017 indicated that EPA staff may try to coordinate WIFIA lending operations with SRF lending operations in several ways.

Recognizing that the WIFIA program is intended to complement current SRF lending operations, one suggested approach to co-ordinate these independent lending operations is to jointly fund selected infrastructure investment projects. The WIFIA "cost-sharing" provision would require the SRF loan share to cover 51% of the project costs with the WIFIA loan funding the remaining 49%. This would allow both programs to support critical, high-priority water infrastructure investment projects that might not otherwise proceed because the total costs exceeded SRF capabilities or because other capital market resources may not be available at acceptable costs or terms.

Another suggested approach was to provide some WIFIA loans to the SRFs directly to support a portfolio of SRF proposed loans. The WIFIA loan would provide up to 49% of the costs of the portfolio of loans the SRF planned to issue. These additional WIFIA loan resources would thus allow the SRFs to increase their lending activity substantially. In essence, the SRFs that sought this WIFIA support would be using these pooled WIFIA resources to leverage their lending activities funded just as some use TEBs to leverage their lending operations.

5.5.6 Advantages of Federal Loan Support

Long-term Treasury rates remain below comparable maturity rates for tax exempt municipal bonds, thus reducing costs to borrowers. This pattern has prevailed since 2010 as shown in Figure 21. Consequently, WIFIA loans at Treasury rates will reduce current water infrastructure financing costs for those projects that would have been financed by local utility or community TEBs. WIFIA loan rates may also be lower than SRF loans that are not explicitly subsidized (i.e. offered at below market rates). (In June of 2017, the 20-year Bond Buyer index rate was 3.53% compared to 20-year constant maturity Treasury rate of 2.6%.)

Figure 21. 20-Bond Buyer Index Compared to 20-Year Treasury Bonds. Source: Data via the Bond Buyer 20-Bond GO Index.

The table below shows the weighted average of DWSRFs interest rates for direct loans to local communities and utilities relative to state market rate (presumably TEB rate) weighted averages and 30-year constant maturity Treasury rates. The maturities for the DWSRF and state rates are not known, but are likely to be shorter maturities than the 30-year Treasuries. The interest rate "subsidy" offered by DWSRFs in 2016 was 180 basis points, substantially lower than the "subsidy" provided between 2000 and 2010.[197] While the 30-year Treasury rate would provide an average subsidy of 44 basis points relative to the 2016 state average market rate, this interest subsidy would not be as large as the 2016 average DWSRF subsidy of 180 basis points. Aggregate average CWSRF interest rates have been below 2% since 2013 and averaged 1.6% in 2016, slightly lower than 2016 DWSRF average rates. If WIFIA were authorized to provide subsidized loans and chose to do so, WIFIA loan rates could be reduced to the SRF average. However, this would require a larger WIFIA credit subsidy to support the same level of WIFIA loans.

[197] These DWSRF interest rates shown in the table and the resulting below market rate subsidy do not include the effect of "additional subsidies" due to loan forgiveness. Thus the total annual subsidy provided is larger than the interest rate subsidy shown in Figure 19. The discussion of average subsidy simply reflects the difference between market rates and the interest rates charged by the SRFs – the standard economic concept of interest subsidy. EPA also provides "additional subsidies" primarily through principal forgiveness – converting loans to grants – for economically distress local utilities and communities.

Comparative Interest Rates					
	2000	2005	2010	2015	2016
DWSRF weighted averages	2.9	2.2	1.9	1.6	1.7
State market weighted averages	5.8	4.9	4.4	3.8	3.5
DWSRF "average subsidy"	2.9	2.7	2.5	2.2	1.8
30 Year Treasury	5.46	4.51	4.34	3.01	3.06
Difference State market	0.34	0.39	0.06	0.79	0.44
Difference DWSRF weighted average	2.56	2.31	2.44	1.41	1.36

Figure 22. Comparative Interest Rates [198]

Using some WIFIA loans to directly support additional SRF lending activity presents some interesting opportunities. Discussions at the CIFA Federal Policy Conference in April 2017 suggested this could reduce WIFIA administrative costs, since WIFIA staff would not have to process, evaluate, and monitor individual loans, but could rely on SRFs to perform those functions – activities that they already perform. Most importantly, in the current constrained federal budgetary environment, it may be easier to secure additional support for expanded SRF lending activities by seeking additional credit subsidy appropriations for WIFIA than additional capitalization grants.

Given the substantial water infrastructure investment needs and the limited federal resources available through both WIFIA and the SRF programs, it is critically important to ensure that these separate federal resources are used effectively to fund the highest priority water infrastructure investments. Using WIFIA loans in conjunction with SRF loans to jointly fund specific investment projects or a portfolio of SRF loans is one way to coordinate these separate lending operations.

[198] DWSRF data from U.S. Environmental Protection Agency 2016 National Roll-up data and 30-Year Treasury from FRB St Louis FRED data base.

Panel Recommendation #16

An evaluation of any state use of Water Infrastructure Finance and Innovation Act (WIFIA) loans to expand their State Revolving Fund (SRF) lending activities is needed to compare the advantages and disadvantages of this leveraging technique relative to other leveraging techniques (e.g., tax exempt bonds). The evaluation can also identify potential program or statutory impediments to increasing SRF lending operations by leveraging WIFIA resources and assessing WIFIA's ability to meet its statutory goals by allocating some of its loan resources to increase SRF lending activity.

5.6 Other Financing Reforms

A wide variety of specific financing reforms have been proposed to help local utilities and communities bear the costs of meeting their CWA water quality goals and fund the associated long-term investments required for those and other capital improvement needs. These reforms typically involve one of three generic approaches;

1. New organizational structures or programs to improve the allocation of capital resources to water infrastructure needs;

2. New investment instruments to provide access to a broader set of capital markets (e.g. potential investors) or to lower current water infrastructure investment costs; or

3. An expansion or removal of barriers that restrict the use of current financial assistance programs supporting water infrastructure investments.

In some instances, specific financial reform proposals can involve more than one approach. For example, Congress has just funded the new Water Infrastructure Finance and Innovation Act program (WIFIA) for 2017, but proposals have been advanced to increase funding to the fully authorized level and to remove or relax certain current program restrictions.

5.6.1 Organizational Structures

There have been various proposals to create a Federal Infrastructure Bank to provide additional federal support for a wide variety of state and local infrastructure projects, including water infrastructure. The need for a new organizational structure to provide federal funding for water infrastructure projects is not clear. The new WIFIA program already provides federal support (loans) for larger water infrastructure projects and the state revolving funds for clean and drinking water – the CWSRFs and DWSRFs – already serve as "banks" supplying loans for local water infrastructure investments using federal capitalization grants. This Federal Infrastructure Bank reform would require new authorizing legislation and an appropriation to provide any new federal support.

A variant to the Federal Infrastructure Bank, or perhaps an alternative structure for the Bank, is the proposal to create a Government Sponsored Enterprise (GSE) for water infrastructure investments modeled after the two housing GSEs – Fannie Mae and Freddie Mac. In the housing industry, these GSEs were created to help lower the cost of long-term mortgage financing and to overcome perceived market barriers to supplying long-term financing through the use of guarantees. As the discussion in the next section will illustrate, the plethora of creative financial instruments to help meet water infrastructure financing needs do not suggest the presence of significant market barriers. Capital markets are far more extensive and sophisticated than they were in the 1930s when Fannie Mae was created.

In addition to these two financial organizational structures, there have been proposals to create organizational entities to help broaden the focus of water pollution issues beyond the boundaries of local communities and utilities to include a watershed or river basin approach. These proposals can involve inter- as well as intra-state issues and address a broader range of issues than improving access to long-term capital financing. They are examined in a separate section of this chapter.

Proposals to create a Low-income Water Assistance Program (LIWAP) modeled after the Low Income Home Energy Assistance Program (LIHEAP) are an indirect way to help local communities and utilities pay for needed water infrastructure investments. Water affordability issues, especially for low-income users, have become an increasingly important concern for local communities and utilities. Utilities must be able to repay their long-term borrowings, and affordability issues can impede that ability. Again, this LIWAP proposal is reviewed more thoroughly in the section on alternative rate structures and consumer assistance programs in this chapter.

The current organizational structures used to provide EPA funding support for local water infrastructure investment needs – the CWSRFs, the DWSRFs, and WIFIA – enjoy broad support among water industry stakeholders. Other federal programs in HUD (e.g., Community Development Block Grants), the Department of Agriculture (e.g., Rural Utility Service Grants and Loans), and the Army Corps of Engineers also provide federal support for local water infrastructure investment needs. From the water industry stakeholders' perspective, the critical issue is not the lack of organizational structures to provide federal resource support, but the amount of federal resources provided through the current structures.

The need for new financial organizational structures to help local communities and utilities obtain low cost, long-term capital financing appears to be far less critical than the need for additional federal financial support for water infrastructure investments.

Panel Recommendation #17

> Those proposing financial reforms to address local community and utility water infrastructure investment needs should focus on the most critical issue – additional resources to lower costs and provide greater access to long-term financing to meet water infrastructure investment needs.

5.6.2 New Financial Instruments

Capital markets and financial consultants have been creative in developing new financial instruments to help local communities and utilities secure new sources of capital financing and/or lower their investment costs. Social impact bonds, performance-based environmental impact bonds, and Green Infrastructure bonds have been issued to help specific localities meet unique financial challenges. Many of these creative instruments require substantial upfront analysis and planning, as well as some statutory flexibility. For example, the performance-based Environmental Impact Bond (EIB) issued for DC Water's Clean Rivers GI project required pre- and post-construction monitoring of runoff using flow meters, and modeling of alternative outcomes before the bond could be structured to share risks appropriately.[199] Since investors were asked to accept a variable-return based on the performance of the green infrastructure investments being financed, these data and analyses were needed to help define performance results and understand the risks of under and over performance.[200] The costs of these analyses and data development activities must be considered in addition to other bond development costs in assessing the net benefit to the locality from targeted bonds, such as EIBs.

Several water industry stakeholders have also proposed lengthening the terms of water infrastructure bonds and loans to match the long-term expected life of the structures being financed. While longer terms for financial instruments will increase the total interest costs for the particular project, annual interest costs will be lower and these costs will be shared more equitably with future users thereby providing greater intergenerational equity. Matching investment terms more closely to the expected life of the financed projects would appear to meet both efficiency and equity concerns assuming expected life estimates are reliably accurate.

An example of an extended term bond is the "century bond" recently issued by DC Water. DC Water believes their "century bond" achieved several objectives. It reduced the annual costs for funding the long-term infrastructure investment, thus helping to address affordability issues. It also provided a greater measure of intergenerational equity by allowing future users to bear some

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[199] Quantified Ventures, *World's First Environmental Impact Bond to Reduce Stormwater Runoff and Combined Sewage Overflows in Washington, D.C.*, http://www.quantifiedventures.com/dc-water.

[200] North, J. and Gong, G., *DC Water Environmental Impact Bond*, 2017. Harvard University, Kennedy School of Government, Performance Lab, https://govlab.hks.harvard.edu/files/siblab/files/dc_water_eib_project.pdf.

of the costs of the water infrastructure they will be using throughout the expected useful life of the long-lived asset.

Some stakeholders have also suggested that the SRFs or the federal government provide loan guarantees to help reduce the cost of local bond financing or provide access to capital markets for high risk communities or utilities with a low or non-existent credit rating. SRFs may be reluctant to issue state guarantees to high risk borrowers, since the risk of defaults would be much higher than on their own loan portfolio and could jeopardize their own hard-earned and closely-guarded high (often AAA) credit rating.

From the federal government perspective, a new loan guarantee program would appear to be less advantageous than a direct loan program. First, under FCRA, loan guarantees require the same credit subsidy appropriation as a direct loan with comparable terms and default risks. Thus, the federal budgetary impact is the same. From the borrower's perspective, the loan guarantee is likely to be more costly than the direct federal loan, since the reduction in interest rates for the guaranteed bond is not likely to produce an interest rate lower than the Treasury rate for a comparable maturity. Second, administrative costs are also likely to be higher for the guarantee program, since the community or utility would incur the issuance fees and other bond administrative costs while the federal government would incur administrative costs for risk assessment, processing, and monitoring program performance for the guarantees.

Finally, a number of communities have adopted different forms of P3s to obtain access to private financial resources to fund their water infrastructure investments. While these P3s' borrowing costs may not always be lower than the locality's own costs, they often provide ancillary benefits, including greater efficiency in constructing the project and/or operating the facility that may exceed or offset any higher borrowing costs. However, the private borrowing costs usually exceed those offered by the SRFs. In addition, some communities face political issues when seeking to "privatize" the delivery of basic services. The various forms of P3s used by communities are reviewed in another section of this chapter.

5.6.3 Barriers to Effective Financing

AWWA, among others, has proposed some reforms to the newly initiated WIFIA program. One proposal was to eliminate the limitation on the amount of total project costs that can be funded by the WIFIA loan – i.e. the cost sharing feature of the program. Since the program has just received a funding appropriation and has not issued its first loan, it is not possible to assess the impact of this cost sharing feature on the program. However, the demand for WIFIA loans appears to exceed the supply of loans that can be supported at current funding levels. In its first funding round, the WIFIA program received 43 letters of interest requesting more than $6 billion in credit assistance, far more demand than the program can support at its FY 2017 appropriated level.

Other suggestions have addressed perceived barriers to the use of tax exempt financing. Proposals to provide federal guarantees to tax exempt bonds have been vigorously opposed by the Treasury Department and others. These past objections reflect concern about the impact on federal borrowing costs that guaranteed tax exempt bonds may exert. In addition, these guarantees appear to be inferior instruments to direct Treasury loans as explained above.

The Panel finds that capital markets are able to develop a wide range of financial instruments to help local communities and utilities lower their investment costs or expand their access to new investment resources. But the costs, as well as the benefits of these new instruments, need to be fully understood. This is especially important for small localities with limited financial expertise.

Local communities and utilities need to understand the risks and returns from any of these new financing instruments the same as private investors making their own investment choices.

Panel Recommendation #18

The Environmental Protection Agency (EPA) should ensure that the Water Finance Clearinghouse and technical assistance activities provided through the Water Infrastructure and Resiliency Finance Center (Water Finance Center) include sharing information on the risks, costs, and advantages of any innovative financial instrument being proposed with states and localities before those instruments are used.

EPA's Water Infrastructure and Resiliency Finance Center and the Environmental Finance Centers affiliated with universities in each of EPA's 10 regions have the analytical expertise to develop and provide that information.

5.7 Rate Structures, Affordability, and Consumer Assistance Programs

Numerous economists, consultants, and other stakeholders have noted the growing concern over water affordability in the U.S. As noted in Chapter 2, water and sewer bills have increased faster than the CPI and household incomes since 2000. The impact of these trends has been most pronounced for low-income households or users. Water utility bills constitute a much larger portion of low-income household budgets. BLS consumer expenditure data indicate that water and other utilities account for decreasing amounts of consumer expenditures as incomes increase. Consequently, water rate increases have a more severe impact on low-income users.

Low-income users are not only less able to accommodate rate increases, but are also more vulnerable to other financial crises leading to higher likelihood of missed bill payments. Census data confirm that low-income users are far more likely to have difficulty paying utility bills and face service interruption or disconnections. "One 1995 Census study, for example, reported that while 9.8% of non-poor families could not pay their utility bills in full, 32.4% of poor families

could not do so."[201] Extended non-payment of utility bills can result in service interruptions and disconnections. The incidence of these problems is also higher among low-income users. As another Census study noted, "while 1.8% of non-poor families had their electric and/or natural gas service disconnected for nonpayment, 8.5% of poor families suffered this same deprivation."[202]

5.7.1 Water Rate Fundamental Principles

Water utilities are well aware of the impact their water bills have especially on their most economically vulnerable customers – low-income users. However, they also note that their water rate structures are driven by two underlying public finance principles – user pay or benefits principle and full cost recovery. The challenge occurs in determining who pays those costs. The potential conflict between the user pay or benefits principle and affordability issues emerges when low-income users cannot afford their full cost recovery water rates.

Whether publicly or privately owned, water utilities have traditionally relied upon revenues from their users to fund their operating and long-term capital costs. This reliance on own source revenues has increased as federal support for water infrastructure projects has declined or shifted from grants to loans. The termination of the EPA construction grant program to finance water infrastructure projects in the late 1990s and subsequent shift to SRF loans, albeit often subsidized, has reinforced that reliance and highlighted increased concerns about water affordability. State laws and/or public utility commissions have also limited water utility flexibility in developing opportunities to cross-subsidize certain user groups within their rate structures to help reduce affordability issues for low-income users while still generating sufficient revenue to meet their operating and capital costs.

5.7.2 Competing and Conflicting Water Pricing Goals

As Professor Manuel Teodoro acknowledges, "utilities generally design retail service rates with two main goals in mind: (1) revenue stability – the amount and reliability of sales revenues collected, and (2) equity – the degree to which customers' bills reflect the cost of their relative service requirements. A third goal, conservation pricing, has emerged in recent years as another important goal in water rate design."[203] Revenue stability is essential in helping utilities adhere to the full cost recovery principle. The equity goal reflects a utility's effort to meet the user pay or benefits principle. But affordability issues can limit the utility's ability to pursue that user pay principle.

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[201] Fisher, Sheehan & Colton, *A Water Affordability Program for the Detroit Water and Sewerage Department*, FSC's Law and Economics Insights 5(1), 2005, p. 28-29.
[202] Ibid., p. 29.
[203] Teodoro, Manuel P., *Tailored Rates*, AWWA Journal 94(10), October 2002, p. 54.

These three water pricing goals can encounter other conflicts, especially since utilities have experienced greater price elasticity than expected when raising rates to meet higher costs.

Customers do respond to higher water prices by reducing their use of water services. While this response helps achieve the conservation goal, it increases revenue volatility – thus jeopardizing the revenue stability goal. Indeed, water usage per household has declined over the past decade in response to the increase in water rates, leading some analysts to conclude that the water industry is an increasing cost industry. As Dr. Janice Beecher has observed, "water supply in general is a rising-cost industry. The combination of declining sales (as water rates increase) and rising costs, along with the movement toward full cost pricing, is placing considerable pressure on utility water rates."[204]

This conflict among water pricing goals and the need for increased revenues to meet higher costs manifests itself among utilities in very different economic markets with different structural conditions. Very small utilities with high fixed costs or impending investments needs and a limited ratepayer base present very different challenges than larger utilities in declining areas (e.g. "rust belt" cities) that also face large fixed costs and/or impending investment needs and a declining ratepayer base. But water affordability issues compound the complex choices these and other utilities face in increasing water rates and/or revising their rate structures to meet their rising costs.

5.7.3 Limited Consumer Assistance Programs

Water utilities would obviously prefer to avoid the additional costs incurred when financially distressed low-income users face service interruptions and terminations from non-payment of their water bills. Some utilities have created various forms of consumer assistance programs (CAPs) to help avoid those costs and provide eligible ratepayers financial assistance in affording their water bills. EPA's Water Finance Center conducted a survey of 795 water and wastewater utilities and found that only about 30% had some form of CAP. [205] Moreover, many existing water CAPs are limited in size due to a number of restrictions. Some rely on voluntary contributions to fund their CAPS since they are unable to use own source revenues to fund them. The recent report from the staff at the Environmental Finance Center (EFC) at the University of

[204] Beecher, Janice, *Declining Water Sales and Utility Revenues: A Framework for Understanding and Adapting*, White Paper for Water Rates Summit, August 2012, p. 4.

[205] U.S. Environmental Protection Agency, Water Infrastructure and Resiliency Finance Center, *Drinking Water and Wastewater Utility Customer Assistance Programs,* April 2016, p. 2. This WIRFC report indicated that the EPA surveyed 795 wastewater and drinking water utilities and found that only 30% of those surveyed had some form of CAP.

North Carolina (UNC) found that, "the vast majority of utility CAPs around the country tend to be rather small with limited ability to meet the needs of their at-risk low-income customers."[206]

This is strikingly different from the situation for many gas and electric utilities. As the National Consumer Law Center has noted, "while states require the electric and gas companies provide discounts to their low-income customers and telephone discounts are also available to poor consumers nationwide, most states lack any requirement that water/wastewater utilities provide a discount program to low-income customers."[207]

This lack of state support for water utility CAPs or rate discounts for low-income users is compounded by the presence of statutory limitations on the ability of water utilities to implement specific CAPs or develop rate structures that could make water rates more affordable for financially distressed low-income users. Research by the Environmental Finance Center staff at the University of North Carolina indicates that in developing CAPs or other types of rate relief for their most vulnerable users, "utilities must navigate a complex, confusing, and often ambiguous legal framework that varies considerably from state to state."[208] Adding to the complexity is the fact that different regulatory or legal restraints may apply to different types of utilities (e.g., privately vs. publicly-owned) even within the same state. "Private utilities, government-owned utilities, and non-profit water utilities often fall under different economic regulatory frameworks that influence their ability to use rate revenues to fund CAPs."[209]

As the attached state maps from the UNC EFC report reveal, UNC EFC research also indicates that 20 to 40 states either explicitly prohibit water utility rate-funded CAPs or have statutes that pose potential challenges to them.

The Panel finds that developing more efficient and equitable water rate structures and explicit CAPs focused on low-income users can only benefit both the water utilities and their most vulnerable users to meet affordability issues and reduce the costs of providing high quality water and wastewater services.

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[206] University of North Carolina, School of Government, Environmental Finance Center, *Navigating Legal Pathways to Rate-funded Customer Assistance Programs: A Guide for Water and Wastewater Utilities,* July 2017, p. 7.

[207] National Consumer Law Center, *Review and Recommendations for Implementing Water and Wastewater Affordability Programs in the US,* March 2014, p. 5.

[208] UNC, SOG, Environmental Finance Center, Ibid, p. 7.

[209] Ibid., p. 7.

Panel Recommendation #19

The Environmental Protection Agency (EPA) should work with local and state governments to eliminate barriers restricting utilities' ability to develop more efficient and equitable water rate structures, including specific Consumer Assistance Plans (CAPs) for financially distressed low-income ratepayers. EPA's Water Finance Center should continue to develop and disseminated information on CAPs to water industry stakeholders and other interested parties.

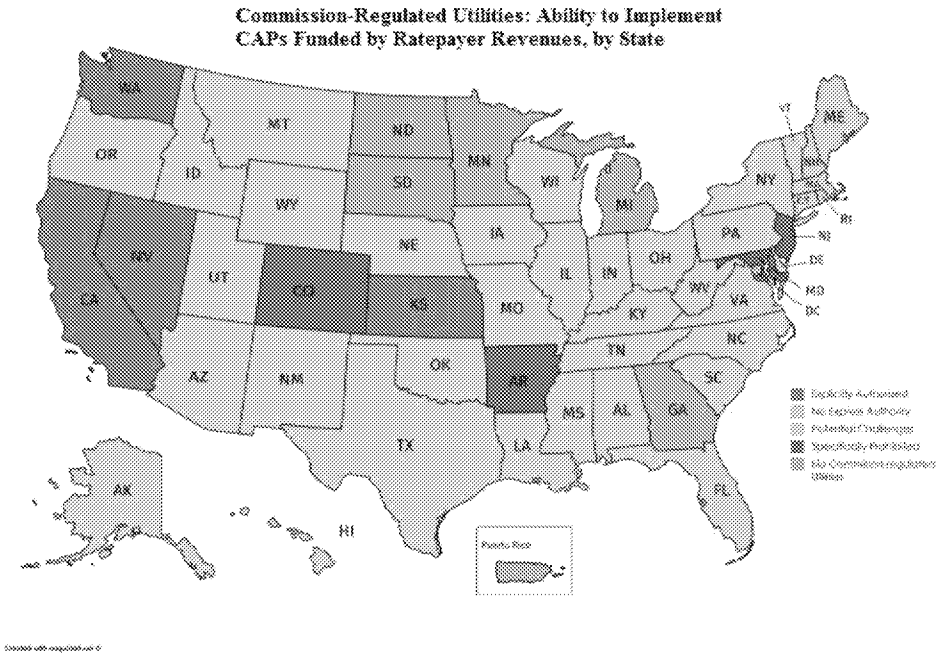

Figure 23. State CAP limitations for Commission Regulated Utilities [210]

[210] University of North Carolina, School of Government, Environmental Finance Center, *Navigating Legal Pathways to Rate-funded Customer Assistance Programs: A Guide for Water and Wastewater Utilities,* July 2017, p. 7.

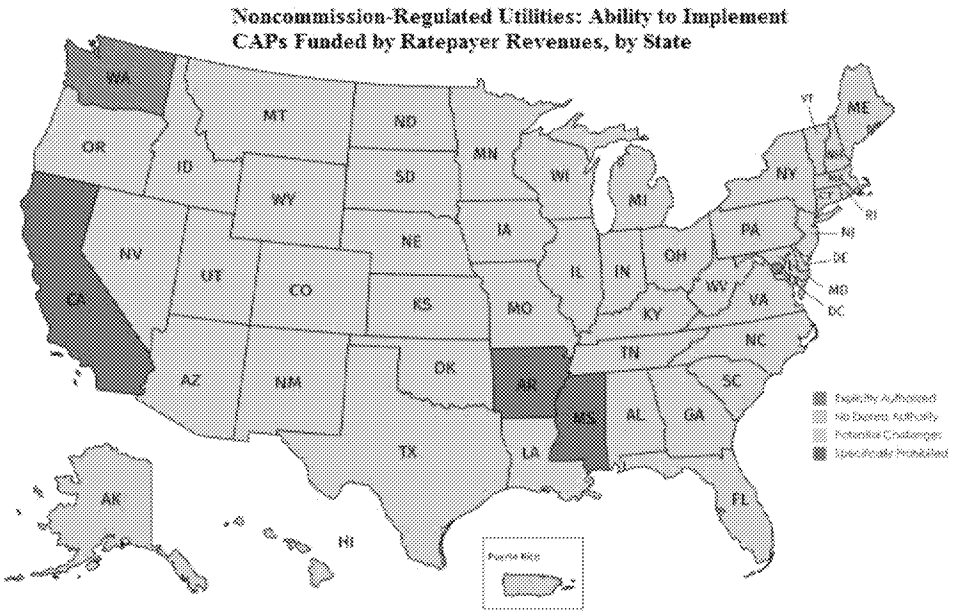

Figure 24. State CAP limitations for Noncommission-Regulated Utilities. [211]

5.7.4 Current Innovative Rate Structure Alternatives

Despite this complex, conflicting, and restrictive state legal and regulatory environment, a number of local utilities have begun to implement alternative water rate structures that can encourage conservation, provide additional revenues, and reduce water costs for low-income users who use less water than other ratepayers. "During the past two decades, conservation-oriented inclining block rate structures have steadily gained popularity in the US as utilities look to provide a financial incentive to conserve water and offer relief to conservative customers."[212] These tiered rate structures start with a small initial block rate but then increase water prices in the higher tiers as water consumption increases. Others have experimented with setting some sewer charges separate from water charges and usage. This is an attempt to expand the ratepayer base and to charge those who impose sewer costs without necessarily using water. As discussed in a previous section, separate sewer charges, especially stormwater fees, can also provide these users an incentive to control stormwater flows on their properties or take other actions to reduce their use of sewer services. Prime examples include parking lot owners with large impermeable surfaces and developer construction sites with storm water run-off issues.

Rate structures vary widely among local utilities, reflecting not only their specific financial needs and the income distribution of their users but also the regulatory and legal environment facing them. The UNC report states that "the vast majority of water and wastewater utilities in the US

[211] Ibid., p. 7.
[212] Teodoro, Manuel P., *Tailored Rates*, AWWA Journal 94(10), October 2002, p. 55.

have rate structures that are classified as "Uniform", "Increasing Block", or "Decreasing Block."[213] Most of these rate structures have an initial fixed base-charge that may be assessed regardless of the amount of water services used, or for some standard, common usage amount. These structures also include an additional 'volumetric charge' that is based on actual water usage. For the uniform structure, the volumetric charge is the same for each increment of water used. The increasing or inclining block rate has a higher rate for each additional increment of water used, while the decreasing or declining block rate has lower rates for each additional increment.

A number of utilities have attempted to use an increasing or inclining rate structure to both encourage conservation and help address affordability issues for low-income and low utilization users. DC Water's CAP program, initiated in 2009, provides an example of how that approach can work. DC Water's CAP uses the same income eligibility standards in the Federal LIHEAP program to qualify for its program. If users are eligible for LIHEAP assistance, they are eligible for DC Water's CAP. Under DC Water's CAP the first four cubic feet of water and sewer usage is free. In addition, several of the fixed charges in the user's water bill are also free.[214] George Hawkins, DC Water's CEO, has also noted that the DC Water CAP program has been supported by all DC ratepayers since there has been no opposition to the CAP at more than 74 DC Water rate hearings over the past few years. DC Water has more recently introduced an additional lifeline rate for residential users to address affordability issues for seniors on fixed incomes who are less able to accommodate water rate increases. These lifeline rates provide a discount on the first four cubic feet of water and wastewater use for eligible seniors and have proved successful in lowering their water costs and encouraging conservation.

Philadelphia has a severe and extensive water affordability issue since its poverty rate of more than 26% substantially exceeds the national poverty rate and the poverty rate in Pennsylvania. Philadelphia created the first water rate program that is based on annual user income. Philadelphia modified its Water Residential Assistance program (WRAP) with a new Tiered Assistance Program (TAP) with legislation passed in December 2015. TAP relies on federal poverty income levels that vary by size of household to determine user eligibility for TAP. Water rates vary depending on user income and household size with rates increasing at higher income levels. As Brett Walton, Circle of Blue reporter, noted,[215] TAP water rates vary as follows:

- 2% of monthly income for users with income below 50% of federal poverty levels;

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[213] University of North Carolina, School of Government, Environmental Finance Center, *Navigating Legal Pathways to Rate-funded Customer Assistance Programs: A Guide for Water and Wastewater Utilities,* July 2017, p. 166.

[214] DC Water has also reduced its reliance on volumetric charges by increasing its reliance on fixed charges to improve revenue stability.

[215] Walton, Brett, *Philadelphia Water Rate Links Payments to Household Income,* Circle of Blue, May 16, 2017.

- 2.5% of monthly income for users with income between 51% and 100% of federal poverty levels;
- 3% of monthly income for users with incomes between poverty levels and 150% of poverty levels.

Since most of these low-income users had water bill arrearages, those arrearages and arrearage payments will be suspended for users enrolled in TAP. The TAP also addresses several deficiencies in Philadelphia's previous WRAP that will be phased out and replaced by TAP. The WRAP program required that rate payers be behind on their water bills and must be homeowners. TAP eliminates these requirements.

As water utilities consider changes in the water rate structures to help address affordability issues for their most vulnerable user, they may want to apply basic guiding principles for establishing effective, equitable, and efficient public finance systems. A National League of Cities report – *Toward a System of Public Finance For the 21st Century* – defines a set of principles that can be applied in assessing the adequacy and appropriateness of municipal tax rates.

The Panel finds that these key public finance guiding principles are appropriate for assessing proposed changes to water rate structures. These include equity among income groups and intergenerational users, efficiency in encouraging conservation in the use of water services, effectiveness in meeting revenue needs and stabilizing future revenue streams, and administrative transparency and collectability.

Panel Recommendation #20

The Environmental Protection Agency's (EPA) Water Infrastructure and Resiliency Finance Center staff and the staff at the 10 Environmental Finance Centers should extend their work with local communities and utilities to help them apply those principles of equity, efficiency, effectiveness, transparency, and collectability in adopting more effective water rate structures and Consumer Assistance Plans to address increasing water affordability issues for low-income users.

Chapter 6: Other Issues to Consider

The Panel recognizes that there are a number of issues that have been raised that require response and support from the broader community and that would need to be addressed by other actors, such as Congress and state and local leadership. Often these issues require legislative change and/or funding, champions or enablers to support and implement the actions, and a broader paradigm shift with a look toward a longer timeline in order to implement the recommendations in this report. What's listed in this chapter include concepts or approaches to be explored as EPA, states and local communities, and other key stakeholders continue to pursue affordable, clean water for the all.

6.1 Performance Standards for Integrated Plans

As discussed in Chapter 3, the Panel has found that integrated planning can, in appropriate situations, yield substantial benefits, by enabling communities to achieve the greatest benefit to the environment and public health at the lowest cost. Accordingly, the Panel recommended that EPA consider requiring that integrated planning proponents should work to develop their plan before seeking regulatory approval of any deferred implementation schedules whenever feasible. Currently, there are not performance standards against which the sufficiency of integrated plans would be evaluated that can guide the development of outcome-based tools that inform decision making.

A widely accepted principle in regulatory policy is that performance standards are generally preferable to design standards. For example, an executive order on "Regulatory Planning and Review," which was issued in September 1993 and has been applied by every Administration since then, states that federal regulatory agencies shall, "to the extent feasible, specify performance objectives [performance standards], rather than specifying the behavior or manner of compliance that regulated entities must adopt [design standards]."[216] In guidance to agencies issued in 2003 and still in effect, OMB explained why performance standards are generally better (due to the flexibility and cost effectiveness for the regulated parties) but also noted a frequent drawback, which is the cost of assuring compliance.

> ***"Performance Standards Rather than Design Standards"***
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> "Performance standards express requirements in terms of outcomes rather than specifying the means to those ends. They are generally superior to engineering or design standards because performance standards give the regulated parties the flexibility to achieve regulatory objectives in the most cost-effective way. In general, you should take into

[216] Executive Order 12866 of September 30, 1993, "Regulatory Planning and Review," Sections 1(b) and 1(b)(8), published at 58 *Federal Register* 51735 (Oct. 4, 1993).

account both the cost savings to the regulated parties of the greater flexibility and the costs of assuring compliance through monitoring or some other means."[217]

In contrast, the published views of academic writers and government officials have emphasized that performance standards should not be considered a one-size-fits-all principle for designing regulatory programs.[218] Such standards may be desirable under some circumstances but not others, and, in certain situations, the best approach may be a hybrid that combines elements of both performance and design requirements.

The descriptions of the circumstances under which performance standards may be effective, and the circumstances under which design standards or a hybrid approach may be preferable, can provide a useful roadmap for considering how EPA's Community Affordability Guidance and Integrated Planning Process may be redesigned.

A performance standard that "simply codifies a broad societal objective" allows regulated parties the greatest "discretion in how they will meet the ultimate objective."[219] Therefore, a starting point would be to articulate what is the broad societal objective that the Community Affordability Guidance and Integrated Planning Process are intended to serve.

At a minimum, they are intended to bring individual CSOs into compliance with EPA's NPDES discharge requirements as soon as possible. However, to apply a single performance standard uniformly to multiple pollution sources has been found generally to "miss opportunities for flexibility and costs savings."[220] In fact, EPA's current community affordability and integrated planning guidance already recognizes the value of applying different guidelines to different sources. For a CSO that discharges to a sensitive water body or use-impaired receiving waters, EPA's February 1997 CSO guidance for schedule development states that the municipality's affordability difficulties are given relatively less weight than for a CSO that does not impact a sensitive water body or use-impaired waters. Likewise, EPA's 2012 IP Framework states that a plan should deploy the available financial resources to address the highest-priority water-quality

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[217] Office of Management and Budget, Circular A-4, to the heads of executive agencies and establishments, *Regulatory analysis*, September 17, 2003, https://www.whitehouse.gov/omb/circulars_a004_a-4#c.

[218] C. Coglianese, J. Nash, and T. Olmstread, *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection*, Regulatory Policy Program Report No. RPP-03 (2002), John F. Kennedy School of Government, Harvard University, https://www.hks.harvard.edu/m-rcbg/Events/Papers/RPPREPORT3.pdf ("Harvard Kennedy School Report"); L. Bennear and C. Coglianese, *The Performance of Regulatory Performance Standards,* The Regulatory Review, Penn Program on Regulation, May 8, 2012, https://theregreview.org/2012/05/08/the-performance-of-performance-standards; P. Swire, "Safe Harbors and a Proposal to Improve the Community Reinvestment Act, *Virginia Law Review*, vol. 79, p. 349 (March 1993), http://peterswire.net/archive/pssafe~1.htm (Introduction and Conclusion only); A. Morrison, "Case law, Systematic Law, and a Very Modest Suggestion," U. of Michigan Public Law Research Paper No. 361, *Statute Law Review*, volume 35(2), p. 159-180, (July 18, 2013, revised August 7, 2014), https://ssrn.com/abstract=2295245.

[219] Harvard Kennedy School Report, above, at p. 5.

[220] Bennear & Coglianese, "Performance Standards," above.

problems first. Multiple stakeholders have suggested that currently, integrated plans are not being consistently evaluated in an effective manner. The Panel recognizes the value of improving the approach by which integrated plans can be evaluated.

Panel Recommendation #21

The Environmental Protection Agency (EPA) should consider whether it is feasible and desirable to develop and apply performance standards against which the sufficiency of integrated plans would be evaluated. In developing such performance standards, EPA should consider the following components:

1. Under the performance standard, an integrated plan for compliance with National Pollutant Discharge Elimination System (NPDES) requirements (in addition to meeting other applicable conditions) should provide for the achievement of the greatest water-quality benefits as quickly as affordable.
2. Under the performance standard, an integrated plan for compliance with both NPDES and Safe Drinking Water Act requirements (in addition to meeting other applicable conditions) should provide for the greatest water-quality and drinking-water benefits as quickly as is affordable. Regulators should encourage and accept such a proposed one-water integrated plan only if they are willing and able to collaboratively apply equitable and principled criteria for reviewing and, if appropriate, approving the proposed choices among water-quality and drinking-water priorities.
3. The performance standard might list several specific conditions with which the proponents of a control plan should be required to demonstrate compliance, in such areas as:
    - Compliance with applicable statutory and regulatory requirements.
    - Methodology for constructing an acceptable implementation schedule.
    - Consideration of green infrastructure.
    - Use of available sources of financing to enhance affordability.
    - That the sequencing addresses higher-priority environmental or public-health risks soonest.
    - Avoidance or mitigation of any disproportionate adverse impacts on disadvantaged communities.

Variations that may exist among the water-pollution sources being controlled and the trade-offs inherent in trying to address the highest priority sources first. The panel has identified criteria for EPA to consider when developing a performance standard for the review and approval of municipalities' Clean Water Act (CWA) integrated plans, and the Panel suggests that the performance standard might be stated in language such as the following:

> *An integrated plan for compliance with NPDES requirements is acceptable if;*
> *(1) all pollution sources covered by the plan will come into compliance;*
> *(2) the greatest water-quality benefits will be achieved as quickly as is affordable, and*
> *(3) all statutory and regulatory requirements applicable to the pollution sources covered by the plan will be complied with.*

As discussed earlier, communities may be able to gain even greater flexibility and ability to craft cost-effective solutions by developing one-water integrated plans, under which the proponents review all of their outstanding clean-water and drinking water challenges and then set priorities on how available financial resources should be deployed to address the highest-priority wastewater and drinking water problems first. EPA might use language such as the following to establish a performance standard for the review and approval of proponents' one-water integrated plans, addressing both clean-water and drinking water requirements:

> *An integrated plan for compliance with NPDES and Safe Drinking Water Act (SWDA) requirements is acceptable if;*
> *(1) all pollution sources and public water systems covered by the plan will come into compliance;*
> *(2) the greatest water-quality and drinking water benefits will be achieved as quickly as is affordable; and*
> *(3) all statutory and regulatory requirements applicable to the pollution sources and public water systems covered by the plan will be complied with.*

For this approach to work, the regulatory offices at all levels of government that implement, apply, and enforce clean water and drinking water requirements must collaboratively apply equitable and principled criteria for reviewing and approving the choices among water quality and drinking water priorities addressed in the proposed plan.

While a generally stated performance standard may offer the regulated parties the greatest flexibility and opportunity to choose cost-effective solutions, this approach may also make both regulators and regulated entities uncomfortable with the amount of discretion they must exercise in developing plans and in determining whether each individual situation meets the standard.[221] It

[221] See, generally, Harvard Kennedy School Report, note [218] above, at p. 10; Bennear & Coglianese, "Performance Standards," note 218 above.

therefore seems desirable to increase the level of specificity somewhat by adopting a hybrid approach such as by stating certain factors that a plan must address in order to demonstration that the performance standard is satisfied. Based on the Panel's review, the Panel suggests that factors such as the following may be appropriate:

A demonstration that an integrated control plan satisfies the performance standard must show, at least, the following;

- *In the implementation schedule for a pollution source or a public water system,*
  - *the baseline is the time needed for normal design and construction of the control measures;*
  - *additional time may be included in an implementation schedule if necessary because of affordability; and*
  - *such additional time must be minimized for a pollution source or public water system that, respectively, causes relatively greater water-quality harm or poses relatively greater public health risk.*
- *Green infrastructure must be considered and, if it would contribute to compliance while also saving money that would enhance overall affordability of the plan, must be deployed.*
- *All available sources of financing, including innovative financing solutions, must be considered and, if useful, deployed to enhance overall affordability of the plan.*
- *Integrated planning must be undertaken to address the higher-priority environmental or public-health risks soonest, thereby enhancing the affordability of controls for lower-priority sources.*
- *Consideration must be given to disproportionate adverse impacts on disadvantaged communities, and any such impacts must be mitigated to the extent possible.*

Further application of a hybrid approach may be desirable to address the costs and burdens of compliance and implementation. Performance-based standards may impose increased costs on regulated parties, "particularly small firms, because firms must search for ways to meet regulatory standards. Some firms may simply prefer to be told exactly what to do, rather than incur costs to identify steps needed to achieve a performance standard."[222] Applying performance-based standards can also create similar challenges for regulators. "Performance-based standards depend on the ability of government agencies to specify, measure, and monitor performance, and reliable and appropriate information about performance may sometimes be

[222] Ibid., p. 7.

difficult if not impossible to obtain."[223] Regulators also are "frequently uncomfortable with the discretion inherent in loosely specified performance-based standards."[224]

One way to provide greater specificity is to start by requiring compliance with specific design requirements, "but to add to the regulation so-called equivalency clauses or provisions for alternative compliance mechanisms. These provisions effectively allow firms to 'opt out' of the prescriptive standard if they can demonstrate that they can achieve a comparable level of performance through other means."[225]

A version of this approach is what EPA uses in its current community affordability guidance. To accommodate municipalities that prefer a simple approach, especially smaller entities that may not have the resources or desire to design and conduct their own economic study to demonstrate the extent of their financial capability, EPA's 1997 FCA Guidance establishes relatively straightforward measures in the form of the Residential Index and the Residential Indicator and Community Financial Indicator, with specified percentage thresholds representing specified degrees of financial capability. EPA also believes that requiring the use of these indicators provides a common baseline for all municipalities that want to present an argument about their financial capability. But EPA's 2014 FCA Framework also welcomes municipalities to develop and submit additional information, if they wish, to bolster the demonstration about financial capability. This option might be considered a kind of "equivalency" option, allowing the municipality to develop and apply a different way of achieving the same compliant result.

However, as discussed in Chapter 3, the Panel has found that the desired flexibility that EPA seeks by this equivalency option has largely been lost, because front-line regulators often insist on applying the specified financial indicators and percentage thresholds, without giving enough credit to a municipality's proposed alternative way of demonstrating its limited financial capability. To address this problem, a different regulatory design might put greater emphasis on the flexibility offered by the performance standard. This approach would begin by requiring compliance with the performance standard stated in general terms, and would then offer municipalities the alternative option of complying with the specific financial indicators and percentage thresholds, which might be termed as "guidance" suggesting ways to comply,[226] or as a "safe harbor" guaranteeing "favorable treatment automatically."[227]

Under these approaches, the regulator would review a submitted control plan under a generally stated performance standard that allows phased or extended implementation schedules if the plan

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[223] Ibid., p. 2.

[224] Ibid., p. 10.

[225] Ibid., p. 8.

[226] Ibid., p. 7.

[227] Swire, "Safe Harbors," above. See, also, Morrison, "Modest Suggestion," above.

demonstrates that extra time is necessary because of affordability (and provided that the other applicable conditions are satisfied). The municipalities submitting the plan would be free to design and document their affordability demonstration however they wish, provided they show that the plan provides the greatest overall water-quality and drinking water benefits as quickly as can be afforded. Alternatively, if the municipalities choose to rely on a simpler and less-flexible approach, they could rely on the specific affordability indices and thresholds that EPA may specify as guidance or as a safe harbor. (The Panel's recommendations for improving those indices were stated earlier in Chapter 2.) Moreover, if a municipality's design of their own demonstration of financial capability is deemed inadequate, then the regulator could insist that the specified indices be used.

While inviting municipalities to design and document their own demonstration of financial capability, EPA's 2014 FCA Framework should specify what financial information the municipalities must make available for review. This clarity and predictability would help assure the municipalities that the front-line regulator will not have too much discretion, while it would also reassure the front-line regulators that they will receive the information they need to reach a sound decision on the application. And as is the case, generally, when information is required to demonstrate compliance, the "principle of proportionality" should apply so that the amount of information required for a municipality to demonstrate affordability would be commensurate with the size and importance of the implementation-plan issue under consideration.

6.2 One Water Approach

The discussions throughout this report that include outcomes as they relate to both clean and drinking water considerations highlight the issue of an integrated water policy or "one water" to which it is often referred. This is an approach to thinking about and managing water resources in all their forms as an integrated whole. It seeks to address the full water cycle – surface water, groundwater, drinking and industrial water, wastewater, and stormwater – and calls upon all sectors of users, providers, governmental leaders, and regulators to adopt an integrated planning approach to managing this vital resource. The arenas for action include water utilities, local government, industries, agriculture, regional conservation efforts, and others.

Because of the historic fragmentation of the governmental and non-governmental organizations that manage and use water resources, a One Water approach faces significant political, administrative, and economic obstacles,[228] but the goal of addressing the management of water resources in a holistic and integrated manner is widely accepted by those working in the field. For example, EPA's Office of Water cited the quest of the U.S. Water Alliance "for a national

[228] See, for example, BH Thompson, Jr., "A Federal Act To Promote Integrated Water Management: Is The Czma A Useful Model?", 42 *Environmental Law* 201, March 15, 2012. https://law.lclark.edu/live/files/11180-421thompsonpdf.

water vision with 'one water' at its core" as a key outside initiative that helped EPA craft its own planning to support technology for ensuring sustainability of water resources.[229]

Some stakeholders have proposed that, if a community could set priorities and schedules for satisfying SDWA requirements as well as CWA requirements in the same Integrated Plan, such a One Water approach would offer opportunities to address a range of regulatory requirements, provide multiple water quality benefits, and make strategic capital investments to maintain, repair, and build infrastructure. Under this view, decisions regarding water utility management should be approached with a systems mindset that encompasses the full water cycle and larger infrastructure systems. Advocates for a One Water policy maintain an all-encompassing water approach recognizes the true cost of water and allows for more accurate pricing, respects a holistic water ecosystem, and can be instrumental in achieving multiple benefits, with an eye on addressing an integrated natural system in an integrated fashion.[230]

However, as a practical matter, challenges related to siloed organizational structures and regulatory and statutory requirements present obstacles to such an approach. The complex structure of regulations with overlapping responsibilities and jurisdictions that currently exist for drinking water, wastewater, and stormwater management would present challenges to the development, approval, and enforcement of such a broad integration.[231]Also, some have expressed concern that, if schedules for SDWA compliance and for CWA compliance are negotiated as part of a single Integrated Plan, the greater public salience of drinking water issues may cause those issues to eclipse important but less salient water-quality issues. There is also a concern that integrating the water systems can create a consequence of disparate impact for users. Citizens are entitled to both clean surface waters and clean drinking water, and extended compliance schedules for different pollution control requirements may impact entirely different populations.

Currently, organizational structures at the EPA headquarters and regional levels (as well as in many state and local offices) are bifurcated to reflect the CWA and SDWA directives and therefore create challenges when addressing an integrated water approach. The Office of Wastewater Management is expected to prioritize meeting CWA requirements, while the Office of Ground Water and Drinking Water is expected to prioritize meeting SDWA goals. In addition,

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[229] U.S. Environmental Protection Agency, Office of Water, *Promoting Technology Innovation for Clean And Safe Water: Water Technology Innovation Blueprint – Version 2*, April 2014, p. 16. https://www.epa.gov/sites/production/files/2014-04/documents/clean_water_blueprint_final.pdf

[230] Triple bottom line (or otherwise noted as TBL or 3BL) is an accounting framework with three parts: social, environmental (or ecological) and financial. Many organizations have adopted the TBL framework to evaluate their performance in a broader perspective to create greater business value.

[231] US Water Alliance, *One Water Roadmap: The Sustainable Management of Life's Most Essential Resource,* 2016. http://uswateralliance.org/sites/uswateralliance.org/files/publications/Roadmap%20FINAL.pdf.

the stovepipes of drinking and clean water at all levels layer in additional challenges as it relates to day-to-day implementation of service delivery and regulation.

6.3 Intergenerational Equity

Funding of the current and future infrastructure needs and regulatory requirements requires attention to the intergenerational equity issues that surround the community's financing mechanisms. The question that must be asked is "does the payment for the assets align with the use of the assets?" Stakeholders have raised the concern that the lifecycle of the bonds and loans often put an inequitable burden on a smaller segment of the population due to deferred maintenance and not meeting the obligations of compliance and/or enforcement. Just as there are intergenerational equity concerns related to environmental sustainability issues, communities have looked to develop funding strategies that align with the life of the asset in order to offset inequitable financial burden on residents. The example previously mentioned of the Municipal bond which has a duration of more than 30 years, or in the case of the Century Bond, has an amortization period of 100 years, reflect the importance of addressing the costs over the long term and spreading these costs across multiple generations. Similarly, there is a need to ensure that the benefits of clean, fishable, and swimmable, where attainable, water cover residents now and in the future. There is a need to look beyond the horizon in order to ensure that the decisions being made by leaders now do not adversely affect those who will be impacted decades from now.

6.4 Addressing the Need for More Supporting and Enabling Resources

Many of the recommendations made in this report call on EPA to provide guidance and assistance to communities and state regulators in order to address the issues of achieving both affordability and water quality. These are not activities that can take place without a great deal of support and enabling factors.

There is a tremendous opportunity to draw upon the knowledge and expertise of national stakeholder organizations or other appropriate non-federal organizations that may be in a position to develop and make available informational resources and assistance useful to both permittees and front-line regulators. Much like this report recommends development and expansion of knowledge sharing, there are scenarios in which those outside of the public sector may be able to take a more partnership-like role and in essence share some of their technical assistance in a managed, transparent way in order to provide clarity on how to address affordability frameworks, to embrace and implement smart practices, and to plan both short and long-term strategies for meeting community needs.

Workforce training will be critical to the future success of EPA and its partners. Key skills sets will include technical proficiency in environmental policy, urban planning, civil and water engineering, public budgeting and management, and data analysis. Analyzing data also requires

that EPA has the right access to the necessary data and the appropriate data analytic tools in order to inform critical decision-making.

Another enabling factor will be the role of legislative branch. Congress will play a key role in enacting legislation that supports both imperatives of affordability and water quality and that does so in a way that doesn't create additional mandates without the funding to support their implementation. Many of the cutting edge technologies and more creative finance mechanisms will only be possible if there is access to technology and an embracing of innovation. Along with effective knowledge management and stakeholder engagement, there are components of the federal government that can enable this innovation. The recent establishment of the Office of American Innovation within the White House offers a new opportunity for the executive branch to shepherd new ideas and foster an innovative energy that can address regulatory and process reform, creating transformational infrastructure projects, and modernizing information technology. There are also opportunities to incorporate changes and process improvements into guidance that is being shared by the Office of Management and Budget in efforts to improve efficiency and effectiveness.

6.5 Conclusion

The Panel recognizes the efforts that EPA has undertaken to develop and improve necessary affordability guidance and to assist the states and local communities in delivering clean, affordable water to its citizens. These challenges reflect a complex set of issues EPA has been called upon to address. The fragmented set of authorities and regulatory approaches addressing CWA as well as SDWA requirements create both financial and governance pressures at multiple levels and can lead to inefficient processes. Efforts to manage across organizational silos (at all levels of government) to address drinking water, wastewater, and stormwater do not always align with community efforts to plan and sequence activities and investments in an integrated fashion. EPA continues to provide information about how to best utilize integrated planning as a key mechanism to inform decision making and to look for ways to improve this process. The agency's work to address new and innovative approaches to improving water quality standards reflects forward-looking efforts to positively affect the health and safety of citizens. The ongoing efforts to improve municipality leader's ability to assess and respond to concerns of community and individual affordability illustrate the commitment to responsive, accountable government at all levels.

Appendix A: Panel and Study Team Biographies

PANEL OF ACADEMY FELLOWS

Stanley J. Czerwinski, *Panel Chair*: Chief Operating Officer, National Governors Association; Director, Office of Administration & Finance, National Governors Association. Former positions at the U.S. Government Accountability Office: Director, Intergovernmental Relations, Controller; Associate Director, Environmental Protection. Former Assistant Director, Superfund Program; Project Director, Hurricane Andrew Task Force.

Elizabeth Fretwell: Senior Vice President, Switch. Former City Manager, City of Las Vegas. Former positions for the City of Las Vegas: Deputy City Manager; Assistant City Manager. Former Director, Intergovernmental Relations, City of Henderson; Strategic Issues Manager, Management Analyst II & I, Clark County.

R. Scott Fosler: Mayor, Town of Chevy Chase, MD; Former Visiting Professor and Roger C. Lipitz Senior Fellow, Center for Public Policy and Private Enterprise, School of Public Policy, University of Maryland. Former President, National Academy of Public Administration; Vice President and Director of Government Studies, Committee for Economic Development (CED); Member and President, Montgomery County (Maryland) Council; President, Washington Metropolitan Council of Governments; Senior Fellow, Johns Hopkins University Institute for Policy Studies; Assistant to Executive Director, National Commission on Productivity; Senior Staff, Institute of Public Administration.

Greg Lindsey: Professor, Hubert H. Humphrey School of Public Affairs, University of Minnesota. Former positions with the University of Minnesota: Executive Associate Dean; Interim Dean. Positions with Indiana University Purdue University: Professor and Associate Dean, School of Public and Environmental Affairs; Director, Center for Urban Policy and the Environment. Former Senior Fulbright Scholar, National Fisheries University, Nha Trang Vietnam. Chief, Policy, Planning, and Regulation Development Division, Maryland Department of Environment.

Michael A. Pagano: Dean, College of Urban Planning and Public Affairs, University of Illinois at Chicago. Former Director and Professor, Graduate Program in Public Administration,

University of Illinois at Chicago; Member, Intergovernmental Issues Panel, U.S. Government Accountability Office; Former Director of Graduate Studies, Department of Political Science, Miami University; Lincoln Government Fellow, National League of Cities.

STUDY TEAM

Joseph P. Mitchell, III, *Director of Academy Programs* – Dr. Mitchell leads and manages NAPA's studies program and serves as a senior advisor to NAPA's President and CEO. He has served as Project Director for past Academy studies for the Government Printing Office, the U.S. Senate Sergeant at Arms, USAID/Management Systems International, the National Park Service's Natural Resource Stewardship and Science Directorate, and the USDA Natural Resources Conservation Service. During his 16 years at the Academy, Dr. Mitchell has worked with a wide range of federal cabinet departments and agencies to identify changes to improve public policy and program management, as well as to develop practical tools that strengthen organizational performance and assessment capabilities. As the Academy's studies director, he has provided executive-level leadership, project oversight, and subject matter expertise to over 50 highly regarded organizational assessments and studies, consulting engagements, and thought leader engagements. He holds a Ph.D. from the Virginia Polytechnic Institute and State University, a Master of International Public Policy from The Johns Hopkins University School of Advanced International Studies, a Master of Public Administration from the University of North Carolina at Charlotte, and a B.A. in History from the University of North Carolina at Wilmington.

Brenna Isman, *Project Director* – Brenna supports the Academy as a Project Director and Senior Advisor. She leads and advises projects that provide organizational assessment, strategic plan development, and performance improvement guidance to Federal agencies as well as Offices of the Inspector General and other regulator organizations. Brenna's consulting experience includes both public and private sector clients in areas of stakeholder engagement, organizational development, and communication strategy. Prior to joining the Academy, Brenna was a Senior Consultant for the Ambit Group and a Consultant with Mercer Human Resource Consulting facilitating effective organizational change and process improvement. She holds a Masters of Business Administration from American University and a Bachelor of Science in Human Resource Management from the University of Delaware.

Kenneth F. Ryder Jr., *Senior Fellow and Senior Advisor* – Ken held the position of Executive Director for Research and Analysis in the Office of Thrift Supervision at the U.S. Department of the Treasury. Ken also held former positions with the U.S. Office of Management and Budget as the Deputy Associate Director of the Housing, Treasury and Finance Division; as Deputy Associate Director in the Special Studies Division with Economics and Government; as Branch Chief of the Housing Branch in the Treasury, Commerce and Housing Division; and as Senior

Management Associate of the Management Division in the National Security and International Affairs Department. Ken's other positions include a former staff economist for the Rand Corporation; Economist at Manpower Requirements; and Directorate at OASD.

Lawrence B. Novey, *Senior Advisor* – Larry served with the Senate Committee on Homeland Security and Governmental Affairs for seventeen years, the last 4 years as Chief Counsel for Governmental Affairs. While there he led and managed the committee's legislative and oversight agenda on government management and aspects of homeland security. Larry also served at the Congressional Office of Compliance, at EPA, and on detail to OMB. While at these agencies he structured and drafted regulations and procedures to implement new legislation in areas of pollution control, terms and conditions of employment, and the permitting of large industrial projects. He also coordinated the legal review of proposed regulations and of other agency initiatives; and conducted studies on topics related to employees' rights and protections. While in private practice, Larry practiced at large international firms in Washington, D.C. and New York City. He advised and assisted companies and trade associations regarding environmental regulatory compliance and assessed environmental liabilities in connection with corporate transactions. Larry holds an undergraduate degree from Harvard College, and J.D. from Columbia Law School.

Sylvia Tognetti, *Senior Adviser* – Sylvia returns to the Academy as a Senior Advisor for the Environmental Protection Agency Community Affordability and Bureau of Safety and Environmental Enforcement Projects. In 2000, she worked briefly with the Academy as a Research Associate in the final stages of a study of innovation in environmental protection at the EPA. She also teaches World Physical and Cultural Geography courses as an adjunct professor at the University of the District of Columbia Community College. Prior to attending graduate school, she held positions at the National Academy of Sciences - National Research Council, and the former Congressional Office of Technology Assessment. Since completing an MA in geography at the University of Maryland, she has consulted with a variety of non-profit and multi-lateral organizations as well as a private firm on matters of science and policy associated with land and water and climate change. Her work resulted in several reports and publications, including a chapter in the Millennium Ecosystem Assessment, for which she served as a lead author. She also held a position with the World Resources Institute's Food, Forests and Water program, Natural Infrastructure for Water initiative, helping to build the case and develop strategies for increased public and private investment in conservation and restoration of forests, wetlands and other ecosystems for their natural infrastructure values.

Elijah C. Evans, *Research Associate* - Elijah is a Research Associate at the Academy. In addition to project work, Elijah leads digital analytics and other communication projects at the Academy, and staffs the Working Capital Fund Symposium. In December 2016, Elijah received a B.S. in Convergence Journalism and Political Science from Abilene Christian University. His undergraduate thesis addressed the future of digital engagement and best digital engagement practices for small firms.

Melissa Wood, *Intern* – Melissa is a rising Junior at the University of South Carolina pursuing a Bachelor's degree in International Studies with a minor in Social Work and Economics.

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Appendix B: Methodology/Research Gaps

The Academy convened an expert Panel of five Fellows with broad knowledge and expertise in urban and environmental planning, urban finance, infrastructure, capital budgeting, intergovernmental issues, city management, regional development, and other relevant federal government and academic expertise. The Panel provided ongoing guidance and counsel to a five person Study Team who conducted the research, following a structured methodology. (See Appendix A for biographical information on Panel and Study Team members.) The Study Team approached its research in a multi-faceted and phased manner. The first phase consisted of rigorous research, analysis, and interviews. During this phase, the team conducted extensive research and analysis of EPA guidance documents, SRF data, and other public documents about EPA and their stakeholders from a wide variety of sources. The Study Team also interviewed over 100 individuals, including EPA and other federal agency officials; state and local government officials; officials from the five recipients of the EPA Technical Assistance; and various other stakeholders and stakeholders groups. (See Appendix C for the full list.) The Study Team conducted one round of long-form electronic interviews that collected 23 in-depth responses from a variety of stakeholders around the country. The Study Team visited Onondaga County, NY and Springfield, MO, which were two recipients of EPA Technical Assistance for Integrated Planning. These visits included interviews with a variety of stakeholders and tours of relevant infrastructure sites. Finally, the Study Team conducted an extensive literature review, including legislation, regulatory guidance, and other relevant perspectives on water affordability. The second phase of the process involved a stakeholder roundtable and briefing with relevant parties at EPA. The Study Team convened a group of stakeholders at the Academy headquarters for a roundtable. The roundtable acted as a sounding board for the Study Team to collect stakeholder feedback of initial findings on key topics like affordability, affordability metrics, innovative solutions, and others. The EPA briefing was similar to the roundtable and allowed the Study Team to get EPA's first impression of the preliminary findings. Throughout this phased process, the Panel advised the Study Team on direction and content. The third phase of the project process involved significant drafting, debate, and revisions of the report between the expert Panel and the Study Team.

George Washington University MPA Program Capstone Report

The Capstone is the culminating project for candidates in the Master of Public Policy and Master of Public Administration degree program at the George Washington University's Trachtenberg School of Public Policy and Public Administration. Completed in the last semester of the program, the Capstone provides an opportunity for students to synthesize and apply their academic and professional experiences through a substantial and relevant pro-bono project with an organizational partner/client, for example, a nonprofit or government agency. Over the course of 8-10 weeks, students act as consultants to the client, conducting extensive research and analysis, providing valuable assessments, evaluations, reports and recommendations to organizations working locally and around the world.

This specific capstone report contributed to the National Academy of Public Administration's efforts to fulfill a congressional request to "conduct an independent study to create a definition and framework for community affordability."

To do this, the GWU research team assessed the current efforts of localities, water utilities, and clean water permitting authorities to reduce CSOs, to implement the EPA's FCA guidance, and to leverage innovative solutions and financial assistance programs. Below is a summary of the report's findings and the potential limitations to our research.

Capstone Findings

"Great variability exists in CSO reduction strategies at the state level. This may be due to the fact that states agencies, which generally act as the NPDES permitting authorities charged with regulating CSOs, lack a unified national reduction strategy. There is not even coordination of reduction efforts between states in the same EPA regions. CSO communities have not extensively used the 2014 FCA Framework or the process of setting priorities through integrated planning. This is primarily because the majority of CSO reduction plans predate the updated guidance. Communities have hesitated to interrupt approved implementation plans to accommodate new and untested guidance. Increased coordination between EPA regions and the states during negotiations over the development of long-term control plans (LTCPs) and enforcement standards would allow communities to more freely implement integrated planning, innovative solutions, and effective CSO reduction efforts in a cohesive manner across the nation." –GW Capstone Team

Potential Limitations

"The limited data EPA publishes on CSO control efforts are frequently out of date and sometimes contradict regional and state data. The EPA often does not provide enough information to fully understand events surrounding a locality's CSO reduction efforts. There is a scarcity of academic literature that analyzes the impacts of the 1997 FCA Guidance on community affordability and CSO control. Government agencies and advocacy organizations publish much of the extant literature that is relevant to this topic. State and EPA regional officials were often unfamiliar with the EPA/NAPA initiative to update the FCA and thus were reluctant to provide complete and candid responses to the team's inquiries. The current political climate could have contributed to this reluctance." –GW Capstone Team

The Study Team concurs with the GW Capstone Team assessment that there are significant data gaps regarding CSO control efforts. The Study Team notes that the lack of nationwide CSO control data and data detailing nationwide burden per the 1997 affordability guidance contributes to the complex nature of the affordability problem. It is difficult to solve a problem when the specifics of the problem are unknown.

Stakeholder Survey – April 2017

A survey was distributed to a diverse group of external stakeholders in order to gain perspective regarding the EPA Community Affordability Framework, Innovative Solutions to address both water quality concerns as well affordability and included questions about IP as well as Cost Benefit Analysis.

Stakeholders invited to participate include the following:

American Public Works Association, American Society of Civil Engineers, American Water Works Association & Research Foundation, American Rivers, Association of Metropolitan Water Agencies, Chesapeake Bay Program, City of Springfield Missouri, City of Durham, New Hampshire, City of Burlington, Vermont, City of Santa Maria, California, Clean Water Action Project, Clean Water Construction Coalition, Council of Infrastructure Financing Authorities, Environmental Financial Advisory Board, Government Finance Officers Association ,Green Infrastructure Leadership Exchange, International City/County Management Association, National Association of Clean Water Agencies, National Association of Counties, National Association of Water Companies, National Drinking Water Advisory Council's Affordability Work Group, National League of Cities, National Rural Water Association - Local Government Advisory Committee, National Governors Association, National Resources Defense Council, Onondaga County, New York, Philadelphia Water Authority, Urban Waters Federal Partnership, US Conference of Mayors, US Water Alliance, Washington, DC Water

These organizations were encouraged to share the surveys to their members, where appropriate as well to those who they identified as thought leaders with direct experience in these topic areas. Questions included:

- The 1997 Residential Indicator (RI) of more than 2% of median household income (MHI) accurately measures the impact of wastewater costs on disadvantaged or vulnerable households/taxpayers.
    - Strongly Agree
    - Agree
    - Disagree
    - Strongly Disagree
    - No Opinion/No basis for judgment

- Should the MHI be replaced? If so, what alternative should be used?

- Yes (If yes, please describe what alternative you suggest, in the Other Box
- No
- Other

- Is the 2% benchmark appropriate for assessing high household/ratepayer burden? If not, what is a more accurate benchmark?
  - Yes
  - No (If no, please discuss a more accurate benchmark in the Other Box below.)
  - Other

- Should the costs measured in the RI be expanded? If so, what other costs should be included?
  - Yes (If yes, please detail what costs should be included, in the Other Box below.)
  - No
  - Other

- The 1997 Financial Capability (FCI) (6 data elements for debt burden, socioeconomic conditions, and financial operations) accurately measures a community's/permittee's ability to afford the costs of investments needed to achieve Clean Water Act (CWA) goals.
  - Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree
  - No opinion/No basis for judgment

- Should EPA's Affordability Framework include both impacts on households and community/permittee financial capability in assessing the burden of proposed CWA costs?
    - Only household burden
    - Only community/permittee financial capability
    - Either household burden or community/permittee financial capability
    - Both household burden and community/permittee financial capability combined

- Has EPA's revised 2014 guidance, which identifies other data elements communities/permittees can present, improved the ability of EPA's Affordability Framework to identify highly burdened communities/permittees or households?
    - Extremely
    - Very much
    - Somewhat
    - Not at all
    - No opinion

- Should EPA apply this Affordability Framework to other community/permittee environmental issues [e.g., meeting drinking water or clean air goals]? If so, what should be included and why?
    - Yes (If yes, please discuss what should be included, in the Other Box below.)
    - No
    - Other

- Have EPA regions and the states applied this more flexible 2014 Affordability Framework consistently for all communities/permittees in their area? If not, what changes are needed to assure greater consistency among permittees?
    - Can we contact you for more information? If so, please enter your email below.

- How should the Financial Capability Indicator component in EPA's 1997 Affordability Framework be changed to better measure a community's/permittee's ability to afford the costs of investments needed to achieve CWA goals?
    - Open Ended

- Are there any additional changes the EPA should make to their revised 2014 guidance that would improve the ability of EPA's Affordability Framework to assess the financial capability of communities/permittees to bear proposed CWA investment costs and their impact on household ratepayers?
    - Open Ended
- In 2012, the EPA updated its 1997 guidance in a memorandum titled Integrated Municipal Stormwater and Wastewater Planning Approach Framework. This survey section examines your interaction with the 2012 guidance.
- To what degree has the 2012 guidance changed your approach to developing and implementing effective integrated plans to meet specific CWA water quality standards?
    - It has significantly changed our approach
    - It has moderately changed our approach
    - It has little impact on our approach
    - It has had no impact on our approach
    - No opinion

- In your experience, how consistent has this guidance been applied among the EPA regions and by the individual states involved in issuing NPDES permits and/or consent decrees?
    - Extremely
    - Moderately
    - Not at all
    - No opinion

- How can EPA and/or individual states better facilitate the integrated planning process when reviewing and approving the plans developed by you or your members?
    - Open Ended
- What changes, if any, should EPA make to its current guidance to improve the use, effectiveness, and consistency of its integrated planning process?
    - Open Ended

- To what degree does the current guidance consider both costs and benefits of proposed CWA investments?
    - Extremely accurate
    - Very accurate
    - Mildly accurate
    - Not accurate
    - No opinion

- In assessing a community's/permittee's ability to afford the proposed CWA investment costs, should the EPA include costs and benefits for other community investments to meet other EPA environmental goals?
    - Yes (If yes, please explain in Other Box below.)
    - No (If no, please explain in Other Box below.)
    - Other

- What changes, if any, should EPA make to ensure all costs and benefits of proposed CWA investments are assessed?
    - Open Ended

- What categories of innovative solutions for reducing costs or helping to meet CWA water quality goals have you or your members implemented/proposed?
    - Green Infrastructure
    - Innovative Financing
    - Integrated Planning
    - Regionalization
    - Alternative rate structures/consumer assistance programs
    - N/A

- Have you been able to determine the net benefits derived from the solutions you have implemented?
    - Yes
    - No
    - N/A

- Are there impediments to implementing the innovative solutions you have proposed?
    - Yes
    - No
    - N/A

- What changes do EPA or the states need to make to help communities/permittees identify and implement innovative solutions and address impediments for reducing costs or facilitating the achievement of CWA goals? Please discuss below.
    - Open Ended

Responses to the survey were extremely comprehensive but came from a small number of respondents (23 responses were received, however some reflected a consolidated set of responses

from multiple members of the same organization.) While the low response rates would not deem the survey results as statistically sound, the Study Team was able to synthesize the findings (particularly in the open-ended questions) in a manner that informed the study work.

Stakeholder Roundtable – June 1, 2017

For the stakeholder roundtable discussion, the Study Team hosted participants* from National Association of Clean Water Agencies, National County Managers, National Association of Counties, National League of Cities, US Council of Mayors, National Resources Defense Council, National Rural Water Association, Brookings Institute, American Water Works Association, Skeo, Center for Progressive Reform.

*Additional organizations were invited to attend and were unable or chose not to attend.

The Study Team conducted a facilitated conversation between the panelists to expand on questions regarding meeting affordability goals as well as proposed solutions to address these challenges. The conversation allowed the Study Team to build on initial research to gain additional perspective regarding the current affordability framework and how the definition and financial capability calculation can better identify the most burdened members of communities. The Study Team also gained insight into other avenues for improving water quality affordably and how to better understand and analyze costs and benefits relative to water affordability issues. The roundtable discussion also included feedback regarding findings of the Survey. Some overarching concepts that were expressed include:

- The 2% MHI that municipalities and regulators consistently rely on is not an effective measure of affordability as a singular metric.
- Once localities use the 2% measure, they often feel as if they are locked into it from a regulatory perspective.
- There is a disconnect between HQ/Regions/Municipalities that has come from the complexity of implementation.
- Municipalities lack the economic and technical capacity to understand that they can engage with EPA for more flexibility in how they carry out the process.
- There was an emphasis throughout the roundtable on place-based analysis.
- The FCI indicator values should try to forecast what a community would look like in 20 years and consider emerging trends that could take place.
- There is a consensus that an IP process brings parties together and helps to overcome barriers.

- An important message to convey to Congress is that EPA needs more resources to build technical capacity and build towards capacity.
- State oversight and engagement is necessary to make sure that key rate making practices are being considered.
- Enterprise financing must maintain its integrity, and not pull funds from the water enterprise for other local services (example of Flint, MI was discussed).
- States must be an essential third party in ratemaking and in the affordability discussion.

Appendix C: Participating Individuals and Organizations

(Titles and positions listed are accurate as of the time of the Academy's most recent contact.)

The Study Team met with approximately 121 stakeholders through formal interviews and meetings. The Academy would like to thank these individuals for their contributions.

American Water Works Association
Ardnt, Aurel—Board Treasurer
Holmes, Tommy—Director of Legislation
Mehan, G. Tracy III—Executive Director, Government Affairs
Via, Steven—Director, Federal Relations

Burlington, Vermont
Moir, Megan—Assistant Director of Public Works, Director of Water Resources

DC Water
Bezak, Bethany—Green Infrastructure Manager, DC Water
Hawkins, George—CEO and General Manager, DC Water
Lisle, John—Chief of External Affairs, DC Water

Durham, New Hampshire
Janelle, Bill—Associate Vice President Facilities, University of New Hampshire
Lynch, Mike—Director of Public Works, Durham
O'Keefe, Matt—Director of Energy and Utilities, University of New Hampshire
Selig, Todd—Town Administrator, Durham
Talon, April—Town Engineer, Durham

Environmental Protection Agency
EPA Office of the Inspector General
Butler, Katie —Director of Water Evaluations
Copper, Carolyn—Assistant Inspector General for Program Evaluation
Municipal Enforcements Branch
Denton, Loren—Chief
Office of Enforcement and Compliance Assurance
Gonzalez, Sarah— Attorney-Adviser, Water Enforcement Division
Theis, Joseph—Deputy Director

Office of Groundwater and Drinking Water
Grevatt, Peter C.—Director
Kochman, Miriam—Financial Analyst, Drinking Water State Revolving Fund
Rubin, Howard E.—Senior Program Analyst, Drinking Water State Revolving Fund
Office of Science and Technology
Keating, Jim—Associate Branch Chief, Water Quality Standards
Russo, Gary—Environmental Scientist
Office of Water
Fontaine, Tim—Budget Director
Shapiro, Mike—Director, Office of Water
Office of Wastewater Management
Billah, Mohammed—Environmental Engineer
Brubaker, Sonia—Program Manager, Water Infrastructure Resiliency and Finance Center
Connor, Timothy—Chemical Engineer
Covington, John—Senior Financial Analyst, Water Infrastructure Resiliency and Finance Center
Danesi, Robin—Environmental Scientist
Frace, Sheila—Deputy Director
Gebhardt, Jim—Director, Water Infrastructure Resiliency and Finance Center
Kloss, Christopher—Chief
Sawyer, Andrew—Director
Stein, Raffael— Director, Water Infrastructure Division
Weiss, Kevin—Chemical Engineer
Region 5
Perdomo, Susan—Associate Regional Counsel
Prichard, Gary—Associate Regional Counsel
Region 9
Smith, David—Chief

Government Accountability Office
Gomez, J. Alfredo—Director, Natural Resources and Environmental Issues
Thomas, Swati Sheladia—Senior Analyst

National Association of Clean Water Agencies
Andrews, Nathan Gardner—Chief Advocacy Officer
Hornback, Chris—Chief Technical Officer
Krantz, Adam—CEO
Sinicropi, Patricia—Senior Director, Legislative Affairs

National Association of Counties
Ufner, Julie—Associate Legislative Director (Environment, Energy and Land Use)

National League of Cities
Berndt, Carolyn—Program Director, Sustainability

Onondaga County, New York
Glazer, Travis—Director, Office of the Environment
Quinn, Madison—Project Coordinator, Save the Rain, Department of Water Environment Protection
Rhoads, Tom—Commissioner, Department of Water Environment Protection

Springfield, Missouri
Barnes, Kevin—Director of the Department of Resource Management, Greene County, MO
Burris, Greg—City Manager, Springfield
Carani, David—Consultant, HDR Consulting (MCDA)
Davies, Cynthia S.—Regional Director, Missouri Department of Natural Resources
Davis, Tim—Environmental Compliance Manager, Green County, MO
Dove, Eric—Consultant, HDR Consulting (MCDA)
Hedrick, Daniel—Director of Environmental Affairs, City Utilities – Springfield, MO
Lamb, Carrie—Water Quality Coordinator, City of Springfield, Mo
Meyer, Stephen—Director of Environmental Services, City of Springfield
Milam, Kristen—Communications Coordinator, City of Springfield, MO
Millington, Jan—Assistant City Attorney, City of Springfield, MO
Rojas, Mary Ann—Director of Workforce Development, City of Springfield, MO
Scott, Cora—Director of Public information and Civic Engagement
Shockey, Sheila—Shockey Consulting
Smith, Tim—Deputy City Manager, City of Springfield, MO
Stephens, Bob—Mayor of Springfield

Syracuse, New York
Dodson, Khristopher—Associate Director, Environmental Finance Center, Syracuse University
Kerney, Owen—Assistant Director, City Planning, City of Syracuse
Maxwell, Andrew—Director of Policy and Innovation, City of Syracuse

U.S. Conference of Mayors
Anderson, Rich—Senior Advisor, Urban Water Council
Arakawa, Alan—Mayor, City of Maui (HI)
Berger, David J—Mayor, City of Lima (OH)
Buttigieg, Pete—Mayor, Southbend (IN)

Cooper, Joy—Mayor, Hallandale Beach (Fl)
Cownie, Frank—Mayor, City of Des Moines (IA)
Gray, Richard—Mayor, Lancaster (PA)
Horrigan, Dan—Mayor, City of Akron (OH)
McNally, John—Mayor, City of Youngstown (OH)
Sheahan, Judy—Assistant Executive Director
Tisdahl, Elizabeth—Mayor, City of Evanston (IL)
Zelenko, Paula—Mayor, City of Burton (MI)

Other

Anastasio, Julia—Executive Director & General Counsel, Association of Clean Water Administrators
Bacchieri, Jane—Watershed Services Group Manager, City of Portland Bureau of Environmental Services
Barnes, Glenn—Associate Director/Senior Project Director, Environmental Finance Center, UNC School of Government
Beecher, Dr. Janice—Director, Institute of Public Utilities, Michigan State University
Belan, Gary—Senior Director, Clean Water Supply, American Rivers
Cameron, Diane—Cameron and Associates
Cammarata, Marc—Director, Office of Watersheds, Philadelphia Water
Coad, Gail—Principal, Industrial Economics
Colson, Kim H.—Division Director, Division of Water Infrastructure, North Carolina Department of Environmental Quality
Connolly, Paula—Green Infrastructure Leadership Exchange
Conrad, David R.—Water Policy Consultant, Association of State Floodplain Managers
Copeland, Claudia—Specialist, Resources and Environmental Policy, Congressional Research Service
Dombroski, Marian—Director, Friends of Quincy Run Watershed
Durson, Francine—Special Issues Technical Lead, Division of Water Infrastructure, North Carolina Department of Environmental Quality
Epstein, Lee—Lands Program Director and Special Counsel, Chesapeake Bay Foundation
Farrell, Rick—Executive Director, The Council of Infrastructure Financing Authorities
Feinstein, Laura—Senior Research Associate, Pacific Institute
Fox, Jessica—Senior Program Manager, Environment, Electric Power Research Institute
Fretwell, Jeffrey K.—Director, Office of Legislative & Intergovernmental Relations, Department of the Environment, Maryland
Green, Olivia—Director of Water Programs, Atlantic States Legal Foundation
Greif, Judson—Deputy Director, U.S. Water Alliance (USWA)
Gsellmann, Patrick—Program Manager, Environmental Division, Akron Engineering Bureau, City of Akron (OH)

Holland, Craig— Senior Director Product Development, NatureVest, The Nature Conservancy

Hughes, Jeffrey A.—Lecturer and Director, Environmental Finance Center, UNC School of Government

Isaacson, Evan—Policy Analyst, Center for Progressive Reform

Kane, Joseph—Senior Research Analyst and Associate Fellow, Metropolitan Policy Program, Brookings Institution

Khuman, Jag S.—Director Water Quality Financing Administration, Maryland Department of the Environment

Kosco, John—Principal Engineer, Tetra Tech

Levine, Larry—Senior Attorney, Water Program, Natural Resources Defense Council

Liberatore, Patrick—Assistant Vice President and Analyst, Moody's

Matthews, Joan Leary—Senior Attorney, Water Program Natural Resources Defense Council

McGee, Beth—Senior Scientist, Chesapeake Bay Foundation

Miller, Sofie—Senior Policy Analyst, Regulatory Studies Center, George Washington University

Miller-Travis, Vernice—Senior Advisor for Environmental Justice and Equitable Development, Skeo

Mumm, Jason—Independent Municipal Utility Consultant

Murthy, Sharmila—Assistant Professor, Suffolk University Law School

Osann, Ed—Senior Policy Analyst and Water Efficiency Project Director, Water Program, Natural Resources Defense Council

Rexhausen, Jeff—Senior Research Associate, University of Cincinnati, Economics Center

Rothstein, Eric—Principal, Galardi Rothstein Group

Teodoro, Manuel P.—Associate Professor, Texas A&M Liberal Arts University

Tonning, Barry—Director of Applied Research, Tetra Tech

Van Wye, Brian—Branch Chief, Stormwater Program Implementation, District of Columbia Department of the Environment

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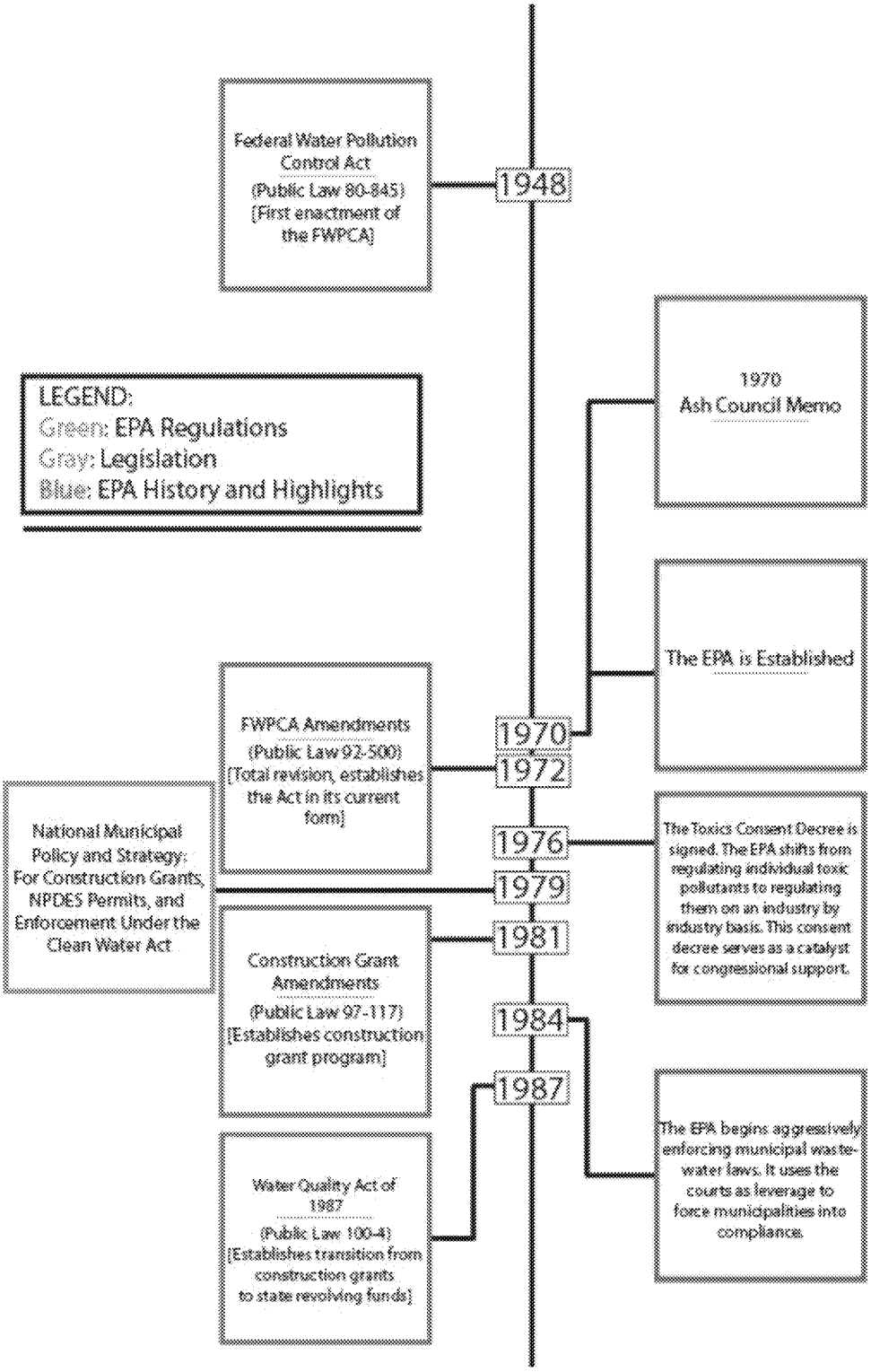
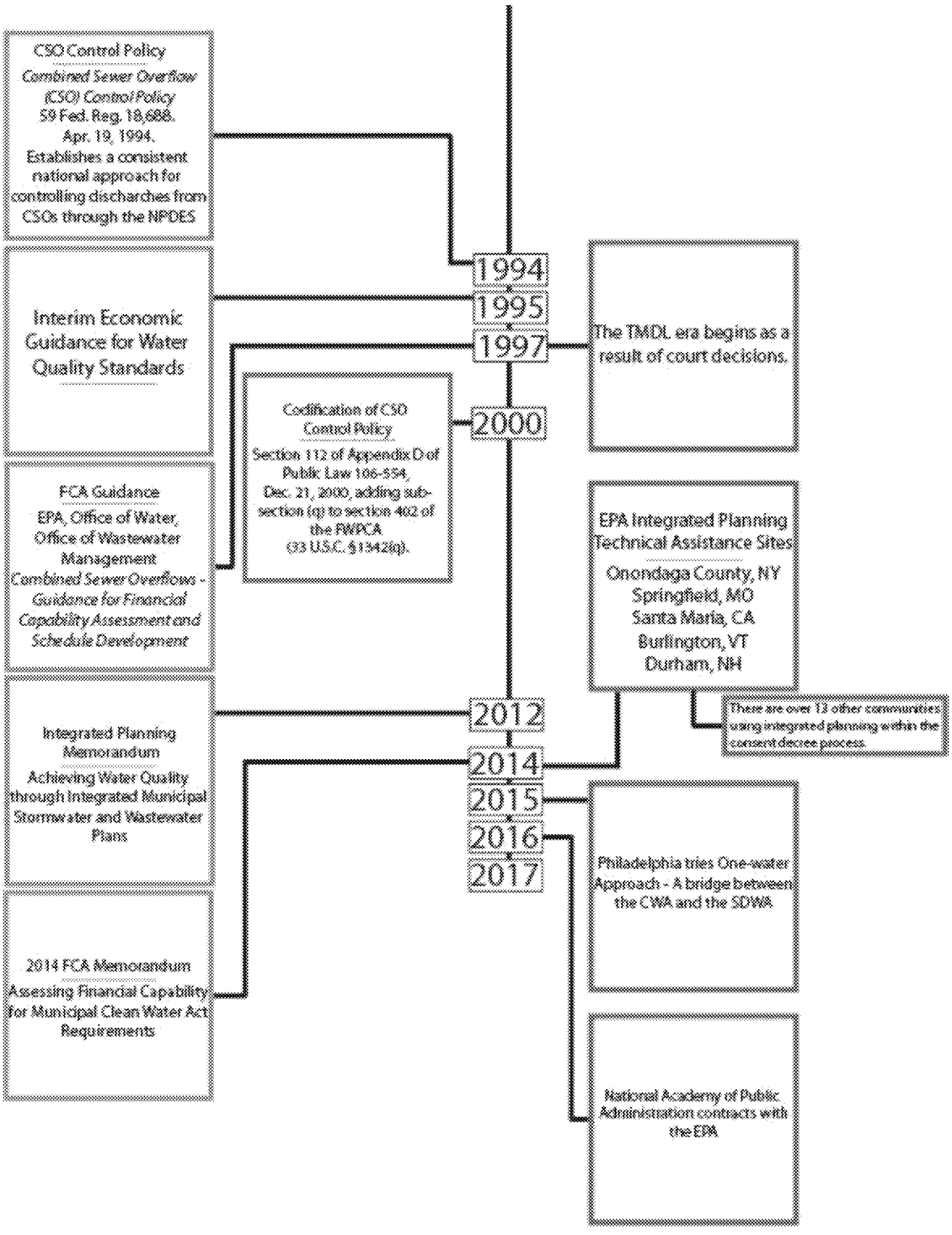
Appendix D: Legislative and Regulatory History Timeline




CSO Control Policy
Combined Sewer Overflow (CSO) Control Policy
59 Fed. Reg. 18,688. Apr. 19, 1994.
Establishes a consistent national approach for controlling discharches from CSOs through the NPDES
Interim Economic Guidance for Water Quality Standards
FCA Guidance
EPA, Office of Water, Office of Wastewater Management
Combined Sewer Overflows - Guidance for Financial Capability Assessment and Schedule Development
Integrated Planning Memorandum
Achieving Water Quality through Integrated Municipal Stormwater and Wastewater Plans
2014 FCA Memorandum
Assessing Financial Capability for Municipal Clean Water Act Requirements
1994
1995
1997
2000
2012
2014
2015
2016
2017
Codification of CSO Control Policy
Section 112 of Appendix D of Public Law 106-554, Dec. 21, 2000, adding sub-section (q) to section 402 of the FWPCA (33 U.S.C. §1342(q).
The TMDL era begins as a result of court decisions.
EPA Integrated Planning Technical Assistance Sites
Onondaga County, NY
Springfield, MO
Santa Maria, CA
Burlington, VT
Durham, NH
There are over 13 other communities using integrated planning within the consent decree process.
Philadelphia tries One-water Approach - A bridge between the CWA and the SDWA
National Academy of Public Administration contracts with the EPA

Appendix E: Community Spreadsheet

Community	Description of Environmental Challenge	Business Case/Primary Benefit Sought	Tools Utilized	Innovative Solutions	Status of Plan
City of Springfield, Missouri • Population - 167, 319. (Approximately 300,000 people are living working, and/or studying everyday) • Median household income is $33,557. • 9.9% of families and 15.9% of the population are below the poverty line	The Springfield-Greene County region, is located in the Ozarks, and relies heavily on recognizes the that the quality environmental resources are especially important since much of our economic development, tourism, and overall quality of life is directly tied into the quality of the air, water, and land. An amended consent state decree directs the city to take all necessary measures to achieve compliance with respect to the goals of eliminating Wet-weather SSOs from WCTS and prohibited bypasses at the WWTFs.	Springfield's Integrated Plan will take a holistic look (across water, air and land) at each of its environmental needs and prioritize investments based on the most effective solutions to address the most pressing problems that matter most to the community. By looking at the big picture of environmental compliance, the optimal set of environmental benefits can be provided in a manner that is affordable to citizens.	• Multiple-criteria Decision Analysis • Sustainable Return on Investment • Adaptive Management • Geographic Information System for information sharing	• Acquisition and preservation of riparian corridors • Replacing and minimizing the use of "hard" infrastructure (concrete channels, pipes) by using green infrastructure such as vegetated channels, and retrofitting detention basins • The City and James River Basin Partnership engaged local artists to paint storm drain murals to educate the public about stormwater. View the Storm Drain Reveal Brochure • Engaging local community partners such as schools and churches to address environmental challenges.	IP for the Environment – Environmental Priorities Task Force Report was finalized February 3, 2015.

Appendix E: Community Spreadsheet (cont.)

Community	Description of Environmental Challenge	Business Case/Primary Benefit Sought	Tools Utilized	Innovative Solutions	Status of Plan
Onondaga County, NY • Population - 467,026 • Median Household Income - $51,507 • 14.7% of the County lives below the poverty line but 1 in 2 children lives below the poverty line within the city of Syracuse (which is part of Onondaga County)	New York is a home rule state which provides general powers of local governments to adopt and amend local laws. Within the County of Onondaga is the city of Syracuse and 35 other small municipalities, all with separate decision making authority. County is addressing CWA requirements that include: • Stormwater permit requirements • Wastewater plant permit requirements • Combined sewer overflows • Total Maximum Daily Load	• To address stormwater and wastewater with a single decision-making process • Consolidates the various goals, priorities, actions and outcomes desired of separate Clean Water Act requirements into one planning exercise	Multiple-criteria Decision Analysis • Environmental Performance • Life Cycle Costs • Supplemental Benefits	• A 2009 Consent order reversed a county requirement to build a series of sewage plants along tributaries of the lake and instead reduce sewer overflows with trees, vegetated roofs, rain gardens, and permeable pavement and rain barrels.	IP has not been implemented, however a number of innovative, cross jurisdictional efforts continue.

Appendix E: Community Spreadsheet (cont.)

Community	Description of Environmental Challenge	Business Case/Primary Benefit Sought	Tools Utilized	Innovative Solutions	Status of Plan
City of Santa Maria, California • Population - 103,410 • The average cost of living is 13% lower than the average of California and 19% higher than the national average. • 21.2% of city residents are in poverty. • Cost of housing is 38% higher than the national average.	Current regulatory requirements that result from urbanization and pollutant loading from upstream sources include: • NPDES permits issued under CWA • Waste Discharge Requirements issued under Porter-Cologne Water Quality Control Act • TMDLs • Post-Construction Stormwater Requirements for Development Projects in the Central Coast Region, • Groundwater management obligations • Safe Drinking Water Act Standards	To help focus the City's efforts and prioritize its resources, the City has worked with the Central Coast Regional Water Quality Control Board develop an Integrated Plan that will consolidate, in one place, all of the City's water quality requirements and outline the specific and measurable steps the City will take to achieve compliance with those requirements.	Initial Ranking Tool to identify criteria for comparing and prioritizing and evaluating potential projects. Cost/Load Removed analysis – to determine the estimated benefits and costs of pollutant removal projects.	Woodchip biofilter to convert nitrate from drainage water into harmless nitrogen gas.	While supportive of the IP effort, Regional Water Board is struggling with determining how to allow for and enable the integration across the diverse jurisdictions.

Appendix E: Community Spreadsheet (cont.)

Community	Description of Environmental Challenge	Business Case/Primary Benefit Sought	Tools Utilized	Innovative Solutions	Status of Plan
Town of Durham and University of New Hampshire • Population of 14,638 • Median Household Income - $51,697 • Overall cost of living index is 5% higher than the New Hampshire average and 28% higher than the U.S. average.	Both the Town and UNH are also subject to EPA's MS4 Stormwater General Permit having adjacent regulated urbanized areas that also drain to the Oyster River estuary. There are overlapping requirements for wastewater and MS4 permits lead to duplication of efforts and inefficiencies.	A balanced approach to using nonpoint source control measures in combination with a modest Waste Water Treatment Facility upgrade could achieve similar if not greater nitrogen load reductions in a more cost-effective and sustainable manner.	Watershed based modeling approach.	• Incorporated stormwater regulations with low impact development incentives • Retrofitted a bio-retention structure in downtown parking lot • Partnered with High School to build 1,000 square foot rain garden	Durham continues to work with EPA on permit language

Appendix E: Community Spreadsheet (cont.)

Community	Description of Environmental Challenge	Business Case/Primary Benefit Sought	Tools Utilized	Innovative Solutions	Status of Plan
City of Burlington, Vermont • Population - 42,417 • Median Household Income – $42,677 • Ranked 49th in Vermont for livability due to high cost of living	CWA programs include: • 3 permitted WWTPs, each with separate and combined sewer, and remaining CSOs; • Phase II MS4 with requirements to develop Flow Restoration Plans for 3 stormwater impaired watersheds The Lake Champlain Phosphorus TMDL is currently being revised by the EPA, and Burlington is expected to receive additional regulatory requirements related to phosphorus reductions	This effort would "kick start Integrated Municipal Stormwater and Wastewater Planning in Burlington and provide the foundational elements for the successful completion of an Integrated Plan that can serve as a mechanism for meeting various human health and CWA objectives in a way which maximizes the environmental, social/community, and cost benefits (triple bottom line). It can also provide a model for similarly sized smaller communities across the nation, as well those in Vermont with similar water quality challenges.	Multiple-criteria Decision Analysis • Environmental Performance • Life Cycle Costs • Supplemental Benefits	• Stormwater Infrastructure Plan identifying retrofit opportunities throughout the watershed. • Green infrastructure toolbox • Comprehensive plan for green infrastructure retrofit opportunities.	Updated drafts of their report were submitted to EPA while Burlington continues to pursue a suite of strategies for implementing IP.

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Appendix F: Case Studies

Portland

Portland has played a pioneering role in the development of green infrastructure, which enabled the city to reduce the size of pipes needed in their Combined Sewer Overflow (CSO) control program and insure the capacity of the system for 30 years. Construction of Portland's CSO controls took place between 1991 and 2011, and reduced CSOs from 50 events per year to an average of four overflows per winter. Previously, the sewer system used to overflow into local waterways during even small rain events with accumulations as little as one-tenth of an inch; now the system can handle over one inch of rain without overflowing.

The $1.4 billion cost of the CSO program was financed by ratepayers via stormwater and sanitary utility fees, which make up approximately two-thirds of the average household combined water/sewer bill. The City continues to make payments on the CSO program debt, and also faces costs for deferred maintenance of other elements of the system. A 2008 "Gray to Green" initiative allocated $50 million from stormwater management fees for installation of complementary green infrastructure over five years.

Green infrastructure practices continue as part of a post-2011 facilities plan to further reduce CSOs while also keeping pace with increases in stormwater associated with growth. These have now become standard practices for development and redevelopment and are part of a broader asset management strategy. Portland is currently developing a Stormwater System Plan for all stormwater management using a risk-based approach to assess conditions and identify high priority areas where the consequences and likelihood of failure can be reduced. It is guided by the Portland Watershed Management Plan developed in 2005, which provides guidance for identifying projects that can meet multiple regulatory requirements in an integrated way.

These activities were initiated in response to a 1991 lawsuit by non-profit Northwest Environmental Advocates which alleged that CSOs were not covered by the existing NPDES permit and therefore constituted a violation of the Clean Water Act. CSOs discharge points were incorporated into a new permit issued by the Oregon Department of Environmental Quality in 1991. However, given that it was not feasible to meet the requirements within the five-year permit term, a separate Compliance Order was issued in which Portland agreed to a 20-year timetable to reduce CSOs.[232]

Although EPA did not initially approve a proposal for smaller interceptor sewer pipes in conjunction with green infrastructure, the Portland Bureau of Environmental Services adopted a proactive experimental approach during the planning process for their NPDES permit

[232] NWEA v Portland, decision of June 7 1995, United States Court of Appeals, Ninth Circuit. No. 92-35044. http://caselaw.findlaw.com/us-9th-circuit/1316526.html#sthash.U5GulqF5.dpuf

applications – with an emphasis on research, modeling, monitoring, and evaluation of pilot projects to identify more effective ways to manage stormwater using innovative green technologies. By implementing these on public properties they were also able to demonstrate effectiveness prior to city-wide implementation. The initial plan identified a set of cornerstone projects that were designed to remove significant amounts of stormwater from the combined sewer system prior to constructing the tunnels.[233] Key among these was the disconnection of residential downspouts. At a cost of $13 million, this project alone reduced the volume of stormwater by 20% (1.2 billion gallons per year), reducing capital costs of CSO construction by $300 million. Other cornerstone projects were the installation of stormwater sumps and sedimentation manholes to collect and infiltrate street runoff and trap sediment; stream diversion from the CS area, removing 165 million gallons; and sewer separation in some areas.

Key innovations:

- Portland was among the early developers of green streets, initially working with private developers to find creative solutions for managing stormwater runoff. With $7 million in funding through EPA's Innovative Wet Weather Programs, in 2003 Portland began piloting and evaluating new configurations of green streets. For example, the city developed green streets for industrial areas designed to reduce conflicts with bike lanes, and maximize parking. After demonstrating these would work, green streets became a part of Portland's stormwater management toolbox, and there are now close to 2000 throughout the city.

- Portland implemented the "Tabor to the River" program to address sewer system deficiencies and basement sewer backups in a neighborhood served by the combined sewer system. A pre-design cost benefit analysis indicated that combining green infrastructure with traditional gray (pipe) solutions could reduce project costs by $63 million (from $144 to $81 million).[234] Evaluation and integration of green and gray options is now becoming standard practice in developing public infrastructure projects.

- In typical capital improvement projects, BES invests 1% of the total budget in public involvement beginning six months in advance of a project. For Tabor to the River projects, the bureau directed up to 3% of the capital budget toward public involvement and started outreach efforts 18 months in advance of construction. This expanded outreach was critical to project success because of the visibility of the green infrastructure and impacts – such as parking and aesthetics - to the neighborhood. BES plans to apply this early more comprehensive engagement approach in other project areas that integrate green infrastructure and deliver multi-benefit projects.

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[233] Water Environment Research Foundation, *Case Study: Portland Oregon – Building a Nationally Recognized Program Through Innovation and Research*, 2009.

[234] Portland Bureau of Environmental Services, *Tabor to the River Program,* www.portlandoregon.gov/bes/47591.

- The City of Portland developed its first Stormwater Management Manual (SWMM) in 1999, which provides policy and design requirements for stormwater management throughout the city. The requirements in the manual apply to all development, redevelopment, and improvement projects within the city on private and public property impacting over 500 square feet of impervious surface, and prioritized the use of green (vegetated) facilities. The manual is periodically updated to incorporate innovations and build on experience, with the next – major revisions expected in 2019.

- Portland's approach to stormwater management includes investment in natural infrastructure. The 63-acre Foster Floodplain Natural Area project, completed in 2012, is a key example of Portland's multiple-benefit natural infrastructure projects. Previously a rural-residential neighborhood that was flooded an average of every other year by nearby Johnson Creek, the City acquired properties from 60 families over 15 years through its Willing Seller Acquisition Program. Buildings and roads were removed from the floodplain, along with 50,000 cubic yards of soil and other material. More than 80,000 native plants were brought in and the creek was restored to a more natural state. Foster Floodplain Natural Area is now a much-visited nature park that helps manage the most frequent floods, provides habitat for wildlife such as bald eagles and red-legged frogs, and has improved the water quality of Johnson Creek, a salmon stream in the heart of Portland.

- Co-benefits of green infrastructure projects have enabled the Bureau of Environmental Services (BES) to build partnerships and leverage additional sources of funding.

    - A FEMA Pre-Disaster Mitigation grant helped fund the aforementioned Foster Floodplain project and BES collaborated with Portland Parks and Recreation to make the natural area an amenity for the neighborhood. BES is now collaborating with the Portland Housing Bureau, Prosper Portland (the City's economic development office), and other agencies and community groups to take a holistic approach to floodplain-related issues that are still impacting the area north of Foster Floodplain. This group is working in the short term to stabilize households threatened by the rising cost of flood insurance, and developing a long-term strategy to add floodplain storage that reduces the footprint of the 100-year flood on scarce commercial/industrial land and historic residential neighborhoods.

    - The Crystal Springs restoration project is another example of the ability to attract other partners because of co-benefits - in this case, replacement of culverts not only provided improved stormwater conveyance but also enabled fish passage. Additional funding was leveraged from several partners including the USACE and Portland Parks and Recreation, which supported inclusion of recreation amenities.

- Tree planting for stormwater management provides additional health and other socioeconomic benefits, such as reduced heat island effect and increased home values.

Currently, BES's tree planting efforts are focused in historically underserved low income communities and communities of color, which tend to have lower rates of tree canopy cover.

- The Green Streets Steward program was developed to engage volunteers to help with more regular maintenance of green street facilities and reduce city costs. To date, volunteers have adopted more than 400 green streets throughout the city.

Some challenges:

Portland is aware of concerns about green infrastructure as a potential driver of gentrification and is applying an equity lens to its forthcoming Stormwater System Plan, which will guide future bureau investments. To date, the threats of CSOs and basement sewer backups in the combined sewer system have been major drivers of BES's green infrastructure investments. Because the combined sewer system is mostly confined to the historic inner city neighborhoods, which also tend to be relatively affluent, many green investments have been made in economically privileged and rapidly gentrifying neighborhoods. The bureau is concentrating some green investments, such as the tree planting, in traditionally underserved communities, where stormwater management and socioeconomic needs overlap. Further green investments need to serve stormwater management and risk-based priorities, but community partnerships are helping the bureau work beyond its traditional scope and develop projects that have multiple benefits.

Philadelphia

The Philadelphia Green City Clean Waters initiative, approved by EPA in April 2012, is investing $2.2 billion over a 25-year period to avoid the need to increase the capacity of sewer tunnels and treatment plants to avoid overflows from combined sewers that make up 60% of the city sewer system. Of this, $1.67 billion will be invested in green infrastructure, $345 million in wet weather treatment plant upgrades, and $420 million in an adaptive management or "flexible spending category" which can be targeted towards measures found to be the most efficient as the program progresses.[235] It was the first agreement to substitute green for gray infrastructure in stormwater management and is expected to reduce the cost of CSO control by $8 billion compared with the use of a gray approach.[236]

The plan was supported by an economic analysis of environmental, social and economic or "Triple Bottom Line Benefits" which compared costs and benefits of capturing runoff from 50% of impervious surfaces using green infrastructure to a 30-foot diameter tunnel option, and

[235] PWD 2011 *Amended Green City, Clean Waters: The City of Philadelphia's Program for Combined Sewer Overflow Control – Program Summary*. Amended June 1, 2011. http://www.phillywatersheds.org/doc/GCCW_AmendedJune2011_LOWRES-web.pdf

[236] Ballard Spahr – Environmental Law Institute 2016 Fifth Annual Green Infrastructure Conference, October 13, 2016, https://www.youtube.com/watch?v=NLByX3ZmhPQ&feature=youtu.be.

estimated a net benefit of $2846.4 million for green, compared with $122 million for gray. [237] Expected benefits cited in the program document included employment in green jobs (approximately 250 people/year), increases in recreational opportunities and property values, a reduction of heat-related fatalities as a result of that is attributed to shade, reduction of heat-absorbing pavement and rooftops, and water vapor emissions, health benefits of improved air quality, energy savings, and water quality and habitat improvements.[238] The original analysis also found a higher Willingness-To-Pay per household for the additional water quality and habitat improvements that would not be provided by the tunnel option.[239]

As part of this initiative, the City set a target of "greening", i.e., the ability to capture 1" of rainfall from 10,000 impervious acres. As of the fifth anniversary of the program, it had exceeded its 5-year target with 837 Greened Acres that reduce stormwater runoff by 1.5 billion gallons a year.[240] However, the program only receives compliance credit for projects on public property that the city maintains, which total only 179.7 acres.[241]

Program funds target publicly owned land including buildings, streets and rights-of-way. New stormwater rules are expected to leverage private investment as redevelopment occurs. At an estimated redevelopment rate of 1%, the City estimates that 5,000 to 6,000 acres will be greened over the course of the GCCW program. Incentives for private property owners are provided through reductions in the stormwater fee for adoption of specific practices to manage stormwater onsite. Up to 80% credit is provided for management of 1" of stormwater, which would reduce the fee on a one-acre parcel from $5600/year to as low as $1100. The Stormwater Management Incentives Program (SMIP) provides grants of up to $100,000 per acre for projects on non-residential private properties. To encourage more green infrastructure projects on private property, which have a lower cost, in 2014 the City also established the Green Acre Retrofit Program (GARP) as a way to identify the lowest-cost opportunities for these projects by enabling private contractors to identify and bundle projects, and compete for public grants to fund them.[242] A review of the program by NRDC found that contractors also have difficulty identifying these

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[237] Stratus Consulting, *Final Report: A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds*, 2009, Prepared for Howard M. Neukrug, Director, Office of Watersheds, City of Philadelphia Water Department, under contract to Camp Dresser and McKee.

[238] PWD 2011.

[239] Stratus Consulting 2009.

[240] Philadelphia Water Department, Green City, Clean Waters, http://phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan; 5 Down, 20 to Go: Celebrating 5 Years of Cleaner Water and Greener Neighborhoods – www.Phillywatersheds.org/5down

[241] Ballard Spahr – Environmental Law Institute 2016 Fifth Annual Green Infrastructure Conference, October 13, 2016 https://www.youtube.com/watch?v=NLByX3ZmhPQ&feature=youtu.be

[242] City of Philadelphia Water Department, *Stormwater Grants*. http://www.phila.gov/water/wu/stormwater/Pages/Grants.aspx

opportunities and resulted in recommendations to develop a platform through which they can connect with interested property owners.[243]

An important component is insuring city-wide access to green spaces for all citizens through the Green 2015 Action Plan, for which the goal is to add 500 acres of parkland with the goal of having a patch of parkland within a 10-minute walk from anywhere in the city [244] An additional key component is a partnership with PowerCorpsPHL, an AmeriCorps program, through which the City trains at risk youth, provides opportunities for them to gain work experience, and job placement support. As of the fifth year of the program, 24 individuals were reported to have gained permanent employment through the PowerCorpsPHL program.[245]

Key innovations and accomplishments achieved in the course of the program:
An analysis of the economic benefits of the first five years of the program by the Sustainable Business Network of Greater Philadelphia (SBN) found[246]:

- Stormwater management regulations for development helped catalyze a best-in-class GSI industry cluster for which annual growth was estimated at 13.8% from 2013-2014. Estimated economic impacts were almost $60m. It currently supports 430 local jobs, and generates nearly $1million in local tax revenue.
- 60 current GSI Partners have 1,600 employees and aggregate annual revenues of $189 million.
- Innovative stormwater management products developed by local companies have led to export opportunities.
- Projects had positive impacts on nearby property values – which had an aggregate gain of $1.3 billion, resulting in annual property tax increase of $18 million.
- Significant reductions in violence and criminal activity.
- Recreational opportunities improved physical health. Other benefits were improved mental and emotional health and aesthetic.

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[243] Valderrama, A., *Spurring Entrepreneurship and Innovation in Stormwater Markets*, 2016. Natural Resources Defense Council, Washington DC.
[244] Hogan, Dianna M., Carl D. Shapiro, David N. Karp, and Susan M. Wachter. *Urban Ecosystem Services and Decision Making for a Green Philadelphia.* U.S. Geological Survey, 2014. http://dx.doi.org/10.3133/ofr20141155.

[245] Ballard Spahr – Environmental Law Institute 2016.
[246] Green Stormwater Infrastructure Partners, *The Economic Impact of Green City, Clean Waters: The First Five Years*. Sustainable Business Network of Greater Philadelphia, 2016.

- Estimated per acre environmental benefit of green space, $10.5M/year in the form of: water quality improvement, aquatic habitat enhancement, wetlands enhancement and creation, air pollutant removal.

- Public investment in GSI of $1.2b over life of GCCW (25 years) is expected to induce additional private investment via regulation and incentives which are expected to produce an impact of $3.1 billion, support 1000 jobs a year, and generate $2 million a year in tax revenue.

The program advances social equity by generating more accessible on ramps to find employment and contracting opportunities. A majority of the projects are in relatively low income neighborhoods where they provide amenities.

Challenges and future directions of the program:

- Establishment of Community and Performance-Based Public-Private Partnerships (CBP4s) that enable the City to leverage private sector investment and efficiencies as appropriate

- Leverage partnerships by aligning PWD green infrastructure projects with capital investments e.g., in other improvements of schools and parks, in order to be able to do complete projects.

- Coordinate infrastructure planning with other sectors of the city to reduce costs

- Standardize best practices through the development of manuals and updating regulations

- Ability to develop GI projects on large, non-city properties such as schools, faith-based and academic institutions by enabling them to reduce costs, e.g., through reductions in stormwater fees and energy savings.

- Use of smart technologies for monitoring at scale to reduce maintenance costs and demonstrate program effectiveness

- Integrate CSO controls with measures to address flooding and climate change

As part of a One Water approach, Philadelphia has also established partnerships and is sharing knowledge and experience related to stormwater management with smaller upstream jurisdictions which are a significant source of wastewater effluent and stormwater runoff.[247]

[247] Couillard, E., M.D. Hesson, K. Anderson, C. Crockett, and M.E. McCarty. *Philadelphia's One-Water Approach Starts with Source Water Protection,* Journal AWWA 107(4), 2015, p. 62–71.

Other cities that have been able to modify their consent decrees to incorporate green infrastructure include New York City,[248] Washington DC,[249] Buffalo,[250] and Kansas City.[251] However it can require significant effort and resources to reopen and renegotiate existing consent decrees, and a significant investment of resources can be required to make the case for a green infrastructure plan. For example, as noted below, Washington DC invested $14 million in exploring the potential for green infrastructure that enabled them to modify a 2005 consent decree to a hybrid approach that was approved in 2015.

Washington DC

Washington DC initiated development of its Long Term Control Plan in 1998, which led to agreement on a consent decree in 2005, which had a price tag of $2.6 billion to build 3 tunnels to control CSOs that discharge 3.2 billion gallons a year.

In 2009, with a capital budget projected to expand from $200 to $550 million in 2012, combined with $950 million in costs for regulatory obligations at the Blue Plains treatment facility, DC Water initiated a Customer Assistance Program subsidized by rate payers, in which those who have met qualifications for the Low Income Energy Assistance Program are automatically qualified for water bill assistance. With a rise in fixed vs. volumetric costs, lifeline rates were also established for residential ratepayers, which discounts the first 4 CCFs of water used, thereby also providing a conservation incentive. In 2011, with an investment of $14 million, DC also began to explore the potential for Green Infrastructure with triple bottom-line benefits. This provided the basis for reopening of the consent decree. Given that DC has many households with low and high incomes with comparatively low proportion of middle income households, use of median household income as an affordability measure was not representative of community impacts. As a result, DC Water presented additional analysis of affordability to EPA which demonstrated that costs were well over 2% for the lower quintiles, to make the case for modification of the consent decree. The consent decree was modified to a gray-green hybrid plan in 2016[252] in which GI and targeted sewer separation enable the upper portions of the Potomac tunnel to be shortened. A planned Rock Creek tunnel, with a capacity of 9.5 MG, was eliminated, and replaced with GI.

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[249] DC Water 2015, Clean Rivers Project *https://www.dcwater.com/clean-rivers-project*; and Long-Term Control Plan Modification for Green Infrastructure. Executive Summary. https://www.dcwater.com/sites/default/files/green-infrastructure-exec-summary.pdf

[250] U.S. Environmental Protection Agency, *EPA Approves Buffalo Sewer Authority's Plan to Reduce Sewage and Water Pollution in Niagara River,* 2014. https://yosemite.epa.gov/opa/admpress.nsf/0/F62F59FBDAEE3ABD85257CBA005A497E

[251] U.S. Environmental Protection Agency, *Consent Decree: City of Kansas City, Missouri*, 2011, https://www.epa.gov/enforcement/consent-decree-city-kansas-city-missouri.

[252] DC Agreement to Implement Green Infrastructure to Control Combined Sewer Overflows Entered in Federal Court; January 15, 2016. https://dcwater.com/whats-going-on/news/dc-agreement-implement-green-infrastructure-control-combined-sewer-overflows

The 2016 modified consent decree maintains more affordable rates by extending the implementation schedule by 5 years, reducing typical residential sewer bills from $1675 to $1200 per year, projected for year 2032. However, use of green infrastructure to manage 498 impervious acres will enable water quality and co-benefits to begin in 2017 rather than when tunnel projects were to have been completed in 2025 in the unmodified consent decree. This is expected to reduce CSOs by 96%, reduce the chance of flooding from 50% to 7% in the Northeast Boundary area, and also reduce nitrogen discharges to the Chesapeake Bay by 1 million pounds per year.[253]

Key innovations developed in the course of the program:

- Issuance of a Century Bond that matches the term of the loan to the life of the asset. This increases intergenerational equity by spreading costs that date back a century and go forward a century.

- Issuance of a Pay-for-Performance Environmental Impact Bond: DC Water issued the first Environmental Impact Bond to fund DC Clean Rivers GI project, which targets Rock Creek. Brokered by Quantified Ventures, Goldman Sachs and the Calvert Foundation are investing $25 million for GI installations managing 20 impervious acres.[254] The amount repaid to investors is contingent on the impact of green infrastructure, as indicated by a comparison of baseline to after GI measurements, which is measured by flow meters. Payments are higher if green infrastructure facilities over perform because this potentially reduces the amount of GI needed to manage CSOs. Issued as a municipal bond, it is the first Pay for Success (PFS) bond in the environmental space, and largest PFS investment.[255]

- Green Jobs Training and Certification program was developed in partnership with the Water Environment Federation (WEF)WERF, awarding them a $1 million contract to develop and launch the program. The initial focus was on entry level jobs in construction, maintenance, and inspection, to fulfill a need for employees with the new skill sets required for green infrastructure and also provide them with a career path. In addition to DC Water, 14 other communities supported the development and launch of the program, who each paid $50,000, of which $40,000 was paid back to DC Water for having fronted the initial cost to develop the program with the $1 million contract to WEF. In the long-term, the intention was for it to be led by a third party. The initiative now has 14 partners – as a result, DC Water has been reimbursed for over half of the upfront costs. The national scope provides an additional benefit to participants in that it gives them a more

[253] DC Water 2015, Clean Rivers Project *https://www.dcwater.com/clean-rivers-project*; and Long-Term Control Plan Modification for Green Infrastructure. Executive Summary. https://www.dcwater.com/sites/default/files/green-infrastructure-exec-summary.pdf

[254] Quantified Ventures N.D. World's First Environmental Impact Bond to Reduce Stormwater Runoff and Combined Sewage Overflows in Washington, D.C. http://www.quantifiedventures.com/dc-water

[255] North, J. and Gong, G., *DC Water Environmental Impact Bond*, 2017, Harvard Kennedy School Government Performance Lab. https://govlab.hks.harvard.edu/files/siblab/files/dc_water_eib_project.pdf

portable skill, enabling them to work in participating cities. They are considering additional certification levels for higher level positions. So far, 108 people have completed 35 hours of training and passed the certification exam to be awarded certifications. The program aims to be connected to the job market through contractor requirements to hire from the program and meet hiring goals.

- DC Stormwater Retention Credit Trading Program: Enables property developers to meet requirements for onsite stormwater retention by buying stormwater credits from other property owners who are able to exceed requirements, rather than do it all on their own property, or pay an in-lieu fee that is equivalent to the average cost to the city to develop green infrastructure projects. It also incentivizes the identification of least-cost opportunities on private property by third party project developers, who can aggregate green infrastructure projects or work with large property owners to generate a larger volume of credits at a lower cost than the in-lieu fee, which can then be sold to real estate developers. By purchasing credits from third party project developers, the city lowers its own cost, and effectively establishes a performance-based Public-Private Partnership with multiple service providers.[256]

- Formed "Blue Drop" a non-profit and stand-alone affiliate in which DC Water is the only member, which enables them to generate non-ratepayer revenue. Blue Drop markets consulting services to other utilities. In addition to providing a return to DC Water, this lowers the significant upfront costs of innovation to the smaller less efficient utilities and enables all utilities to share in upfront costs for work that would be duplicative.[257]

- Resource recovery: began to produce "Bloom Soil" from biosolids recovered from the Blue Plains Resource Recovery Facility, which is marketed by Blue Drop. [258]

- Reduced a 300-year replacement cycle for water infrastructure to a 100 year one, at a cost of $40 million a year, by adding a fixed monthly Water System Replacement Fee to customers' bills in 2016. The residential fee ranges from $6.30 to $9.67 per month depending on meter size and average flow, with higher rates for larger meters in multi-family and non-residential buildings[259]

Some challenges:

- It is difficult to hold those who install a green infrastructure project responsible for initial maintenance; currently a minimum of one-year maintenance requirement is included in DC Water's GI contracts.

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[256] DC Department of Energy and Environment. Stormwater Retention Credit Trading Program https://doee.dc.gov/src

[257] Blue Drop Performance Soil. https://www.bluedrop.com/

[258] Bloomsoil. www.bloomsoil.com

[259] DC Water, Water System Replacement Fee. https://dcwater.com/system-replacement-fee.

- DC has a small customer base relative to the metro region that is served. CSO pipes are only in DC and they cannot spread costs to suburban ratepayers unless they can show flows from suburbia in the overflow pipes.

A general observation observed across these and other case studies was that it is harder for early adopters. Success is attributed to being stubborn and persistent.

Smart Technology Case Studies

South Bend Indiana

Some jurisdictions have been able to lower costs of CSO control using sewer optimization technology in combination with other approaches. An example is the City of South Bend Indiana, which avoided costs of $120 million for conventional civil engineering projects to separate sewer lines by investing $6 million in "CSOnet". This is a network of smart sensors and valves that enable real-time monitoring of flows in the sewer system so that use of storage capacity in existing pipes can be optimized by redirecting flows.[260]

The City has also conducted feasibility analysis for other ways to reduce total estimated costs of the CSO LTCP, by also using green infrastructure in combination with real-time controls, as a complement to conventional methods. The current Mayor is now seeking to reopen the Consent Decree to be able to adopt a plan that would reduce costs of the LTCP from $700 to $200 million which would reduce costs relative to average sewer bill from 3.7 to 2% of MHI.[261] With a population of just 100 million, and high poverty rates, increases in rates were already leading to increases in water shut-offs.

Syracuse New York

Syracuse faces a backlog of deferred maintenance of its underground water and sewer lines, many of which are over 100 years old and contribute to CSO events, which need to be controlled under a Consent Decree with Onondaga County. Syracuse is one of 36 governments in the County. Given that New York is a home rule state, land use authority and management of collection sewers resides with each of these 36 local jurisdictions. However, under an Inter-Municipal agreement, Syracuse supports the County in meetings its regulatory obligations in exchange for funding assistance.

With a grant from Bloomberg Philanthropies, Syracuse formed an Innovation Team or "i-Team" that undertook several initiatives that enable the city to be more proactive in addressing the challenge of deferred maintenance. Water main sensors, along with testing and replacement of non-functioning valves enable the city to isolate the locations of breaks in the pipes and identify

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[260] City of South Bend, CSOnet, https://www.southbendin.gov/government/content/csonet.

[261] Parrot, J., *South Bend hopes to spend millions less on sewers*, South Bend Tribune, May 9, 2017. http://www.southbendtribune.com/news/local/south-bend-hopes-to-spend-millions-less-on-sewers/article_55fb3cf6-3fd8-5016-a16f-4d2808ea8271.html

the closest water main valves, which minimizes disruption as well as cost in repairing water main breaks. Data science and predictive modeling to assign risk scores provide the basis for an early warning system that enables potential breaks to be addressed proactively and prevented. Lastly, following the "dig once" approach, better construction coordination of repair work among utilities also reduces costs and disruption. [262]

[262] City of Syracuse, Innovation Team, *2016 Infrastructure Final Report*, http://www.innovatesyracuse.com/infrastructure.

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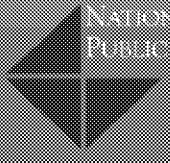

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Message

From: Smith, Wil [wsmith@epri.com]
Sent: 11/14/2017 5:39:33 PM
CC: Hunter, David [DHUNTER@epri.com]
Subject: Understanding Impacts of High Renewable Penetration: An EPRI, DOE, NREL, EPA, EIA Multi-Model Exploration
Attachments: Agenda EPRI DOE NREL EIA EPA Renewable Scenarios Modeling.pdf

Dear Colleague,

Please find attached the agenda for the December 12th Electric Power Research Institute (EPRI) Washington Seminar, *"Understanding Impacts of High Renewable Penetration: An EPRI, DOE, NREL, EPA, EIA Multi-Model Exploration"*. Speakers from each of these organizations will present results and offer insights from a study of high-penetration variable renewable energy scenarios using each organization's own model. The seminar will take place Tuesday, December 12th, 2017, from 8:30 am to 1:15 pm at the The Capitol Hilton, 1001 16th ST NW, Washington DC. Lunch will be provided. ***Please rsvp to Wil Smith (wsmith@epri.com) if you have not already done so.***

Wind and solar deployment in the United States has grown at unprecedented rates in recent years. Over the past decade new capacity installations have been comprised almost solely of new wind, solar, and natural gas-based technologies. This growth and accompanying rapid technological progress have led operating wind capacity (82 GW) to surpass hydropower as the leading renewable technology on an installed capacity basis. Meanwhile new solar installation records (15 GW) were broken in 2016.

Whether this growth trajectory will continue is a key question for policy-makers and industry stakeholders. It is also a challenging question, given significant uncertainties surrounding competing technologies, demand growth, policies, and the degree of continued technology changes. U.S. power sector capacity expansion models are widely used to navigate this uncertainty and inform policy making, investment decisions, technology assessments, and evaluations of drivers and impacts of electric sector evolution.

Capacity expansion models represent a complex power system over long time-scales, typically decades. Doing so requires many simplifications. Tradeoffs between detail and computational tractability are required. The location-dependence, variability, and uncertainty of renewable energy add to the modeling challenges and, at high renewable energy penetrations, might call into question the validity of existing simplifications in the models.

To address these challenges, four national-scale capacity expansion modeling teams—from the Electric Power Research Institute, the Energy Information Administration, the Environmental Protection Agency, and the National Renewable Energy Laboratory—participated in a research project supported by the U.S. Department of Energy to compare modeling methods and results under high-penetration variable renewable energy scenarios.

This seminar will present findings and insights from the four modeling teams and Department of Energy. Speakers will discuss insights into high-penetration renewable scenarios and the strengths, limitations, and opportunities from the four capacity expansion models used. These findings will help analysts, policy-makers, and stakeholders better understand and interpret results from these modeling tools.

Tuesday, December 12, 2017
Seminar: 8:30 am – 1:15 pm
Lunch will be provided
The Capitol Hilton, 1001 16th ST NW, Washington DC
RSVP to: wsmith@epri.com
Name, Title, and Company

Please RSVP to Wil Smith, wsmith@epri.com.

We hope to see you there.

David

David E. Hunter, Ph.D.
Sr. Government and External Representative
Electric Power Research Institute
1325 G ST NW Suite 1080
Washington, DC 20005
Tel: Ex. 6 (m)
Fax: 202-293-6187
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Understanding Impacts of High Renewable Penetration: An EPRI, DOE, NREL, EPA, EIA Multi-Model Exploration

December 12, 2017

The Capitol Hilton, 1001 16th ST NW, Washington DC

TUESDAY, DECEMBER 12, 2017		
TIME	**TOPIC**	**PRESENTER**
8:30 a.m.	*Continental Breakfast*	
9:00 a.m.	Welcome and Introductions	*David Hunter, Senior Government and External Representative, EPRI*
9:10 a.m.	The Importance of Modeling Renewable Energy: Policy and Modeling Considerations	*Steve Capanna, Director, Strategic Priorities and Impact Analysis, DOE*
9:20 a.m.	Capacity Expansion Models and the Electricity Sector: Impact of the EPRI, EIA, NEMS, and EPA models	*Francisco de la Chesnaye, Head, Energy and Environment Analysis, EPRI*
Session 1	**A Multi-Model Renewables Exploration: Study Design and Results** *Moderator: David Hunter, EPRI*	
9:30 a.m.	EPRI, DOE, NREL, EPA, EIA Variable Renewable Energy Multi-Model Project: Overview and Insights	*Wesley Cole, Energy System Modeler and Analyst, NREL*
9:50 a.m.	Insights into the Future of Variable Renewable Energy: A Multi-Model Perspective of the U.S. Electricity System	*John Bistline, Senior Technical Leader, EPRI*
10:10 am.	Discussion	
10:30 a.m.	*Coffee Break*	
Session 2	**Modelling High-Penetration Renewables: Insights and Perspectives** *Moderator: Christopher Namovicz, Team Leader for Renewable Electricity Analysis, EIA*	
11:00 a.m.	Insights from NEMS: 3 Keys to Renewables Modeling: Resolution, Resolution, and Resolution	*Cara Marcy, Renewable Electricity Analyst, EIA*
11:15 a.m.	Insights from IPM	*Ryan Sims, Economist, EPA*
11:30 a.m.	Insights from ReEDS: Better Models = Better Projections	*Bethany Frew, Energy Analyst, NREL*
11:45 a.m.	Insights from US-REGEN: The Importance of Capturing Renewable Co-Variation with Load	*David Young, Principal Technical Leader, EPRI*
12:00 p.m.	*Discussion*	
12:15 p.m.	*Networking Lunch*	
1:15 p.m.	*End*	

Message

From: Matt Mazefsky [Matt.Mazefsky@rosebudmining.com]
Sent: 10/27/2017 5:30:25 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Thank you

Lee:

I just wanted to drop you a quick note to say thank you for taking the time to meet with the Rosebud team on Wednesday. It was a great opportunity for us and we appreciate the EPA listening to our concerns. It was also great to hear about some of the initiatives you have in the works at the EPA. Please let me know what I can do as follow-up on the items discussed at the meeting, including WET Testing in both PA and Ohio. Thanks again and have a good weekend.

Matt Mazefsky
General Counsel
Rosebud Mining Company
301 Market St. Kittanning, PA 16201
724.545.6222 **Ex. 6**
www.rosebudmining.com

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/8/2017 6:41:46 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: AWWA statement on SDWA Health Advisories to NDWAC
Attachments: 2017 12 08 Oral Comment by the American Water Works Association (003).pdf

Lee,

FYI.

Tracy

American Water Works Association

Dedicated to the World's Most Important Resource™

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Oral Comment by the American Water Works Association
to the National Drinking Water Advisory Council
December 8, 2017

The American Water Works Association (AWWA) commends U.S. EPA for recognizing the seriousness of exposure to cyanotoxins, as well as per- and poly-fluoroalkyl substances. We agree that cyanotoxins present an important public health issue and that the nation should have strategies in place to reduce exposure to these compounds. AWWA has repeatedly expressed its concerns in testimony to Congress and in comments to EPA on risk management of cyanotoxins. We have also provided both informational material and opportunities for the drinking water community to learn more about how to detect and manage both cyanotoxins and PFAS.

The water supply community is, however, concerned with EPA's process for the preparation, dissemination, and implementation of health advisories. Rapidly released health advisories and risk management guidance that has not been thoroughly vetted with the informed stakeholder community leads to unwarranted distrust of the nation's public water supply.[i] AWWA encourages EPA to:

1. Actively engage stakeholders as it develops health advisories and accompanying recommendations.
2. Facilitate effective and consistent state action in response to health advisories.
3. Evaluate the appropriateness of the current health advisory development process and calculation used to set health advisory levels.
4. Work with AWWA, states, and other stakeholders to develop an ongoing dialogue around drinking water, contaminants of concern and effective risk communication. [ii]

I would like to share with the National Drinking Water Advisory Council some specific concerns AWWA has already shared with EPA:

1. EPA must avoid "regulation through guidance," as well as, the appearance of regulation through guidance. There are clear court opinions within which EPA must work and recent cases illustrating that Agency actions with *de facto* regulatory impacts are, for all intents and purposes, regulation. These de facto regulatory actions are subject to the same procedural safeguards as a regulatory requirement.[iii], [iv]
2. Health advisories, particularly those that include recommendations for action should be classified as "Economically Significant Guidance Documents" and their development should

meet the expectations of relevant Office of Management and Budget circulars including adhering to transparency and public engagement requirements.[v]

3. As the Agency distributes educational material in the absence of a rulemaking, there is the opportunity to learn from and incorporate key benefits from the normal rulemaking process, including:

    a. Actively involving expert stakeholders to obtain insights into what information is needed, practical constraints that should be reflected, and insights into how to most clearly convey useful information.

    b. Effectively engaging the nongovernmental organization / association community throughout the development of educational materials. The association / NGO community provides an important informal vehicle for assuring that key stakeholder communities like state primacy agencies and water systems are ready when the Agency releases its final products and have informed and prepared their leadership and public(s).

    c. Careful vetting of response strategies with actual practitioners. Educational materials that link thresholds for public health concern to response strategies (e.g., analytical methods, data collection strategies, treatment options, public notification) can be more effective than releasing one without the other, but consideration of input from actual practitioners is critical. Where water system practice is an element of the response strategy, AWWA would be pleased to be of assistance in providing this review.

    d. Demonstrate analytical method and treatment performance. Standardized analytical methods with verified performance at concentrations of interest, as well as demonstrated treatment options, are essential to the credibility of educational materials.[vi]

While the above represent key steps to improving the health advisory process, it is essential that the Agency's tenor and the substance of EPA's communication materials clearly and accurately reflect the role and purpose of health advisories, e.g., as tools that inform risk managers.

Thank you for your time and attention. I would be glad to try and address any questions.

---

[i] June 15, 2015, Correspondence to Ken Kopocis, Microcystin and Cylindrospermopsin Advisories and Guidance.
[ii] September 6, 2016, Correspondence to Peter Grevatt, Health Advisories
[iii] Ibid
[iv] May 15, 2017, Comments on "Evaluation of Existing Regulations"
[v] July 2, 2015, Correspondence to Caryl Muellerleile, "Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water"
[vi] September 6, 2016, Correspondence to Peter Grevatt, Health Advisories

Message

From: Amanda Waters [AWaters@nacwa.org]
Sent: 11/20/2017 2:03:04 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Automatic reply: CLE Form for the Clean Water Law Conference

Thank you for your message. I am out of the officeon vacation until Wednesday, November 22. I will respond to your email then. If the matter is time sensitive, please call my cell phone at Ex. 6 Thank you.

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/8/2017 3:54:05 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re WIFIA and SRF/WIN/WIFIA
Attachments: AWWA memo on WIFIA - Dec 8.pdf

Lee,

We offered these comments with the Chief Counsel of SEPW pursuant to a recent meeting.

FYI.

GTM

American Water Works Association

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TO: Teri L. Donaldson, General Counsel, Senate Committee on Environment & Public Works

DATE: Dec. 8, 2017

FROM: G. Tracy Mehan III, Executive Director, Government Affairs

RE: modifying WIFIA and a proposal for a WIFIA for state revolving loan fund programs

Thank you, again, for meeting with me and my staff to discuss drinking water issues before Congress. We promised to get back to you with some thoughts on the Water Infrastructure Finance and Innovation Act (WIFIA) program that the committee might consider as it works on infrastructure legislation.

WIFIA modifications

The level of interest shown by utilities and communities in this first round of WIFIA loan applications is showing us that there is a genuine interest and need for this program. As I mentioned, this is the first round of applications, so we do not have case histories yet to show where the WIFIA application process could be improved. The first dollar in loan funds have not gone out the door, so we cannot in fairness make recommendations for the loan maintenance process, either.

However, if the committee is looking for ways to enhance WIFIA and help it further realize its potential, we do have an idea. The version of WIFIA approved by the House and found in the original Senate bill did not have the 49-percent cap on WIFIA support for a project. That came about largely because of the unique world of CBO scoring and similar issues. TIFIA funds 49 percent of transportation projects, which commonly receive funding from a variety of sources. Then CBO scored WIFIA on the premise that it would result in exponential increases in infrastructure spending, that tax-exempt finance would cover the remaining 51 percent of project costs, and then that there would be a significant "hit" on the U.S.Treasury.

The water community explained to Congress that water infrastructure projects were inevitable whether or not there was a WIFIA and if there was no WIFIA, they would use considerably more tax-exempt finance. WIFIA, however, could keep the costs of projects lower, with benefits eventually passing on to local ratepayers. Congress did remove the ban on the use of tax-exempt finance for WIFIA, but left the 49-percent cap on WIFIA support.

As a consequence, water utilities or the local entities pursuing a water infrastructure project must pursue additional financing if they want to take advantage of WIFIA's financial and other benefits. Some of our member utilities – with solid credit ratings and worthy projects – have told us that having to apply for additional finance does discourage them from considering WIFIA as a finance tool.

Therefore, if WIFIA authorizing language is to be opened up in this session, we recommend that the 49-percent cap on WIFIA support of a project be raised considerably or simply eliminated.

In addition, the 43 letters of interest EPA received regarding WIFIA financing indicate there is substantial interest in the program. We urge Congress to remove the "pilot program" designation for WIFIA and provide robust and sustained funding commensurate with borrower demand.

Proposal for an SRF-Preference within the WIFIA program

We understand that there may be interest among SRF agencies in creating preferential borrowing terms and exclusive, dedicated budget authority within the WIFIA program for SRFs. As we described in our earlier meeting, we have serious reservations about this idea. First of all, this program appears unnecessary. Every one of the SRF projects eligible under that proposal would already qualify for financing under WIFIA, given that SRFs can bundle smaller projects to meet the project size thresholds, as the State of Indiana has done. We believe we at least ought to see how the Indiana project plays out, and the level of SRF interest in WIFIA generally, before creating and dedicating outsized funding to another SRF program within WIFIA.

We have additional concerns. We believe the enormous interest rate subsidy – funding loans at one-half of Treasury rates – is a significant step backward from our collective effort under WIFIA to leverage limited federal funds to support much-needed water infrastructure investment. With the 12 WIFIA loan applications EPA is processing now, the agency has estimated it will leverage WIFIA capitalization funds at a **ratio of 92:1**. We estimate that loans under the proposed SRF preference would consume an enormous amount of budget authority with the interest rate subsidy, resulting in a dramatically lower leveraging ratio of **just 6:1**.

At 6:1, these SRF preference loans could support about $1.2 billion in loans, which, in turn, would support about **$2.4 billion** in total water infrastructure investment with their **$200 million proposed authorization.**

In contrast, at 92:1, EPA has informally estimated that the agency can support twice that level of loans -- $2.3 billion -- and twice the level of total infrastructure investment -- **$5 billion** in projects -- with **just $25 million in WIFIA authorizations**.

Additionally, the draft bill appears to give the EPA Administrator complete discretion in making loans at half the Treasury rate, so this interest rate subsidy is apparently not targeted to rural or under-resourced systems. Finally, there appears to be no provision for the rate savings to be passed along to the borrowers from the SRF.

Would not Congress want to see its appropriations stretch further, as the original WIFIA would do? Also, why shouldn't states compete on their merits for WIFIA dollars just like the other entities?

There is a provision in the proposed SRF WIFIA bill that would theoretically protect the SRF programs and WIFIA by saying that this new program could not be funded unless the SRFs and WIFIA got the same amount of money as they did the previous year. We believe that once CBO scores this bill, that provision will likely be removed to help reduce the deficit the new program would cause. In addition, this language would create a de facto cap on SRF and WIFIA appropriations at FY 2017 levels, where the WIFIA authorizing legislation provided for increased funding each year for WIFIA.

We would not be surprised to see the SRF WIFIA take the place of the annual capitalization grants for the SRF. There could be economic merit to this, but it very much needs to be discussed in hearings and stakeholder meetings. Several issues would need to be worked out, such as how state agency administrative costs would be handled, what would happen to the set-asides states use to run their drinking water programs, and how to handle the SRF use of negative-interest loans or principal forgiveness for distressed communities and the budgetary impacts on the program.

We would be happy to continue these conversations on the SRFs, WIFIA and any other aspects of the Safe Drinking Water Act and water infrastructure finance. Please do not hesitate to contact me or my staff.

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 1/3/2018 9:21:47 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: The University Bookman: William F. Buckley, Jr. and His Presidents

http://www.kirkcenter.org/bookman/article/william-f.-buckley-jr.-and-his-presidents#.Wk1E6Rd23cY.mailto

I thought you might find my review of this new political biography of William F. Buckley, Jr. of interest.

Tracy Mehan

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 12/8/2017 3:03:26 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Watershed degradation and treatment costs
Attachments: Watershed Degradation Study.pdf

FYI.

Tracy Mehan

Attachment

Estimating watershed degradation over the last century and its impact on water-treatment costs for the world's large cities

Robert I. McDonald[a,1], Katherine F. Weber[b], Julie Padowski[c,d], Tim Boucher[e], and Daniel Shemie[f]

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Edited by B. L. Turner, Arizona State University, Tempe, AZ, and approved June 14, 2016 (received for review April 5, 2016)

Urban water systems are impacted by land use within their source watersheds, as it affects raw water quality and thus the costs of water treatment. However, global estimates of the effect of land cover change on urban water-treatment costs have been hampered by a lack of global information on urban source watersheds. Here, we use a unique map of the urban source watersheds for 309 large cities (population > 750,000), combined with long-term data on anthropogenic land-use change in their source watersheds and data on water-treatment costs. We show that anthropogenic activity is highly correlated with sediment and nutrient pollution levels, which is in turn highly correlated with treatment costs. Over our study period (1900–2005), median population density has increased by a factor of 5.4 in urban source watersheds, whereas ranching and cropland use have increased by a factor of 3.4 and 2.0, respectively. Nearly all (90%) of urban source watersheds have had some level of watershed degradation, with the average pollutant yield of urban source watersheds increasing by 40% for sediment, 47% for phosphorus, and 119% for nitrogen. We estimate the degradation of watersheds over our study period has impacted treatment costs for 29% of cities globally, with operation and maintenance costs for impacted cities increasing on average by 53 ± 5% and replacement capital costs increasing by 44 ± 14%. We discuss why this widespread degradation might be occurring, and strategies cities have used to slow natural land cover loss.

ecosystem services | History Database of the Global Environment | operations and maintenance

Humanity is experiencing the fastest rate of urbanization in history. Over the 20th century, the urban population increased from 220 million to 2.9 billion, and by 2050, another 3.4-billion increase is expected (1, 2). One of the most fundamental requirements of urban existence is a source of clean, sufficient water (3, 4). Urban water supply systems are often complex, drawing water from multiple locations, some surface and some groundwater, some close and some far from the city center (5, 6). Seventy-eight percent of large cities rely on surface water sources (6), and their urban supply systems create teleconnections (7, 8) between source watersheds and the urban users who depend on them. The world's largest cities (>750,000 population), the focus of this paper, occupy less than 1% of the Earth's land surface (9) but their source watersheds occupy 41% of its surface (6).

Natural land cover in urban source watersheds provides important ecosystem services that help maintain the water quality at the city's water source, so-called raw water that will then be treated and distributed to urban residents (10, 11). Natural land cover stabilizes soil, minimizing erosion and sediment loading (12, 13). Natural land cover also has lower loading than most human land-uses of excess nutrients, such as nitrogen (N) and phosphorus (P), and other pollutants (14, 15). When humans convert natural land cover to other uses such as agriculture or housing, the loss of natural land cover decreases ecosystem service provision and the anthropogenic land uses increases pollution, which leads to a decline in water quality (16). This loss of natural land cover over time, and the resulting impacts on hydrology, is often called watershed degradation (17).

This paper focuses on the water quality at the intakes of large cities globally. This raw water quality matters because it determines the type and intensity of water treatment needed to reach drinking water standards (18–20). For instance, Alcott et al. (10) contrast the relatively minimal treatment of Boston's water supply from the largely forested Quabbin reservoir with the more extensive treatment required from Worcester's reservoir, which has had significant land development and water quality degradation in its source watershed. Better raw water quality reduces the need for sediment removal (e.g., addition of coagulants such as alum), makes filtration easier (or in cases of exceptional water quality, removes the need for water filtration), and reduces the need for additional processes (e.g., the need to remove disinfection byproducts). In addition, lower concentration of phosphorus and nitrogen reduce algal growth and the amount of organic matter in the water, simplifying filtration and reducing the prevalence of disinfection byproducts. Thus, water-treatment plants (WTPs) using raw water of high quality can be designed using simpler treatment technologies, which lead to a lower capital cost during construction and lower operations and maintenance (O&M) costs. Avoiding watershed degradation helps maintain raw water quality which reduces treatment costs, as the "natural capital" of natural land cover functions as an alternative to human capital invested in a WTP (13).

Significance

Urban water-treatment costs depend on the water quality at the city's source, which in turn depends on the land use in the source watersheds. Here, we show that globally urban source watershed degradation is widespread, with 9 in 10 cities losing significant amounts of natural land cover in their source watersheds to agriculture and development. This watershed degradation has impacted the cost of water treatment for about one in three large cities globally, increasing those costs by about half. This increase in cost matters because increases in water-treatment costs are paid for by those living in cities, so watershed degradation has had a real quantitative cost to hundreds of millions of urbanites.

Author contributions: R.I.M., K.F.W., J.P., T.B., and D.S. designed research; K.F.W., J.P., and T.B. performed research; R.I.M., K.F.W., J.P., and D.S. analyzed data; and R.I.M. wrote the paper.

The authors declare no conflict of interest.

This article is a PNAS Direct Submission.

Freely available online through the PNAS open access option.

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This article contains supporting information online at www.pnas.org/lookup/suppl/doi:10.1073/pnas.1605354113/-/DCSupplemental.

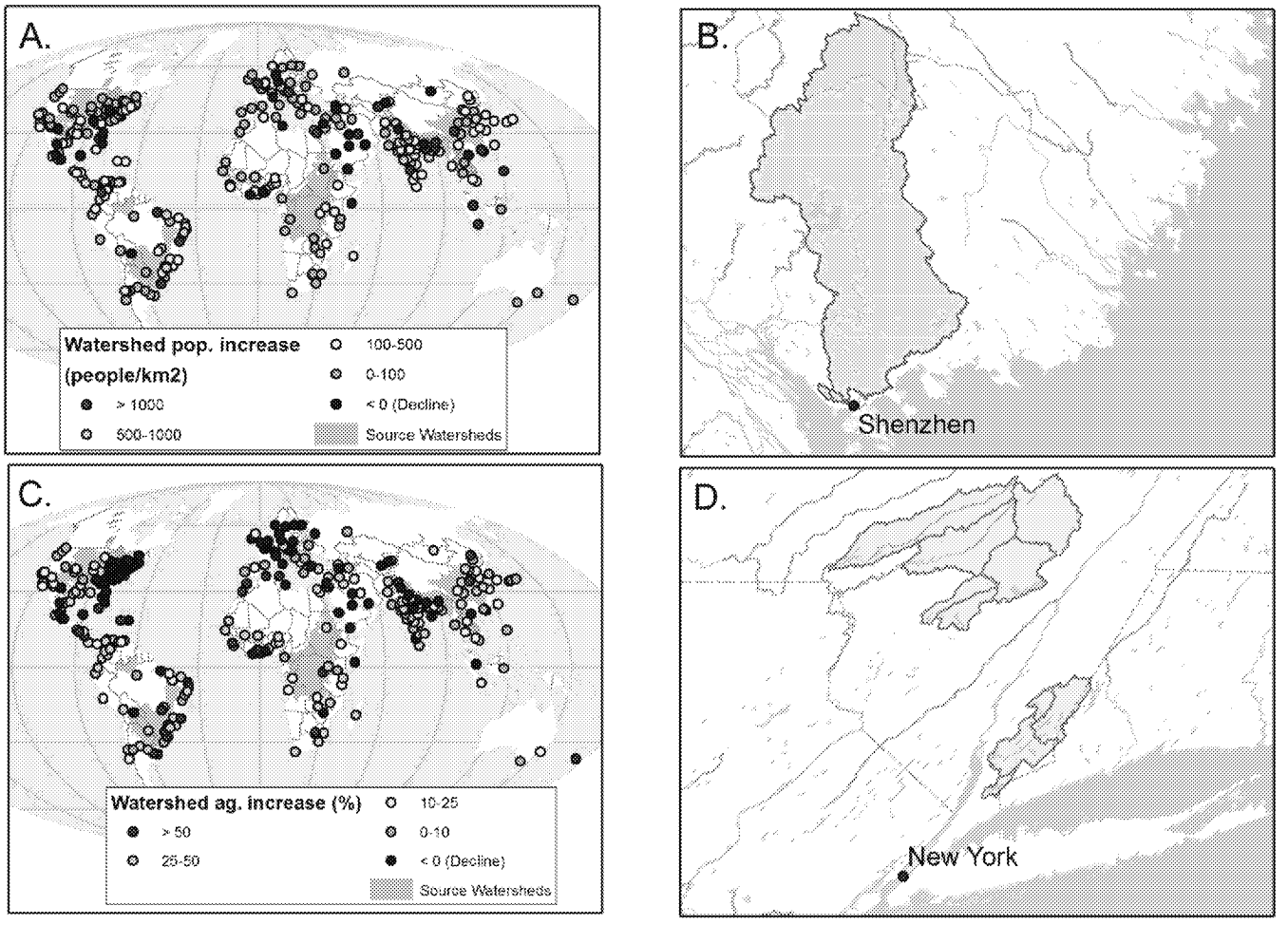

Fig. 1. Spatial variation in human activity in drinking water source watersheds of large cities. (*A*) The increase in a city's source watershed population density from 1900 to 2005. (*B*) Shenzen and its supply watersheds, including the large Dong River watershed. Note that the Dong River also supplies water to Hong Kong. (*C*) The increase in a city's source watershed agricultural use, both cropland and ranchland, from 1900 to 2005. (*D*) New York City and its supply watersheds.

Although the relationship between land cover and water quality has been measured or modeled in numerous watersheds (21, 22), the scientific understanding of the global importance of watershed degradation to urban water-treatment costs has been limited to date. Until recently (6), there has been no global dataset of where cities get their water from or of the complex teleconnections between source watersheds and cities. Similarly, although there are numerous anecdotal instances of clean water leading to reduced treatment costs, there has been relatively little global study of how financially important this proves to be for the world's water utilities. For instance, one notable study looked at 27 US water utilities and found a relationship between forest cover and O&M costs, but did not consider capital costs or changes over time in forest cover and was limited to US utilities (18).

Here, we combine our recently created global dataset of where cities get their water from (20) with datasets on the growth of human population and land use over time (23, 24), allowing us to reconstruct watershed degradation for the period 1900–2005 for the world's source watersheds. Using empirically based data for a training dataset on sediment, N, and P loading for the United States (25), we relate water quality to land use and population in the source watershed, allowing us to estimate how sediment and nutrient pollution have changed. Note that, although our statistical approach for the estimation of pollutant loading is relatively simple, it is necessitated by the long-term period of our analysis. More complex, spatially explicit models of sediment or nutrient loading and in-stream dynamics would require global maps of prior land cover and land cover transitions over the last century at high spatial resolution (<100s meters), which is not available for most watersheds globally. Finally, we assembled a unique dataset of the water-treatment technologies used in 264 WTPs and use it to estimate the statistical relationship between water quality degradation and increased treatment costs. Our two main research questions are as follows: (*i*) how has the degradation of source watersheds affected water quality for the world's largest cities; and (*ii*) how much has the decline in water quality affected water-treatment costs for the world's urban water utilities?

Results

Globally, most source watersheds have increased in population density over the period 1900–2005, but there is substantial spatial variation (Fig. 1*A*). Some places like the Ganges/Brahmaputra basin (home to cities like Dhaka) have increased dramatically in population density, whereas others have increased only slightly in population density, such as the source watersheds of Paris. Population density in urban source watersheds in 2005 varies by four orders of magnitude. Some of the highest values are in Asia. For example, the Dong watershed that supplies Shenzhen and Hong Kong, via an interbasin transfer, had a population density of 261 people/km^2 in 2005 (Fig. 1*B*). Readers who wish to see a higher-resolution image of Fig. 1 *A* and *B* should consult Figs. S1 and S2, respectively.

Agricultural expansion (cropland and ranchland) shows similarly large spatial variability (Fig. 1*C*). Areas like the pampas of Argentina had large increases in agricultural utilization, whereas New England had a decrease as farms were abandoned. These spatial patterns matter because they translate to spatial patterns in water quality, as we show below.

An examination of intake locations shows that cities have placed their water intakes to, in part, avoid severe water quality problems. The majority of intakes are upstream from the cities they serve. This hydrologic head of course facilitates water movement by gravity, but also potentially allows cities to source from less crowded watersheds. For instance, New York City is located along the Hudson River (Fig. 1*D*), a very urbanized river in its lower reaches, with population density exceeding 10,000 people/km^2. If New York City drew from the Hudson River, the average population density of the entire source watershed, including more rural parts of the watershed farther north, would be 123.7 people/km^2 and 14% agricultural utilization. By drawing water from two major reservoirs located an average of 151 km away, New York City can source from watersheds with an average population density of 65.3 people/km^2 and 16% agricultural utilization.

Globally, urban source watershed population density has increased significantly from a median of 22.3 to 124 people/km^2 over the study period (1900–2005), increasing by a factor of 5.4, with the fastest growth occurring in the last few decades of the

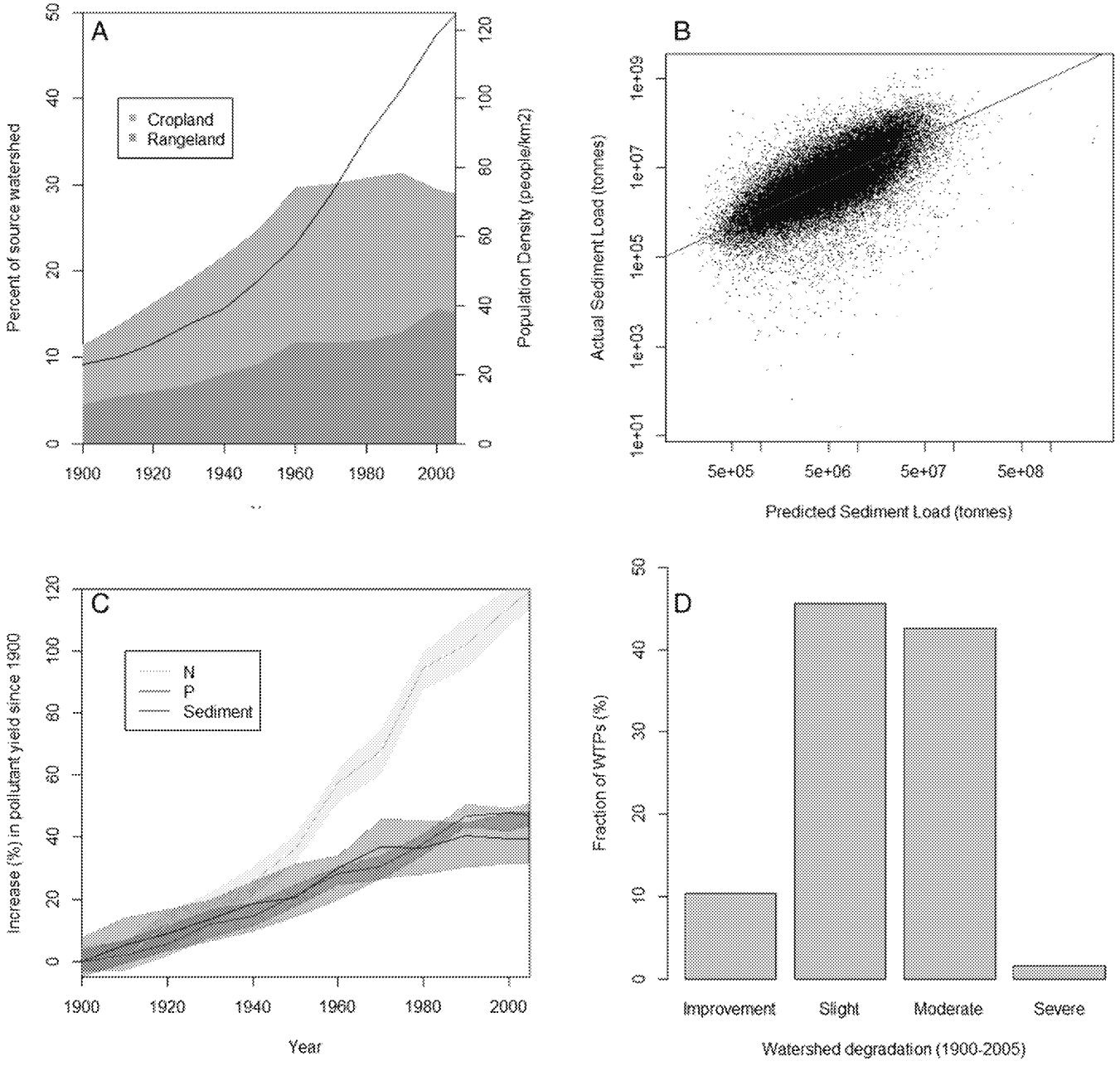

Fig. 2. Trends over time in watershed degradation and water quality in urban source watersheds. (*A*) Time series of median cropland and rangeland coverage, as well as population density. (*B*) Cropland and rangeland coverage, plus population density, predict sediment loading. Red line is the 1:1 line. Trends for N and P (not shown) are similar. (*C*) Estimated pollutant yield over time, relative to the average pollutant yield in 1900. (*D*) Proportion of WTPs by level of watershed degradation.

20th century (Fig. 2*A*). Population growth in urban source watersheds follows the exponential growth pattern commonly seen for human population globally during the 20th century, although the rate of increase in urban source watersheds is actually faster than for overall global population, which increased by a factor of 3.8 over the 20th century (1, 26).

Trends for agricultural utilization in source watersheds are more complex temporally (Fig. 2*A*). Cropland area increased dramatically until 1960 then plateaued and modestly declined from 1990 on. The slight decline in global average cropland utilization in source watershed is due primarily to declines in some source watersheds in parts of the United States and Europe (Fig. 1*C*). Use as rangeland, in contrast, continuously expanded between 1900 and 2005. Trends over time in different regions are shown in Table S1.

Population density and agricultural utilization in a source watershed can be used to predict sediment ($R^2 = 0.50$, $P < 0.001$), N ($R^2 = 0.58$, $P < 0.001$), and P ($R^2 = 0.63$, $P < 0.001$) loading. A 10% increase in population density leads on average (holding all other variables constant) to an 0.8% increase in sediment loading, a 2.6% increase in N loading, and a 1.6% increase in P loading (Table S2). Similarly, a 10% increase in source watershed utilization for cropland leads to a 1.6% increase in sediment loading, a 1.3% increase in N loading, and a 0.1% increase in P loading. Utilization for rangeland has no statistically significant relationship to sediment, N, or P loading. Note that this is likely due to the relatively coarse global data used in our study, as there are many studies that have shown important impacts of rangeland on water quality in particular watersheds or contexts (see literature review in ref. 27).

Based on the fitted regressions with empirical data in our training dataset (Fig. 2*B*), we can estimate the decline in water quality for source watersheds between 1900 and 2005. Sediment yields increased by 40% between 1900 and 2005, with a roughly linear pattern of increase (Fig. 2*C*). Similarly, P yields have increased by 47% over the study period. The biggest increase is for N yields, which increased 119% over the study period, with a more exponential pattern of increase.

Global average figures mask substantial variation among source watersheds. Because sediment, N, and P yields were correlated among one another, we used a principal components analysis (PCA) to describe the main axis of variability in watershed degradation (Table S3). Ninety percent of urban source watersheds had some degree of watershed degradation (Fig. 2*D*). Around 44% of cities had a moderate or severe decline in their source watershed. A small percentage of watersheds (10%) had an improvement in water quality over the 20th century.

Source watersheds with higher N yields are associated with more complex water-treatment technologies (Fig. 3*A*). For instance, for source watersheds in the cleanest third of watersheds globally, 42% of WTPs use two-stage filtration, direct filtration, or no filtration, technology categories that require relatively clean raw water. In contrast, source watersheds in the dirtiest third of watersheds globally have only 22% of their WTPs using these same three technologies. A similar association between water quality and technology level exists for P yield and sediment yield, and we modeled technology level as a function of the first axis of our PCA using an ordinal logistic regression (Fig. S3).

The association of lower water quality with more complex water-treatment technology classes matters because more complex water-treatment technologies cost significantly more (Fig. 3*B*). A typical 250 million liter per day (MLD) no-filtration WTP might cost $104 million in capital costs to build, plus $1.7 million per year in O&M costs, for a total annualized cost of $8.5 million. This cost is a 20% lower annualized cost than a so-called conventional filtration plant, which uses sand or gravel filtration. At the other end of the spectrum, an advanced filtration plant, such as one

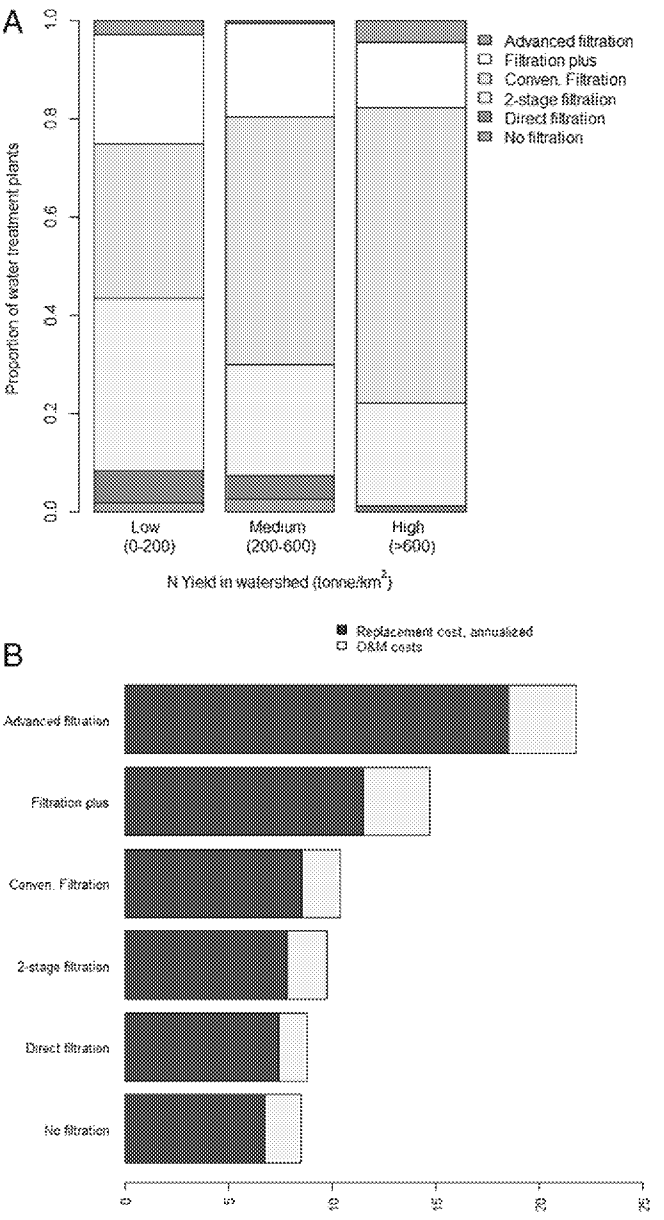

Fig. 3. Effect of water quality on treatment costs. (*A*) Treatment technology as a function of population density, empirical trends. Trends for cropland look similar. (*B*) Average operations and maintenance (O&M) and replacement cost as a function of treatment technology, for a 250 MLD plant. Replacement cost is expressed as the annual cost, assuming a 30-y bond at 5% interest rate.

using membrane filtration, would have 2.1-fold greater annualized costs than a conventional filtration plant.

We estimate that 29% of cities globally have had a significant increase in water-treatment costs due to watershed degradation between 1900 and 2005. That is, these cities would likely be using a lower technology level today if the watershed could be restored to the land use patterns of 1900. The WTPs impacted fit a specific profile. First, their source watershed has had rapid degradation, often significantly exceeding the global average rate of source watershed degradation. Second, in 1900 the watershed was relatively pristine, so a lower technology level would have been hypothetically likely.

Although only approximately one in four cities have been impacted to date, for those that are impacted, there has been a significant increase in water-treatment costs (Fig. 4). Impacted

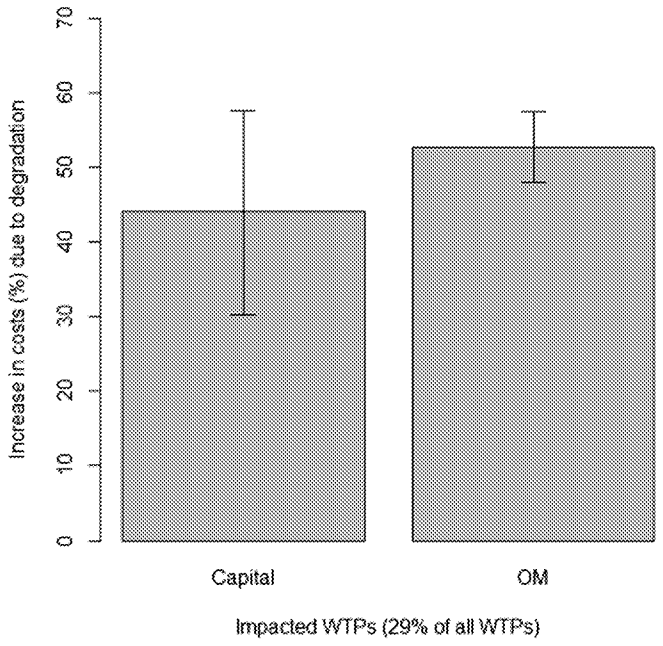

Fig. 4. Estimated percent increase in costs due to degradation for impacted WTPs. Around one in four (28%) WTPs draw water from source watersheds that have been sufficiently degraded from 1900 to 2005 to have likely required more complex water-treatment technologies. In these impacted WTPs, the average WTP is 42% more expensive in capital costs and 52% more expensive in operations and maintenance (OM) costs. Error bars are bootstrapped CIs.

cities had an estimate 53 ± 5% increase in O&M costs and a 44 ± 14% increase in capital costs. The distribution of impacts has a long right tail, with some cities having a doubling or more of treatment costs due to watershed degradation in the study period.

Discussion

This paper provides a global estimate of how much natural land cover degradation has increased treatment costs for a sample of the world's large cities. If the results from our studied cities applied across all global cities, which house 3.6 billion people (2), we would expect that 1.0 billion people are in cities whose treatment costs have been significantly impacted by watershed degradation. One study (28) estimates US $17B annually in capital expenditures for drinking WTPs, so if 29% of all cities had their capital costs impacted by watershed degradation raised an average of 44%, this implies a US $2.2B annual increase in capital expenditures due to watershed degradation. Another study estimated global WTP O&M as US $21B per year (20), so a similar calculation implies that watershed degradation over our study period (1900–2005) has increased WTP O&M by $3.2B per year. The total cost of watershed degradation to water utilities is therefore about US $5.4B annually, which represents a net present cost to urban water utilities of roughly US $108B, assuming a 5% annual discount rate. This financial impact is important to study because it is a cost imposed on urban water-treatment utilities.

By and large, land owners in source watersheds do not consider the effects of their land use on downstream water users. The ecosystem services provided by natural land cover are nonmarket goods, so landowners receive no direct benefit for allowing natural land cover to remain. Conversely, the decision to convert natural land yields benefits to landowners but imposes a large externality on urban water utilities, because of the increase in pollution that often results and the decrease in ecosystem service provision. The conversion of natural land cover to other land uses, such as housing or agriculture, has significant economic value to not just landowners but society at large. Our analysis cannot say whether the degradation of natural land cover is a net good or bad thing, because it only quantified the costs to water utilities of watershed degradation.

Our analysis focused on large cities, but it is worth noting that 1.9 billion people globally live in small cities (<750,000 people) (2). There is reason to think water supply systems are systematically different for small cities than for the large cities we studied. Small cities are much more likely to use groundwater, at least in the United States where comprehensive data are available (29). Small cities also tend to have water intakes for smaller, more local source watersheds. More study is needed to see if the trend we show for large cities holds for small cities.

Most cities, large and small, will be expanding in the 21st century. This urban growth will lead to increased demand for urban water withdrawals, a trend that is happening as surface appears likely to continue being degraded. Cities will also increasingly have to plan for the impact of climate change, which will change water supply and timing in many watersheds globally. Cities may respond to the confluence of factors by developing new water sources, whether from surface waters, groundwater, or desalination. Cities may also try to make better use of their current supply, by limiting leakage from pipes, decreasing domestic consumption, or reusing wastewater (30).

An alternative strategy for cities is source watershed planning and conservation to limit further watershed degradation (30). The goal here is to limit water pollution, often by giving economic value to the ecosystem services that natural land cover provides. This reduction in water pollution can occur through government policy, such as zoning or other land use regulations, or through a payment for watershed services scheme. Regardless the mechanism, the goal is to give value to nature to correct the market failure. Source watershed conservation may be an important strategy to safeguard urban water supplies in the next few decades.

Materials and Methods

Mapping Urban Water Sources. This study focused on a stratified sample (6) of urban agglomerations greater than 750,000 people, which were surveyed by the World Urbanization Prospects (WUP 2011) report conducted by the United Nations Population Division (2). For each target city, we geolocated freshwater withdrawal points and aligned them with the HydroSHEDS (31) digital elevation model (*SI Materials and Methods*).

The full geodatabase of urban water sources, called the City Water Map (v2.2), is publically available online at the KNB Data Repository (32).

Changes in Anthropogenic Activities over Time. Our information on population density, as well as human land use, was the History Database of the Global Environment (HYDE) version 3.1 (33). Details on the HYDE methodology are available online (34) and in *SI Materials and Methods*. We extract for each urban source watershed the HYDE predictions of population density and agricultural land use for 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, and 2005 (Fig. S4).

Relating Anthropogenic Activities to Water Quality. There is a large literature on how anthropogenic activities affect water quality, with agricultural land uses (35) and population density (36) affecting sediment and nutrient loading. Many papers have constructed spatially explicit models of sediment (37, 38) or nutrient loading (39, 40) for the contemporary time period, based on the hydrology and mechanistic processes that lead to water pollution. However, the goal of this paper was to construct estimates of water quality over more than a century (1900–2005). More complex, spatially explicit would require detailed global maps of prior land cover and land cover transitions over this 105-y period, which is not available for most watersheds globally. Accordingly, we built a statistical model to predict sediment and nutrient loading based on agricultural land uses and population density, for which we do have estimates over the past century.

To quantify the relationship between the HYDE measures of anthropogenic activity and water quality, we related the HYDE measures to data for the United States from the SPARROW (SPAtially Referenced Regressions on Watershed attributes) database. The SPARROW models structure is described by Schwarz et al. (41). For all urban source watersheds in our sample of US

cities, we extracted SPARROW estimates of sediment, nitrogen, and phosphorus loading, using the SPARROW national interpolated grids (42).

These empirically based water quality estimates for the United States were statistically compared with the HYDE estimates of population density, crop land use, and ranchland land use in the source watersheds, using linear regression. The total pollutant loading of sediment, N, and P was modeled as a function of the total crop area in the upstream contributing watershed, the total ranchland area in the watershed, the total human population in the watershed, and the watershed area.

In addition, for sediment we included the watershed average of the RKLS component of the universal soil loss equation (43), which represents the total erosion (not accounting for land use practices) as a product of rainfall erosivity (R), soil erodibility (K), and topography (LS). Our values for RKLS were taken from McDonald et al. (20).

Similarly, for N and P, we included information on the contemporary application rates of these nutrients on cropland and grazing. This information was taken from the global grids of the Global Fertilizer and Manure (GFD), version 1, dataset. Agricultural land was assumed to have both manure and fertilizer applied at the rates specified by the GFD, whereas grassland/pasture was assumed to have only manure applied at the rates specified by the GFD.

To validate the predictions of our statistical model, we compared for circa 2005 our estimate of N loading with that predicted by the Water Balance Model (39, 40), as downloaded from the World Water Development Report II website. The correlation between our statistical model predictions and the Water Balance Model was high ($R = 0.71$), and generally follows the 1:1 line (Fig. S5).

Please see *SI Materials and Methods* for more detail on our statistical analysis.

WTP Technologies. We collected information on treatment technologies used by 264 WTPs for around 100 cities in the United States and around 30 international cities. For more detail on the collection of this dataset, please see *SI Materials and Methods* and McDonald and Shemie (20). Table S4 lists the WTPs.

For the purpose of this project, WTPs were classified into seven categories, based on the categories in McGiveney and Kawamura (44): no filtration; no filtration with additional processing; direct filtration; two-stage filtration; conventional filtration; filtration with additional processing; and advanced filtration (e.g., membrane filtration). O&M and capital costs were estimated following McGiveney and Kawamura for all 264 WTPs in our sample, based on the size of the plant, the treatment category, and the presence of any additional processing steps. We adjusted all costs to US$2015, using the Engineering News-Record Construction Cost Index (ENR-CCI). The methodology of McGiveney and Kawamura produces preliminary design estimates, which they report vary from actual O&M and capital costs by +50% to −30% (44). Note that Table S4 contains information on the treatment technology class of each WTP.

Water-Treatment Costs and Water Quality. Treatment technology categories were compared with our estimated sediment, N, and P loads using ordinal regression, specifically a proportional odds logistic regression. See *SI Materials and Methods* for more details on the ordinal regression analysis.

ACKNOWLEDGMENTS. This research began as a Pursuit at the Social Environmental Synthesis Center, with funding from the National Science Foundation. The collection of WTP information was done as part of a working group of the Science for Nature and People Program (SNAPP).

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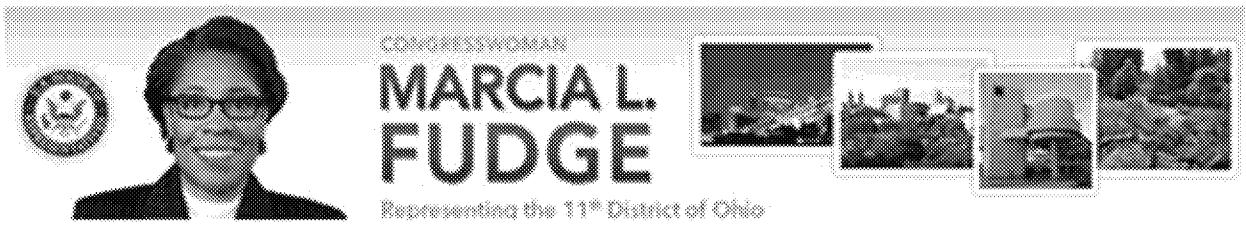
Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 1/29/2018 8:37:27 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Good first step on Farm Bill Reauthorization and Source Water Protection for Potable Water

Subject: RELEASE: Congresswoman Marcia L. Fudge Introduces Collaborative Water and Soil Enhancement Act



FOR IMMEDIATE RELEASE
January 29, 2018

Contact:
Ajashu Thomas
Ex. 6
ajashu.thomas@mail.house.gov

Congresswoman Marcia L. Fudge Introduces
Collaborative Water and Soil Enhancement Act

WASHINGTON – Today, Conservation and Forestry Subcommittee Ranking Member Marcia L. Fudge (OH-11) introduced the *Collaborative Water and Soil Enhancement Act of 2018* to address topsoil loss and protect drinking water from agricultural runoff. The bill will help farmers adopt soil health and water quality management practices by providing additional flexibility to support the delivery of conservation efforts.

"Sustaining the health of our farms, diverse ecosystems, and communities depends on the availability of sound natural resources," said **Congresswoman Fudge.** "The Collaborative Water and Soil Enhancement Act of 2018 leverages new partners and prioritizes conservation efforts in places like the Great Lakes to ensure our soils remain healthy, and a clean and abundant supply of water is there for generations to come."

"The next farm bill is a huge opportunity for the Department of Agriculture and the private sector to work together to help more farmers adopt nutrient management and soil health practices," said **Lynn Scarlett**, **Co-Chief External Affairs Officer at The Nature Conservancy**. "We thank Rep. Fudge for introducing legislation that could lead to cleaner water and air, less erosion and nutrient loss, and healthier, more productive soils on millions of acres across the U.S."

"The American Water Works Association (AWWA) and its 51,000 members applaud Representative Fudge for the introduction of *The Collaborative Water and Soil Enhancement Act of 2018.* AWWA believes this bill is an important step to protecting our communities' sources of drinking water. Working in a collaborative fashion with water utilities and farmers is the right approach and we commend Rep. Fudge for introducing this bill," said **CEO David LaFrance**. "The bill's emphasis on source water protection, targeting of priority areas and increased incentives for producers will improve the quality and quantity of our communities' drinking water."

Click here to view a summary of the *Collaborative Water and Soil Enhancement Act of 2018.*

Click here to read the text of the bill.

###

Ajashu Thomas | Communications Director
Representative Marcia L. Fudge (OH-11)
2344 Rayburn House Office Building |Washington, D.C.
Phone Ex. 6 | Fax 202.225.1339
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Sign up for Rep. Fudge's e-newsletter by clicking here.

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 3/8/2018 8:25:54 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: FW: AWWA Comments on LT-LCR Federalism Consultation have been filed
Attachments: 2018 03 08 AWWA LT LCR EPA Federalism Comments.pdf

From: Steve Via
Sent: Thursday, March 08, 2018 3:13 PM
To: Nancy Sullivan <nsullivan@awwa.org>; Mark Scharfenaker <mscharfenaker@awwa.org>; Tommy Holmes <THolmes@awwa.org>; Amber Wilson <awilson@awwa.org>; Wendi Wilkes <WWilkes@awwa.org>
Cc: Greg Kail <GKail@awwa.org>; Deirdre Mueller <dmueller@awwa.org>; Kevin Morley <KMorley@awwa.org>; Adam Carpenter <acarpenter@awwa.org>; Nate Norris <NNorris@awwa.org>; Paul Olson <POlson@awwa.org>; Barb Martin <bmartin@awwa.org>; Lauren Wasserstrom <lwasserstrom@awwa.org>; Tracy Mehan <tmehan@awwa.org>
Subject: AWWA Comments on LT-LCR Federalism Consultation have been filed

Good afternoon,

AWWA's comments are now in www.regulations.gov and have been distribute to relevant EPA staff.

Greg has a plan for roll-out and can advise as to when to post to the website, distribute via Twitter etc..

Thanks,
Steve

Steve Via
Director Federal Relations, AWWA | Ex. 6

American Water Works Association

Dedicated to the World's Most Important Resource℠

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March 8, 2018

Peter Grevatt
Director, OGWDW
USEPA Headquarters
Mail Code: 4601M
1200 Pennsylvania Avenue, N. W.
Washington, DC 20460

RE: Long-Term Lead and Copper Rule Federalism Consultation (Docket ID No. EPA-HQ-OW-2018-0007)

Dear Mr. Grevatt,

The American Water Works Association appreciates the opportunity to participate in the U.S. Environmental Protection Agency's 2018 federalism consultation on potential long-term revisions to the Lead and Copper Rule. The body of research and experience with lead has grown since the initial federalism consultation on Long-Term Lead and Copper Rule in 2011, and AWWA commends the Agency for its decision to undertake this second consultation.

The primary mission of community water systems is to protect the health of the people they serve. Revisions to the LT-LCR should advance strong customer protections today while we work for a future where lead is no longer in contact with the water we drink. Systems must provide this protection within the means provided by their communities and the constraints of what is operationally and financially feasible. AWWA recommends that the revised LT-LCR result in water systems engaging in:

1. **Development of an inventory of lead service lines**: The inventory should begin with an estimate of the number of lead service lines in each system's service area based on the information available and improve over time through ongoing water system operations, improved detection technology, and community engagement.

2. **Development of plans for the complete removal of lead service lines through a long-term, shared commitment** – Replacing remaining lead service lines is an important, societal undertaking and will require long-term commitments from many partners and a recognition of shared responsibility. Lead service line replacement strategies must consider other water and non-water improvements and customer affordability challenges. Locally developed programs, responsive to local circumstances, are essential. Communities will need to navigate numerous legal and implementation challenges that require time and resources in the face of competing demands.

3. **Application of process control to reduce corrosivity of water reaching customers' homes:** Corrosion control should be robust, and deviations from target conditions should trigger investigation and corrective steps.

4. **Public outreach on lead risk and lead risk mitigation:** Systems should actively and transparently communicate with their customers, particularly customers with lead service lines, about lead risks and steps households can take to evaluate and reduce lead in drinking water.

The proposed LT-LCR is more than a decade in preparation for at least two reasons. First, managing lead in water involves many challenging policy decisions. And second, the science is still evolving to support those decisions. Many of the issues utilities face, in particular how to control particulate lead release, remain poorly understood. Consequently, to move forward quickly, the LT-LCR revisions must focus on improvements to the current rule that provide cost-effective risk reduction with minimal risk of unintended consequences or misallocation of resources.

The LT-LCR revisions represent an opportunity for meaningful health risk reduction by further reducing lead materials in contact with drinking water, encouraging water systems to enhance current corrosion control practice, and bolstering ongoing public education on lead in drinking water. One of the significant developments since the 2011 federalism consultation was the National Drinking Water Advisory Council recommendations. The NDWAC recommendations provide a sound starting point for the LT-LCR revisions, though more recent information should also be considered. Key aspects of rule revisions that can be drawn from the NDWAC report in the near term include:

Individuals and communities need to be empowered to act – Blood lead levels in the U.S. population continue to decline. Still, communities need to better understand lead risks from all sources, including potential exposure from water. Individuals should be empowered to take effective steps to protect their households, and communities should seek to integrate lead risk reduction activities.

Fully removing all lead service lines will require a long-term, shared commitment – Neither individual homeowners nor water systems alone can remove lead service lines. Replacement is a shared responsibility among utilities, customers, government at all levels and other community partners. It will require a long-term commitment and policies to accelerate removal through opportunities such as property transfers. Communities will need to navigate numerous legal and implementation challenges that require time and resources in the face of competing demands. Customers and utilities will face affordability challenges. Locally developed programs, responsive to local circumstances, considering opportunities to reduce lead exposure from all sources, will be essential.

Corrosion control should be carefully evaluated, and if modified, changes should be based on system-specific information using sound process-control practices and system-specific studies -- Each system has specific local water quality and treatment characteristics, so the nation's water supplies are not amenable to a one-size-fits all approach to treatment selection. One thing that has become clear since the initial promulgation of the LCR is that unintended consequences of treatment changes can be catastrophic. The lesson of the successful implementation of the Long Term 2 Enhanced Surface Water Treatment Rule and revised Total Coliform Rule is that tailoring actions to the particulars of each local system yields public health protection at an appropriate cost. Ongoing process control for corrosion control should be robust and trigger investigation and corrective steps, by:

1. Integrating system-specific water quality parameter monitoring with other ongoing distribution system and water treatment process control monitoring.
2. Applying statistical process control strategies to ensure noncorrosive water reaches customers.
3. Flagging deviations from target water quality conditions for investigation and corrective actions.

Corrosion control is a practical, effective and long-term action available to reduce exposure to lead. AWWA encourages EPA to focus on providing utilities the tools, knowledge, and flexibility to select appropriate corrosion control practices for their individual local water quality and treatment characteristics.

The NDWAC recommendations were substantial, and it is not clear if EPA can propose a rule that addresses all of them by August 2018, the anticipated date for a proposal. NDWAC recommendations the Agency has not yet shown that it can complete in a timely manner include:

1. Identify a level of lead in drinking water of public health concern (i.e., NDWAC's proposed household action level).
2. Substantiate the benefit of revising the rule with respect to copper.
3. Identify corrosion control changes that will reduce lead levels further for systems already reliably below the action level while also not leading to undesirable unintended consequences.
4. Dramatically change the method in which tap samples are collected.

As EPA pointed out in its October 2016 white paper, the elements of the LCR are very intertwined. The information available to the public, including EPA's January 8 briefing, do not describe potential rule revision options. Consequently, it is not clear how EPA intends to maintain a balance between the rule elements.

AWWA appreciates the outreach EPA is undertaking to involve states and local government. Actual rule implementation and the burdens associated with it will fall in part on water systems, local communities and state regulators, and more importantly, on individual households. AWWA urges EPA to organize one or more stakeholder meetings that allow the experiences and concerns of advocates for impacted households to be better understood.

AWWA is fully committed to educating systems on the current and revised LCR, assisting systems with evaluating and improving their corrosion control practices, promoting public communications on lead, and advancing full lead service line replacement practice nationwide. Attached are more detailed comments addressing the questions posed by the Agency in its Federalism briefing and comments prepared by Dr. Crawford-Brown on development of a health-based lead concentration of concern. If the EPA LT-LCR team has any questions regarding these comments or would like to become more engaged in our outreach efforts, please contact me or Steve Via at Ex. 6

Best regards,

G. Tracy Mehan, III
Executive Director – Government Affairs

cc: David Ross
Jack Bowles
Eric Burneson
Lisa Christ
Andrew Hanson
Eric Helm

Iliriana Mushkolaj

Attachments: 1

Who is AWWA

The American Water Works Association (AWWA) is an international, nonprofit, scientific and educational society dedicated to providing total water solutions assuring the effective management of water. Founded in 1881, the Association is the largest organization of water supply professionals in the world. Our membership includes more than 4,000 utilities that supply roughly 80 percent of the nation's drinking water and treat almost half of the nation's wastewater. Our 51,000-plus total membership represents the full spectrum of the water community: public water and wastewater systems, environmental advocates, scientists, academicians, and others who hold a genuine interest in water, our most important resource. AWWA unites the diverse water community to advance public health, safety, the economy, and the environment.

Attachment 1

Addressing Questions Posed in Federalism Consultation
Long-Term Lead and Copper Rule Federalism Consultation

(Docket ID No. EPA-HQ-OW-2018-0007)

prepared by

American Water Works Association

for the

U.S. Environmental Protection Agency

submitted

March 8, 2018

CONTENTS

Addressing Questions Posed in Federalism Consultation

Introduction

Revisions to the Lead and Copper Rule should advance strong customer protections today while we work for a future where lead is no longer in contact with the water we drink.

Systems must provide this protection within the means of the communities they serve and within the practical limitations of what is operationally feasible. AWWA suggests that the revised LT-LCR include the following elements:

1. Development of an inventory of lead service lines.
    - Be based initially on available information.
    - Improve over time through ongoing water system operations and community engagement.
2. Development of a strategy for lead service line removal.
    - Develop and initiate in a timely fashion and proceed at a community-specific pace.
    - Recognize that shared responsibility is necessary for successful, sustainable lead service line replacement initiatives.
    - Follow ANSI/AWWA C810-17, Replacement and Flushing of Lead Service Lines.
3. Application of process control to reduce corrosivity of water reaching customers' homes.
    - Implementing changes in corrosion control based on system-specific information using sound process-control practices and system-specific studies.
    - Integrating system-specific water quality parameter monitoring with other ongoing distribution system and water treatment process control monitoring.
    - Applying statistical process control strategies to ensure noncorrosive water reaches customers' services.
    - Flagging deviations from target water quality conditions for investigation and corrective actions.
4. Public outreach on lead risk and lead risk mitigation.
    - Actively and transparently communicating with their customers, particularly customers with lead service lines, about lead risks and steps they can take to evaluate and reduce lead in drinking water in their home.

The Safe Drinking Water Act provides a sound decision-making framework. Revision of the Lead and Copper Rule is challenging, and the selected solution will have implications for community water systems of all sizes in every state. Which and how many sources of lead are present in the plumbing of a home depend on historical development patterns in that community, not whether the community today is large or small, urban or rural, poor or affluent. Moreover, as we seek to further reduce lead exposures, this rulemaking encounters larger societal questions such as who has a duty to pay for achieving lead risk reduction and when does a public entity like a water system have the right to intrude on private property. The Safe Drinking Water Act allows the Agency to make tough policy decisions, but it also sets the expectations that such decisions will be based on sound science and reflect opportunities for achieving meaningful risk reduction in a cost-effective manner.

Community Water Systems efforts already substantially control lead exposure through drinking water. The next step in additional risk reduction must be financially prudent and not create unintended consequences. In its most recent Six-Year Review data call in, EPA compiled more than 808,000 sample values from 42

states for the period 1998 to 2005.[1] AWWA's initial analysis of that data reflects data from approximately 23,100 CWSs serving a combined population of 167 million with LCR data in the database for 2003 to 2005 (for CWSs serving populations >500 using surface or groundwater sources). We found that there were 4,100 systems serving an estimated 23.2 million people where all observed values were less than 1 µg/L, and 90% of systems serving more than 10,000 persons have median lead levels below 5 µg/L.

Compliance data is a limited sample and the sampling protocol and sample pool are not representative of community wide exposure, but the Six-Year Review dataset illustrates that nationwide the water supply community is providing water with low lead concentrations. The question at hand is what is the prudent next step to take to further advance lead risk reduction.

Lead is a multi-exposure pathway challenge. Drinking water is one of many potential sources of exposure to lead. The multi-media nature of lead exposure reduction complicates public education and communication. It also involves numerous responsible parties, many of which are not engaged through the LCR. While the burden of lead health risk should not fall disproportionately on any one group, neither should the burden for achieving lead risk reduction. There is a shared responsibility which is both essential to success and complicates finding timely and affordable solutions.

Reasonable action now is needed. It is desirable but unrealistic to achieve zero exposure to lead in a short period of time. Thus, significant reduction in risk are the appropriate goal. By continuing to debate instead of acting on reasonable rule strategies, as outlined by the National Drinking Water Advisory Council, we continue to delay achieving these risk reductions.

Technical capacity must be built. Nationally, after an initial surge in capacity following promulgation of the LCR, the expert capacity in corrosion control treatment selection has not been adequately developed through academia, maintained in the water system or consulting engineering community, or retained in the regulatory community. EPA and AWWA have roles in supporting the rebuilding of this expertise in the sector. The public health community must also be engaged and educated about lead in water.

Research is needed to support major changes in corrosion control practice aimed at small incremental improvements without causing unwanted unintended consequences. To move forward quickly the LT-LCR revisions must focus on improvements to the current rule that provide cost-effective risk reduction with minimal risk of unintended consequences or significant misallocation of scarce resources for individual homeowners, water systems, or the communities water systems serve.

Lead Service Lines

The most significant barriers to full lead service line replacement are (1) divided ownership / responsibility and (2) the cost of replacement. In drafting the rule revisions, EPA must recognize the limitations these two factors have on (1) the quality of data available to guide action, (2) allocation of the cost of replacement, and (3) the time required for all lead service lines to be fully removed. AWWA is actively engaging its members to foster advancing full lead service line replacement. EPA should avoid setting unrealistic regulatory expectations or creating bureaucratic obstacles to community-specific solutions.

[1] Note, the Six-Year lead concentration data reflects first-draw samples following at least a 6-hour period of stagnation. Samples are taken from homes that are prone to higher levels of lead, e.g., lead service line, older brass, and copper with lead solder plumbing.

Create an Inventory

An important step in creating a future without lead in contact with drinking water rests on developing a sound understanding of the locations of lead service lines in communities. Having an inventory aids in developing a strategy for removing those lines during ongoing main replacement, service line repairs, home remodeling and sale, home rentals and focused outreach and engagement of households with lead services.

An exact inventory describing the use of lead pipes under both water utility and customer ownership is not feasible. At present, estimates of the number of lead service lines in community water systems in the United States range between 6.1 and 10 million. These lead service lines exist within a larger universe of service lines totaling 96.7 million. These estimates are imperfect, and there are anecdotal reports of underestimates and overestimates from individual systems. Where systems are excavating to identify lead service lines (currently being tested as a tool of last resort for confirming the presence of a lead service line), systems are noting that fewer than expected numbers of lead lines are found.

While research is ongoing, at present there is not an accepted field procedure for identifying if a service line is made of lead without physically seeing the whole line. This is important in several respects. These lines are very old and have been repaired; such repairs may have removed portions of an existing lead line. Also, if EPA includes lead goosenecks within the definition of lead service lines for purposes of an inventory, visual inspection requires digging down to the water main, which is often in the street. An exact inventory would necessitate certain knowledge about all 96.7 million service connections in the United States, not simply the 6.1–10 million that are more likely to be lead. Moreover, while lead service lines are typically measured in tens of feet in length, goosenecks are, by definition, typically less than 3 feet long (both Mueller and Hayes goosenecks were manufactured at lengths of 18, 24, 30 and 36 inches in length).[2, 3, 4]

An exact inventory is not, however, needed for the tasks at hand (i.e., guiding sampling efforts, targeting communication initiatives, preparation for construction activities, and tracking elimination of lead services). Therefore, it is important that inventory development move forward with the tools at hand, recognizing their weaknesses. Moreover, use of ongoing activities to improve the lead service line inventory can be framed as a win-win opportunity for such activities as automated meter reading installations, identification of gutter – stormwater connections, backflow prevention device inspection and other initiatives.

If EPA were to craft regulatory language requiring utilities to prepare lead service line inventories, the Agency would need to recognize several challenges:

1. Lead service lines were installed during the 1800s and early – mid 1900s. Consequently, the primary record of installed material selection, tap cards, are decades if not a century or more old. In subsequent years, there have been changes in practice that impact the fidelity of the data, loss of records, and unrecorded changes in installed materials as repairs and other construction have occurred.
2. Service lines are owned in part by the water system and in part by the customer in most communities. Customers do not always advise the water system of improvements to the portion of the service line the customer owns. In many communities, plumbers have not been an active

[2] Mueller Company. Catalog, November 1, 1961, p. 4-3.
[3] Hayes Water Service Products Catalog, p. 18.
[4] Lead Industries Association, Lead in Modern Plumbing, p. 8.

stakeholder in lead service line identification, homeowner awareness or updating utility service line material records.

3. Not all community water systems are villages, towns, or cities where the water system service area is the same as a municipal subdivision. "Municipal" records used to compile an inventory (e.g., building and plumbing permits, tax records, mapping, etc.) will be harder to compile in rural areas served through public service authorities and areas served by investor-owned water companies). Even where the water system and municipal government are the same, there are often extra-territorial service areas where the water system is not able to rely on other municipal departments within the same government entity.
4. Absent the threat of loss of water service, water systems do not have the authority to require customers to cooperate in acquiring data about the service line material on the customer's property. Turning off water presents a health and public safety concern. There are also concerns about social inequity where water shutoffs disproportionately impact segments of a community's households.
5. While water system staff sometimes enter customer premises (e.g., to set or repair meters, respond to water quality complaints, etc.), such contact is minimized for the convenience of customers and for the safety of water system staff (e.g., need for a two-person crew and customer scheduling).
6. Systems are transitioning to new asset management platforms that will, over time, facilitate infrastructure renewal, including lead service line replacement. As EPA is aware from its own software platform transitions, these transitions can complicate data acquisition and present unanticipated challenges that effect timely delivery of expected products.
7. Current technologies used to examine service lines that are buried under yards, sidewalks, and streets requires excavation. Excavation only allows inspection of the exposed pipe length, is costly, and has its own associated risks including the integrity of service lines that are not lead and unnecessarily disturbed.

Given these limitations, it is important that EPA rule requirements and associated guidance set reasonable expectations that:

1. Allow the development of the initial inventory based on existing records, historical practice and utility field experience.
2. Provide sufficient time to allow the initial inventory to be developed, recognizing that in many communities, utilities will be supplementing in-house records with data from other departments and oftentimes other entities.
3. Expect that the inventory will be improved over time as additional information can be incorporated through ongoing water system activities (e.g., meter replacement, water quality visits, etc.) and community outreach (e.g., home inspections when buildings are sold, instructions to homeowners, plumbing permits).[5]
4. Expect that water systems will have practices in place to appropriately address previously unrecognized lead service lines when they are discovered.
5. Improve public information and education so that homeowners can be active stakeholders.
6. Utilize opportunities like the sanitary survey for the primacy agency to review the system's practices to maintain and improve the inventory.

[5] Example customer outreach, "Help us update our records," DC Water, Available 1/25/2018 at https://www.dcwater.com/servicemap.

Public access to information, including the presence / absence of lead service lines, is important to advancing replacement and a natural part of public outreach. Rule requirements for public access should assist property owners without creating unintended harm. EPA may be contemplating a requirement that water systems make inventories publicly available (e.g., on the water utility website, through a database query, or other means). Data compiled by municipal water systems, including information on service lines on private property, may be subject to freedom of information requests. Investor-owned water systems are not necessarily subject to FOIA. Some systems have encountered legal concerns when considering releasing what can be viewed as private information.[6]

Since water systems do not typically own the whole service line and since it may be impossible to determine the material of the whole length of the line, water systems cannot make absolute, always-current statements about the status of a home's service line. Systems that provide a map or database that allows public searches of this data typically use a strong disclaimer statement to users.[7] Some have posed the idea of a state-based or national repository of service line material inventory. The above described data quality and liability considerations are similarly challenges to building such a repository. The burden on EPA, states, and water systems to develop and keep such a data system current warrants careful consideration. On first reflection, managing this data at the local level appears to be the more immediate opportunity for advancing lead service line replacement and educating customers.

FULL LEAD SERVICE LINE REPLACEMENT

Fully removing lead service lines will require a long-term, shared commitment. Water systems and their customers will not be able to replace lead service lines overnight. It will take time to complete a robust inventory, prioritize lead service line replacement among other water system improvements (and other non-water system needs in the community), and identify funding mechanisms to assist in payment for the work. Communities will need to navigate numerous legal and implementation challenges that require time and resources in the face of competing demands. Customers will face affordability challenges. Locally developed programs, responsive to local circumstances, will be essential, and shared federal and state support also will be necessary to facilitate fully removing lead services.

Reducing environmental exposures is a long-term, challenge that must address multiple paths of exposure. EPA has no means at present to understand if a community would benefit most by expanding its lead paint abatement program, targeting lead sources in rental housing, removing lead service lines, or pursuing other sources of lead. This point is best described by other participants in the federalism consultation. From the viewpoint of a water system, this balance must be struck locally so that the water system receives the support and coordination needed from all the partners it needs to effectively engage customers in full lead service line replacement.

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[6] Association of Metropolitan Water Agencies, State FOIA Laws: A Guide to Protecting Sensitive Water Security Information, July 2002, Available 1/25/2018 at https://deq.utah.gov/Permits/drinkingwater/docs/2014/07Jul/StateFOIA.pdf.

[7] Example disclaimer, "DISCLAIMER: The maps provided by the Boston Water and Sewer Commission (BWSC) are based on property surveys conducted during the installation of the Automated Meter Reading system, as well as information directly provided by customers and acquired during physical inspections. BWSC does not guarantee the accuracy of these records and maps, which shall be used for the sole purpose of providing property owners and residents with information regarding their private water services, and not for any commercial, legal or other use. These records will be updated on a monthly basis, or at such alternate times as BWSC designates. BWSC reserves the right to alter, amend or terminate at any time the display of these maps and records." Boston Water and Sewer Commission, Available 1/26/2018 at http://www.bwsc.org/COMMUNITY/lead/leadmaps.asp#TOP_PAGE.

ANSI/AWWA C810-17, Replacement and Flushing of Lead Service Lines should be incorporated by reference as the protocol for lead service line replacement. AWWA developed a management standard for when a water system anticipates or incidentally encounters lead service lines in the course of construction.[8] This standard addresses identification of lead services, notification of impacted customers, and protective measures to reduce the potential for exposure to lead due to the replacement. As with all ANSI standards, C810-17 was developed by a committee selected with a balance of perspectives in mind and was made available for public comment. This standard will be reviewed periodically and improved based on system experience and new research. It is worthwhile to note, that "*The National Technology Transfer and Advancement Act of 1995 directs [federal] agencies to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical.*"[9] EPA Region 5 has recommended the City of Flint, Michigan follow C810-17 when replacing lead service lines.

EPA should not make replacing all lead service lines in a specific timeframe a rule requirement. AWWA is actively urging its members to integrate lead service line replacement into their current distribution system operations and capital programs now, because it is going to take a substantial, long-term effort to replace the 6.1 – 10 million installed lead services. The NDWAC recommendation, which AWWA endorsed, recognized the challenges associated with setting a fixed deadline and focused on establishing strategies to move forward with available authorities and funding. AWWA is urging systems to start as soon as possible to work with the communities they serve to develop a local strategy and begin to fully remove lead service lines. These community-specific strategies consider local circumstances, particularly locally-appropriate approaches to shared responsibility for accomplishing full replacements. There are numerous potential strategies for funding full service line replacement; developing state and local policies to address this challenge of paying for full replacement will take time and solutions will need to be locally appropriate.[10]

In contemplating a timeframe for completing all lead service line replacements, it is important to look at the housing sector for the frequency with which opportunities to engage homeowners arise. Nationwide, approximately 5.4 million existing homes were sold in 2016, and a similar level of sales occurred in 2017.[11] In 2013 the National Association of Home Builders estimated that the typical buyer of a single-family home can be expected to stay in a home approximately 13 years.[12] It is also worth noting that 35% of households in the U.S. rent rather than own their home.[13] The U.S. Census tracks how frequently people move in the U.S. Looking at data from 2013 and 2014, 24.5% of all people living in renter-occupied housing units lived elsewhere one-year prior.[14] As expected, the Census data illustrates that renters move much more frequently than people in owner-occupied housing (roughly 5 times as often).

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[8] AWWA, ANSI/AWWA C810-17, Replacement and Flushing of Lead Service Lines, Available 1/26/2018 at https://www.awwa.org/store/productdetail.aspx?productid=65634922.

[9] EPA Website, Available 1/26/2018 at https://19january2017snapshot.epa.gov/data-standards/federal-national-and-international-data-standards_.html.

[10] Environmental Financial Advisory Board, Financing Lead Risk Reduction, October, 2017, Available 02/22/2018 at .

[11] Lawrence Yun, Residential Real Estate Economic Issues and Trends Forum at the REALTORS® Conference & Expo in Chicago, IL, November 3, 2017, Available 1/26/2018 at https://www.nar.realtor/presentations/november-2017-economic-housing-outlook-lawrence-yuns-presentation-slides .

[12] National Association of Home Builders, Latest Calculations Show Average Buyer Expected to Stay in a Home 13 Years, 2013.

[13] U.S. Census, 2016 American Community Survey, 1-Year Estimates, US Census Bureau. Updated 9/2017 (Note, 53% of households that live in rental housing rent structures with 4 or fewer units).

[14] U.S. Census, Press Release. U.S. Mover Rate Remains Stable at About 12 Percent Since 2008, Census Bureau Reports, January 2015. Available 02/21/2018 at https://www.census.gov/newsroom/press-releases/2015/cb15-47.html.

The Census's mover rate for people living in owner-occupied housing units of 5.0 percent is also comparable to the HAHB typical expected stay statistic.

Opportunities to replace lead service lines require coordination with state and local government beyond the water department / separate utility associated with changes in housing and other events include:

1. Identification/confirmation and replacement at time of title transfer.
2. Identification/confirmation and replacement at as a condition of occupancy post vacancy.
3. Identification/confirmation and replacement prior to rental.
4. Identification/confirmation and replacement as a condition of water service (initial turn on for a new customer or return to service if there is lapse in service).
5. Identification/confirmation and replacement in conjunction with a major remodeling of a current structure.
6. Identification/confirmation and replacement in conjunction with main replacement.
7. Identification/confirmation and replacement rather than repair following a leak or break.
8. Integrating lead service line identification and removal into lead-free facility approval processes for businesses seeking an operating license (including childcare facilities).

The average useful life of water mains varies with the material, the method of manufacture, and the conditions where the pipe is installed.[15] The oldest cast iron mains are quite long-lived with average useful life of about 120 years, while cast iron from the 1920s is expected to fail 20 years more quickly, and pipes installed post-World War 2 are expected to last just 75 years.[16] What is important to note is that the rehabilitation and replacement of these mains is a demographic echo of their initial investment. Today, in 2018, water system capital programs are at the beginning of the resulting wave of capital infrastructure re-investment.[17]

Service lines have a finite useful life, and as older lines fail, there is an opportunity to replace them completely. Lead service lines frequently do not fail for decades, but since those lines were often installed more than 70 years ago, failures are increasingly likely.[18]

Another opportunity for lead service line identification and replacement exists when plumbers engage with homeowners for routine work. Hot water heaters, for example, have a useful life of 8 – 12 years,[19] and installing a new one typically involves a visit from a plumber.

Lead service line replacement programs entail:

1. Identifying and actively engaging homeowners with lead service lines to coordinate full lead service line replacement.
2. Actively coordinating with other utilities engaged in infrastructure renewal (e.g., wastewater, stormwater, electric, gas, telephone, cable, etc.).

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[15] AWWA, Buried No Longer: Confronting America's Water Infrastructure Challenge, 2012. Available 02/21/2018 at http://www.awwa.org/portals/0/files/legreg/documents/buriednolonger.pdf.

[16] AWWA, Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure. 2001.

[17] AWWA, Buried No Longer: Confronting America's Water Infrastructure Challenge, 2012. Available 02/21/2018 at http://www.awwa.org/portals/0/files/legreg/documents/buriednolonger.pdf.

[18] Lee, Juneseok; Meehan, Myles. Survival Analysis of US Water Service Lines Utilizing a Nationwide Failure Data Set. Journal AWWA, Vol. 109, Number 9: 13-21. September 2017.

[19] DOE, 2010 Water Heater Market Profile, U.S. Department of Energy. September 2010.

3. Timing construction to reduce disturbing neighborhoods and respond to local policies that prohibit construction in recently repaved roads.[20, 21]
4. Doing service line replacements concurrent and preferably in coordination with other capital infrastructure investment (e.g., replacing mains that have high break rates, repairs to improve water quality or reduce water loss and maintain pressure etc.).
5. Replacing service lines as part of a community's efforts to revitalize its economy and jobs base (e.g., new or renovated facilities to deliver adequate water supply to new or expanding businesses).

If EPA evaluates lead service line replacement over a specific period of time, it must account for the cost and economic consequences of the timeframe selected. The shorter the period of time, the greater the burden associated with the above elements. There are also secondary impacts, including:

1. Increased failures of other infrastructure and consequent economic harm to the community as other necessary infrastructure improvements are delayed.
2. Disruption and potentially repeated and protracted disruption of neighborhoods and business districts as lead service line replacement would be occurring increasingly on a schedule separate from ongoing capital projects.
3. There is a practical limit as to how many streets can be disrupted in a community at any one time.
4. Larger numbers of households facing the prospect of immediately bearing the cost of replacing the portion of the service line they own. As a consequence, a larger number of households would not have access to financial assistance programs, given limited resources for these programs (or if assistance programs are expanded to meet the required pace, there would be an associated impact on fiscal health of the community).
5. Setting an arbitrary deadline of any length will be a disincentive to action in communities where the goal is unrealistically short given local circumstances, and also where a lengthy timeframe is not needed.

A recurring top concern in AWWA surveys of water sector leaders is the ability to convince ratepayers to fund infrastructure renewal and replacement.[22] An important aspect of building ratepayer trust is establishing a systematic process for prioritized infrastructure investments, or in other words, asset management.

It is also worthwhile to consider the overall management of drinking water infrastructure. EPA has described best practices for asset management as a core element of timely renewal of drinking water infrastructure.[23] An embedded tenet of asset management is the development of a system-specific path from the current state to the desired level of service, considering both the conditions of existing assets and the community's ability to find funding mechanisms -- particularly raising water rates.

One of the purposes of this consultation is to consider the unfunded mandate implications of the proposed rule. While EPA may identify some funding, such as through the state revolving loan fund, that can assist in replacing lead service lines, the demand for SRF funds is already larger than the available state and federal loan dollars. In 2017, total disbursements from state drinking water SRFs total less than

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[20] Sacramento County, Available 02/15/2018 at http://www.sacdot.com/Pages/Trenchingandroadcutmoratorium.aspx

[21] City of Portland, Available 02/15/2018 at https://www.portlandoregon.gov/article/437990.

[22] AWWA, 2017 State of the Water Industry Report. April 2017.

[23] EPA, Asset Management: A Best Practices Guide, April 2008, Available 1/26/2018 at https://www.epa.gov/sustainable-water-infrastructure/asset-management-water-and-wastewater-utilities.

$3 billion dollars. So, if all SRF funds were applied to lead service line replacement without respect how much SRF funds were available in any one state vs another, it would take 10 – 16 years to replace the estimated 6.1 – 10 million lead service lines. Importantly, the SRF is almost always a loan, meaning that the households in a community ultimately pay for the lead service line replacement program, with associated interest.

None of the existing federal or state infrastructure funding programs (e.g., SDWA SRF, Community Development Block Grant, Rural Utility Service, etc.) are positioned to provide grant programs sufficient to meet the $30–50 billion expense often cited for replacing existing lead lines in their entirety.

PARTIAL LEAD SERVICE LINE REPLACEMENT

The current LCR requirement to conduct lead service line replacement should be removed.[24] The most important change with respect to lead service line replacement that EPA can make in the LCR revisions is to change the regulatory construct from punitive to one of building capacity. The current rule requirements replacing lead service lines at a time when corrosion control is either not in place or not optimal. The timeframe for action in this provision is such that partial replacements are an inevitable result. As previously stated, the LCR revisions should reflect the NDWAC recommendation that water systems develop a proactive replacement strategy and work with their communities and other partners to implement that strategy.

It is important that practice in the sector emphasize full lead service line replacement but recognize that partial replacement will occur. In developing AWWA C810-17, the consensus view was reached that it was possible to reduce the number of partial lead service line replacements but there are multiple scenarios where partial replacements will continue to occur, and remain in place for indeterminant periods of time. A few example situations include:

1. An after-hours repair that disturbs a lead service line (e.g., a main or service line repair that occurs outside of typical work hours so as to reduce disturbance to community, provide access to personnel or equipment, etc.).
2. An emergency repair that disturbs a lead service line (e.g., a main or service line repair where water leakage presents a hazard to life or property).
3. A lead service line is recognized during ongoing work and the affected property owner is not available to coordinate full replacement.
4. A partial replacement by a customer's plumber occurs and the water system must schedule and mobilize equipment to address the utility portion.
5. The customer's plumber must schedule or re-schedule replacement of the customer's portion of a lead service line.
6. A customer does not want to or cannot afford to participate in a full-lead service line replacement.

EPA should use the rulemaking to emphasize full lead service line replacement as a routine practice. In lieu of full replacement, there should be a record explaining that either (1) the customer was unwilling or unable to pursue full replacement or (2) the status of the pending actions that will ultimately lead to full replacement. When partial replacement occurs, there is an opportunity for recurring customer notification of the need to complete the lead service line replacement.

Water systems are not the only utilities with buried infrastructure. Electric, sewer, gas, cable, telephone, stormwater, and fiber lines are installed, repaired, and replaced by other utilities and their contractors.

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[24] 40 CFR Part 141.84

To the extent possible, utilities coordinate so that one does not harm the others installed assets. Water systems can provide other utilities with standard operating procedures for how to coordinate around lead service lines, but the rule should recognize that the water system has limited influence over other utilities and their contractors.

PITCHER FILTERS POST LEAD SERVICE LINE REPLACEMENT

A single-choice risk mitigation measure should not be written into regulation. No other federal SDWA regulation specifies a single-choice treatment option. This is a deliberate policy because situation-specific solutions are necessary. An apt comparison for pitcher filters is the specific risk mitigation used following a nitrate maximum contaminant level violation. While states will often advise the use of bottle water with such a violation, other options like the use of an RO device maybe a better solution for some households.

This observation applies equally to plumbed in POU devices.

Pitcher filters are only one of several risk reduction options after lead service line replacement. AWWA Standard C810-17 includes (1) flushing (i.e., running water through) the new or replaced service line immediately after installation, (2) flushing the water lines in the home, and (3) providing instructions to the occupant to flush taps used for drinking or cooking periodically. The standard also recognizes that some situations may warrant using point-of-use filters, or customers may desire to use POU filters.

A number of systems have distributed pitcher filters after either exceeding the lead action level or as part of lead service line replacement protocols. To-date, "maintenance" of the pitcher filters in these systems has been limited to provision of (1) instructions to the customer on POU use, (2) a supply of replacement filters for the pitcher, sufficient for the intended period of performance, and (3) a point-of-contact for assistance. The experience of systems with this level of maintenance and research by other systems considering providing pitcher filters have identified several challenges:

1. Confirming delivery of the pitcher to the intended recipient – When pitchers are left behind by field crews or delivered by third-party providers, there are instances of theft, failure to deliver, failure to deliver in a timely manner, and other issues one would associate with leaving a package on a doorstep.
2. Adequate supply of NSF certified devices – At times, the available supply of NSF-certified filter products has been limited. Surges in demand that are unanticipated by the available manufacturers can lead to shortages and delays in filter delivery to the water system (or fulfillment center) for subsequent delivery to customers.
3. Potential legal liability for failure of the customer to properly use the device – It is conceivable that claims could be brought against a water system if a customer failed to adequately maintain the pitcher filter and subsequently claimed an illness was attributable to the water from the pitcher.
4. Impact on household behavior – It is not clear to what degree households will take seriously a recommendation to use and properly maintain a pitcher filter.

Benefit of providing pitcher filters is no more certain than benefit from routine flushing. Based on EPA's comments, the use of a pitcher filter in this situation would not trigger current guidance for maintaining and guaranteeing the performance of pitcher filters as described by EPA guidance.[25] As with flushing,

[25] EPA, Point-of-Use or Point-of-Entry Treatment Options for Small Drinking Water Systems, EPA 815-R-06-010, April 2006. Available 1/26/2018 at https://www.epa.gov/sites/production/files/2015-09/documents/guide_smallsystems_pou-poe_june6-2006.pdf.

AWWA is not aware of any research demonstrating the effectiveness of pitcher filters reflecting actual customer behavior.

Introducing as regulatory requirement creates a new barrier to implementation. With respect to primacy agency oversight of such a requirement, a traceable record to demonstrate delivery of pitchers within the specific criteria included in the rule language would be required. A regulatory requirement to provide filters, therefore, has the unintended impact of creating a new set of bureaucratic requirements that are a distraction and barrier to timely situation-specific risk mitigation.

The Water Research Foundation is currently sponsoring research into managing lead in drinking water and related issues.[26] This research agenda includes an ongoing effort to better understand flushing protocols around lead service line replacement

1. WRF # 4584, Evaluation of Flushing to Reduce Lead Levels and
2. WRF # 4713, Full Lead Service Line Replacement Guidance.[27, 28]

AWWA's standard review process will consider the information from these projects in the regular review and updating of AWWA Standard C810-17.

COST OF LEAD SERVICE LINE REPLACEMENT

EPA's proposed estimate, $4,700 per individual lead service line replacement, is too low.[29] There is substantial system-to-system and home-to-home variability in the cost of lead service line replacement. Replacement cost includes two components. The first is the administrative infrastructure (e.g., personnel time, business systems and field work) to identify and engage individual customers in lead service line replacement. As water systems make these systems more customer-focused, the cost of this administrative infrastructure rises. Engagement during a replacement may include dialogue with both a property owner and a resident, both of whom have a role throughout the preparation, execution and follow-through on a service line replacement. Water systems do not typically track administrative costs in a manner that supports quantifying administrative infrastructure. One partial example is the lead service line replacement program oversight contract for Flint, Michigan's ongoing program. Available program data from the 2017 Flint replacement program puts the administrative cost per service line removed at roughly $760.[30] Preliminary data presented by Denver Water in November 2017 on its lead service line replacement program suggests that the administrative cost per service line removed is approximately $600.[31] These two estimates illustrate (1) that administrative is a significant element of replacement program cost that must be considered, (2) there is program-to-program variability due to program structure, elements, and maturity, (3) best estimates at present are imperfect and likely underestimate actual program start-up costs and financial burden on departments beyond the water utility, and (4)

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[26] WRF, Lead and Copper Corrosion: An Overview of WRF Research, October 2017, Available 1/26/2018 at http://www.waterrf.org/resources/StateOfTheScienceReports/LeadCorrosion.pdf.

[27] WRF, Evaluation of Flushing to Reduce Lead Levels, Available 1/26/2018 at http://www.waterrf.org/Pages/Projects.aspx?PID=4584.

[28] WRF, Full Lead Service Line Replacement Guidance, Available 1/26/2018 at http://www.waterrf.org/Pages/Projects.aspx?PID=4713.

[29] EPA, Presentation to Federalism Consultation, January 8, 2018, Available 02/22/2018 at https://www.epa.gov/dwstandardsregulations/icr-federalism-consultation.

[30] Mlive, Flint lead pipe replacement program to switch hands in 2018, December 1, 2017. Available 02/22/2018 at http://www.mlive.com/news/flint/index.ssf/2017/12/flint_lead_pipe_replacement_pr.html.

[31] Price, Steve, From 0 to 60,000: Denver Water Gets a Leadfoot, AWWA, Water Quality Technology Conference, November 2017.

current estimates represent "low hanging fruit" of easy replacements. Over time, remaining lead service lines will entail increasingly costly outreach and coordination.

The second component is the cost of replacing the lead service. This latter cost is what is typically reported, and the cost per replacement varies based on many factors including:

1. Steps that can be taken to reduce mobilization cost (e.g., integrate into a larger construction project, execute in a systematic program, utilize existing crews during other operations and maintenance tasks).
2. Level of collaboration with customer (e.g., the number of field teams required to complete the entire replacement rather than coordination among multiple teams, including the customer's plumber and electrician, involved).
3. Site-specific constraints (e.g., the built environment in which the replacement is occurring)

Looking just at the field work costs associated with lead service line replacement, $4,700 is likely a low estimate (see Figure 1).[32] When estimating the cost of field work, EPA needs to be sure the estimates capture:

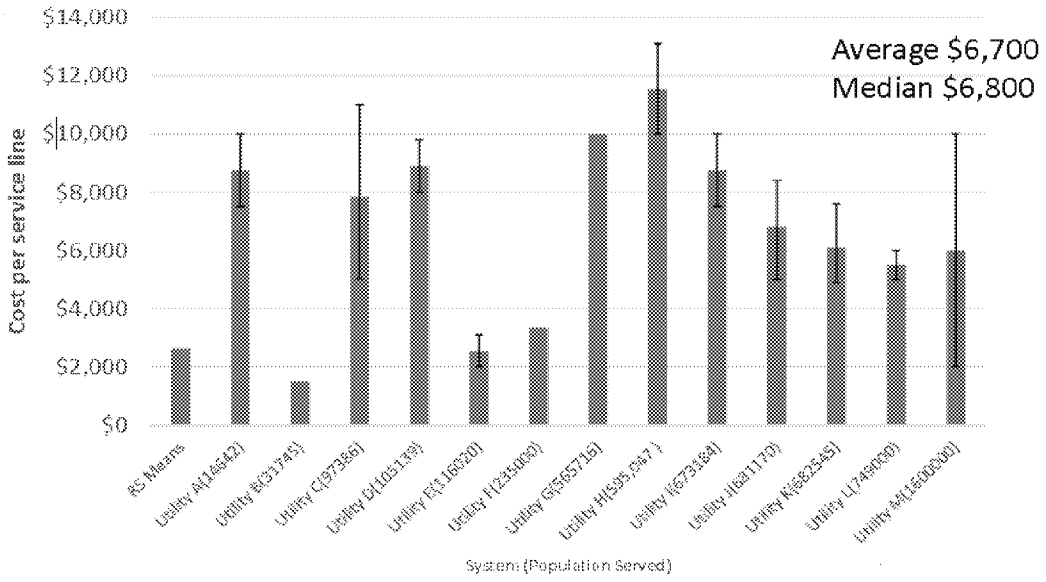

Figure 1 – Cost of full lead service line replacement fieldwork[33]

1. Both the replacement of the water system and the customer owned portions of the service line (these values may be tracked separately),
2. Mobilization costs, as well as time and materials costs, while on site at a specific house, and
3. Troublesome replacement and ideal replacement scenarios.

[32] AWWA, Ongoing data collection effort. Data as of 02/22/2018 reflecting information from 14 community water systems.
[33] Ibid.

Corrosion Control

The NDWAC recommendations could form the basis for LT-LCR revisions with respect to improving corrosion control practice. Today, under the current LCR, all systems may not install "optimized corrosion control" but all systems implement practices that reduce corrosion. The specific practices on which EPA and the sector rely when active corrosion control treatment for lead is needed are (1) pH and alkalinity adjustment and (2) phosphate addition. The current regulatory framework requires these specific treatments at systems that serve more than 50,000 persons and smaller systems that exceed the action level. When revising the LCR EPA should acknowledge that thousands of systems have made choices that reliably maintain 90th percentile lead levels below 15 µg/L. Systems are, in fact, taking corrosivity into account:

1. When selecting water sources,
2. In selecting treatment processes,
3. In making changes to water chemistry during treatment or adjusting treatment practice, and
4. Through the application of corrosion inhibitors and sequestration agents.

The rule framework and guidance should recognize the connections between distribution system operation and maintenance practices and corrosion control benefits, e.g., managing water age, lining of cast iron mains, unidirectional flushing programs, maintaining water quality in finished water storage, flushing stagnant water, etc. These and other practices contribute to limiting conditions that exacerbate corrosivity and complicate chemical corrosion control treatment.

It is important to incentivize sound practices for maintaining distribution system water quality and infrastructure. The NDWAC recommendations recognized that it was important for water systems to more explicitly explore how current practice was impacting corrosion control for lead and to use that information to improve corrosion control over time. This is in contrast with a regulatory model that focuses on either regulatory bright lines or treatment requirements rather than considering the underlying principles behind the regulatory requirements. The following NDWAC recommendations for improving corrosion control should form the basis for LT-LCR revisions, in which:

1. Corrosion control remain a central water system responsibility under the LCR.

2. Water quality parameter monitoring is expanded to include more frequent monitoring and monitoring at a more extensive set of locations, by integrating water quality parameter monitoring with monitoring in the distribution system for other regulations.

   While WQPs cannot predict the lead level at the tap, this is not their primary purpose. A water system sets WQPs to guide operational practices that produce water quality conditions which minimize corrosivity. Monitoring WQPs is used to ensure the system is operating within those target conditions. As with any process control strategy, there should be an ongoing feedback loop through which the system evaluates the data collected and continues to refine its performance.

3. Statistical control charts of WQP data are used for analysis to inform target conditions.[34, 35]

4. Improving and refining WQP parameter selection and target conditions should be supported by special studies to understand system-specific factors influencing corrosion control (e.g., stability

[34] Cornwell, David; Brown, Richard; McTigue, Nancy, Controlling Lead and Copper Rule Water Quality Parameters, Journal AWWA Vol. 107:2 p. E86-E96, http://dx.doi.org/10.5942/jawwa.2015.107.0011.

[35] AWWA, Manual 58. Internal Corrosion Control in Water Distribution Systems, Second Edition, 2017.

of existing scales, impact of historical sequestering agent use, corrosion of existing materials of construction, etc.).

The NDWAC framework also provides a viable strategy for advancing corrosion control practice among smaller and consecutive water systems.

SYSTEMS TARGETED TO INSTALL AND OPTIMIZE CORROSION CONTROL

The framework should focus first on improvement of systems that are only marginally compliant to fully evaluate and address gaps in their corrosion control practices. EPA's question might be restated to ask, "Which systems warrant the most attention now, as we revise the LCR?" A regulatory framework is not efficient if it focuses on systems which are already reliably compliant in documenting and enhancing their corrosion control practices.

SYSTEM SIZE THRESHOLD

NDWAC's proposed approach to improving corrosion control offers a viable path for expanding corrosion control to all systems over time. The NDWAC recommendation was intended, in AWWA's view, to overcome the primary barriers associated with increasing expectations on small systems. The NDWAC proposal focused on actions that:

1. Are based in known science and sound water system practice,
2. Utilize data streams that are readily acquired with available staff and expertise,
3. Foster use of good process control practice and improvements in technology available to small systems at an affordable cost,
4. Provide system-specific information that the system and state can utilize to make changes over time, and
5. Provide a vehicle to build awareness and practice in systems of all sizes around ensuring consistent water quality for all customers.

If EPA pursues a definition of corrosion control that emphasizes installation of active corrosion control treatment, then the Agency will need to stage rule implementation around primacy agencies' ability to manage the large number of small systems that would need to modify treatment. There currently are less than 1,000 water systems serving more than 50,000 persons; in total there are 10,600 systems of all sizes with optimized corrosion control under the current LCR.[36] In contrast, there are more than 5,700 medium-sized systems (population served between 3,300 and 10,000) without optimized corrosion control treatment, and roughly 63,600 smaller systems subject to the LCR that do not have optimized corrosion control treatment, e.g., a total of 69,300 systems that would need to develop and install OCCT per the rule requirements.[37] While some small systems are in suburban areas, many of these small systems serve rural communities.

Typical Agency practice follows one of several approaches:

1. An across-the-board requirement applied equally to all systems at the same time, typically three years after promulgation with the potential for a two-year extension for capital construction if approved by the primacy agency.
2. An across-the-board requirement, with implementation beginning with larger systems and moving over time to smaller system size categories.

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[36] EPA, Analysis of Impacts of Corrosion Control Treatment on Lead and Copper Levels over Time, (prepared by Cadmus Group; provided to NDWAC Workgroup), July 2010.
[37] Ibid.

3. A requirement limited to sizes or a combination of sizes and types of systems.
4. Triggered action, where monitoring is conducted and systems that exceed a trigger then initiate evaluation steps or proceed to installing treatment.

Variances are available under all the above approaches. However, as a practical matter, they are used infrequently. When they are used, they have the effect of adding workload on state primacy programs and complicating communication with customers in the impacted service area.

Treatment technique requirements should be appropriate to the type of public water system. AWWA's comments are primarily focused on community water systems, but the current LCR also applies to nontransient, noncommunity water systems. EPA could distinguish between CWSs and NTNCWSs (approximately, 17,800 NTNCWSs serve less than 10,000 persons) with respect to corrosion control / treatment technique compliance options. CWSs are most often responsible for delivering water to a customer, whose plumbing system contributes the lead that ultimate reaches the drinking water tap. In contrast, all potable water piping and fixtures associated with an NTNCWSs are owned by the same entity. "Appropriate" should also take ease of implementation into account. Drinking water is an ancillary activity for NTNCWSs and consequently few have dedicated staff that are expert in operating water treatment, consequently complex treatment that requires close attention is not a sound compliance option for these systems.

Oversight of Corrosion Control Optimization

Current OCCT decision-making framework is not feasible for state primacy agencies to oversee if applicable to all small systems. As noted previously, optimized corrosion control is defined as a few chemical treatments, and when framed as such, corrosion control treatment changes require extensive evaluation, time, resources and state oversight. Currently, EPA is recommending a year or longer pipe loop study to support installation of a new corrosion control treatment.[38] Under an "across-the-board requirement" regulatory approach, systems of all sizes would require state approval of the following within a three to five-year time window:

1. Identify a preliminary set of corrosion control options (e.g., combinations of pH, alkalinity, phosphate dose, etc.),
2. Develop a pilot loop test plan,
3. Execute the pipe loop test plan,
4. Develop a summary report and recommendations,
5. Conduct an evaluation of potential for unintended impacts as currently required by the LCR,
6. Develop test plans/recommendations to respond to impacts on system operation, particularly compliance with other regulatory requirements,
7. Prepare necessary plans and specifications for construction,
8. Engage in necessary public outreach around the treatment changes, construction, financing, etc.
9. Identify and obtain necessary funding,
10. Develop a test plan for new treatment start-up,
11. Execute the start-up test plan, maintain routine communication with state throughout, and adjust treatment to fix issues identified during start-up,
12. Prepare final as-builts and operations plan.

[38] EPA, Correspondence from Bryce Feighner to Karen Weaver, February, 2017, Available 1/26/2018 at https://www.epa.gov/sites/production/files/2017-02/documents/letter_to_honorable_karen_weaver_and_bryce_feighner_regarding_city_of_fl_0.pdf.

It is reasonable to expect that accomplishing these steps will require substantial training and state engagement directly with smaller systems. A query of the most recent posting of SDWIS found more than 6,300 substantive violations related direct to installation and operation of OCCT.[39] Less than 3% of those violations were associated with large systems; the largest group of violations were associated with very small systems (<3,300 persons served) – both community and noncommunity water systems. These violations suggest that the level of state oversight required for applying the current OCCT decision-making process to thousands of small systems will overwhelm state primacy agencies.

LEAD SERVICE LINES AS TARGET FOR CORROSION CONTROL

Corrosion control has been demonstrated to be effective reducing soluble lead. AWWA has sought input from experts in the field of corrosion control on several occasions to assess whether phosphate addition or pH/alkalinity adjustment would reliably control particulate lead. As recently as November 2017, the response has been that there is not a body of data supporting this conclusion.[40] EPA staff have acknowledged this point. Therefore, targeting water systems with lead service lines in order to control particulate lead is not appropriate.

Because corrosion control is well documented as a means of controlling soluble lead and, thereby, reducing elevated lead levels, EPA might prioritize systems based on the distribution of observed lead levels or consistency of system performance relative to the action level. Such a prioritization approach could inform the pace of state-system engagement on corrosion control described above using the NDWAC framework.

PLUMBED IN POINT-OF-USE DEVICES

Requiring water systems to install and maintain POU devices in customers' homes is not a viable regulatory option for addressing lead from lead service lines in community water systems. There are implementation considerations associated with utilizing plumbed-in POU devices beyond the burden imposed by the standard of performance described in EPA Guidance for SDWA compliance by installing POU devices. [41] They include:

1. Inability to gain access to 100% of homes with lead service lines to install, maintain and monitor filter performance.
2. Liability for harm to customer's property when installing devices (a frequent anticipated risk when installing POU devices on existing faucets and countertops).
3. Personnel safety when installing, maintaining and monitoring filter performance.
4. Inability to assure coordination with customer and consistent, adequate maintenance of the installed device.

Water systems do not own or maintain any plumbing components on customer property that entail as frequent entry into the home for maintenance as POU devices. Such entry presents both coordination challenges and risk to utility personnel.

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[39] EPA, Safe Drinking Water Act Information System, Available 1/26/2018 at https://ofmpub.epa.gov/apex/sfdw/f?p=108:9:::NO::P9_REPORT:VIO.

[40] AWWA, AWWA Expert Workshop-Sampling Fit for Purpose / Corrosion Control Treatment Going Forward, Washington, DC, November 12-13, 2017.

[41] EPA, Point-of-Use or Point-of-Entry Treatment Options for Small Drinking Water Systems, EPA 815-R-06-010, April 2006. Available 1/26/2018 at https://www.epa.gov/sites/production/files/2015-09/documents/guide_smallsystems_pou-poe_june6-2006.pdf.

A single-choice risk mitigation measure should not be written into regulation. No other federal SDWA regulation specifies a single-choice treatment option.

Installed POU devices are only a viable solution when the number of homes being treated is small and the inhabitants cooperate. As noted previously, EPA guidance for the use of POU devices describes a standard of care that includes proper selection and installation, ongoing maintenance and regular monitoring of performance. Historically, EPA has recognized that this treatment strategy was not a cost-effective risk reduction strategy compared to centralized treatment, other than for very small communities.

In Flint, Michigan, there was an extensive installed POU program. The teams responsible for outreach to customers on POU operation and performance were not able to access a significant number of homes for follow-up visits once the devices were installed. In March 2017, the program manager for the Flint outreach effort characterized the situation as follows:

> *"To date, CORE teams have attempted nearly 84,000 visits and connected with around 24,000 residents. We want to get that number up," Weaver said. "Our goal is for CORE workers to connect with a resident at every home in the city. We know some residents are leery about opening their doors to people they don't know, so we asked the workers and the CORE program director, Paul Newman, a long-time Flint resident himself, to come today so residents can see who they are and learn more about what it is they have been hired to do."*[42]

The City of Flint website hosts a video describing this extensive community-based outreach program, the challenges they see implementing the program, and the steps they are taking to overcome them. This program is an exceptionally strong outreach effort; the lack of customer engagement is not due to a lack of effort by the program.[43] Recently, Flint Neighbors United released a survey of Flint households capturing household understanding of POU devices, including maintenance. The survey illustrates that even with a substantial program to provide and support installation of POU devices, 15% of homes that responded to the survey (282 of 1,894 responses) did not have an installed POU. More than 9% of respondents with installed filters appear to not be maintaining the filter correctly. There is a separate question in the survey on when lead in tap water was most recently tested at respondent's homes; roughly 21% had not been tested in the last year.

The CORE program employed 160 field workers and 16 supervisors at hourly wages of $10 and $12 respectively, plus benefits.[44] This amounts to a personnel cost, plus estimated overhead cost of $8,985,600 per year. Assuming each of the 43,000 homes with active accounts in Flint received one filter and 3 replacement cartridges each year ($20 each) the cost for the filters per year is $3,440,000. An estimated annual cost for the CORE program is over $12.4 Million. While a remarkable, community-based effort supported by substantial state and federal subsidies (subsidies, which are unlikely to be available to other community water systems), the Flint POU program would not meet the requirements of EPA's current guidance for SDWA compliance using an installed POU program.

Requiring the water system to install and maintain a POU device to address a defect resulting in whole or in part by the property owner is not sound public policy. Mandatory installation of installed POU devices

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[42] City of Flint Press Release, March 22, 2017, Available 2/16/2018 at https://www.cityofflint.com/2017/03/22/video-released-to-inform-flint-residents-about-core-program-and-workers/.

[43] Ibid.

[44] Mlive.com, Officials say they want Flint residents to fill 160 water crisis jobs, 12/3/2016, Available 02/21/2018 at http://www.mlive.com/news/flint/index.ssf/2016/12/officials_looking_for_flint_re.html.

on taps in buildings would be an unwise national precedent that would have far-reaching consequences well beyond lead.

Optimal Corrosion Control

A DEFAULT CORROSION CONTROL TREATMENT

Water chemistry and pipe materials differ among water systems, so corrosion control strategies must be system-specific. As a practical matter, if EPA establishes a one-size-fits all default corrosion control treatment requirement, that will be the installed treatment. Few if any water systems will be able to successfully demonstrate "equivalent" treatment in the eyes of state regulators or regional EPA staff. One can look at a lack of innovation in both primary disinfection and filtration practice as examples of how conservatively primacy agencies will view a default corrosion control treatment strategy.

EPA has not described what a default corrosion control treatment might be. Most previous EPA statements about a default corrosion control treatment have been based on data reflecting soluble lead levels and limited consideration of particulate lead release.

For community water systems in the United States, corrosion control is more complex than simply complying with the LCR. Systems must:

1. Balance water qualities from multiple water sources,
2. Manage corrosivity to protect buried infrastructure,
3. Anticipate corrosive water impacts on a variety of materials in building plumbing,
4. Provide a stable water quality for industrial, manufacturing, and commercial, as well as residential uses,
5. Reduce the potential for scales interfering with system and plumbing component operation,
6. Reduce exposure to unwanted aesthetic issues such as iron and manganese, and
7. Collaborating with receiving wastewater treatment authorities with respect to the contribution of phosphate and metals reaching publicly owned treatment works.

Regulatory requirements must be achievable while all other aspects of water system operations are realized.

CONSEQUENCES FOR RECEIVING WASTEWATER SYSTEMS

The Office of Water cannot develop SDWA and CWA policies that are in conflict. Mandating the use of phosphorus for corrosion control and requiring elevated doses will have local consequences. At present, where phosphate is used for corrosion control in the U.S., it contributes 10–35% percent of the phosphorus loading to the wastewater treatment facility (based on 10 drinking water–wastewater system pairs).[45] As phosphorus limits become more stringent, the use of phosphate becomes not only a cost consideration for the wastewater treatment facility, but equally importantly, an issue of credibility in the relationship between the utilities and local governing bodies. As more communities partner to achieve economies of scale in water and wastewater service provision, the number of governing bodies impacted by this credibility dynamic also grows, further complicating efforts to develop regional partnerships.

For decades EPA has identified nutrient pollution as a significant challenge for natural water bodies and phosphate as a nutrient of concern for inland water, particularly lakes. Over the past two years EPA has emphasized nutrient control as a key tool in preventing harmful algal blooms, including blooms that

[45] Rodgers, Impact of Corrosion Control on Publicly Owned Treatment Works Water Quality Technology Conference, New Orleans, LA. 2014.

produce cyanotoxins. In 2016 EPA released health advisories for microcystins and cylindrospermopsin. When levels of these toxins are elevated in drinking water, the water system is expected to issue a "do not consume" order, which has significant implications for the community served by that water system. When evaluating the cost implications of phosphate addition on wastewater treatment plants, phosphate corrosion inhibitor addition leads to an incremental increase in wastewater treatment cost. It can also result in some wastewater treatment facilities facing a "cost wall" because it triggers a shift to a new wastewater treatment train design.

Currently, EPA's ATTAINS database indicates that almost 2 million acres of lakes and 55,000 miles of rivers and streams are impaired by phosphorus alone.[46] EPA estimates that by 2020, half of the states will have numeric nutrient water quality criteria for phosphorus under the Clean Water Act.[47] In addition to developing statewide nutrient criteria, EPA is working with states to develop practice around "interpreting" narrative nutrient criteria to set loading limits for nutrients.[48] Implementation of this latter effort appears to be proceeding even more rapidly than state adoption of statewide numeric nutrient criteria. It seems likely that this tension between the addition of phosphate and subsequent removal will only become more frequent with time and will take place where both the water system and wastewater treatment system are both attempting to make ever smaller marginal improvements in performance. Impacts on wastewater discharges is a constraint that should factor into optimized corrosion control treatment selection.

EXPECTATIONS MUST HAVE SOUND PREMISE

Benchtop and pipe loop studies are informative but not perfect predictors of full-scale success. Data from benchtop and pipe loop studies is a key tool in guiding corrosion control, but these test systems are not sufficiently accurate in their predictions as to fine tune corrosion control based on this data alone. Further research is needed to better relate test system results to full-scale performance and to understand variances in test data when interpreting full scale application.

More research with actual pipe scale formation is needed to justify high, sustained levels of phosphate addition. The principle justification for higher orthophosphate levels are solubility curves for a lead phosphate compound. Those curves for required orthophosphate dose are generally a function of an alkalinity (or inorganic carbon). The curves show that at higher alkalinity levels that orthophosphate doses of 1 mg/L as P (3 mg/L as PO_4) or above may be needed. While useful guidance, solubility curves do not fully describe the electrochemical reactions or coatings involved in corrosion. In fact, often the compound modeled is not often found in pipe scales.

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[46] EPA, National Summary of State Information, Available 02/15/2018 at https://ofmpub.epa.gov/waters10/attains_index.control#causes.

[47] EPA, State Progress Toward Developing Numeric Nutrient Water Quality Criteria for Nitrogen and Phosphorus, Available 02/15/2018 at https://www.epa.gov/nutrient-policy-data/state-progress-toward-developing-numeric-nutrient-water-quality-criteria.

[48] 2013, Correspondence Chris Hornback to Nancy Stoner, March 7, 2013. Available 2/15/2018 at https://www.nacwa.org/docs/default-source/default-document-library/letter-to-n-stoner-on-narrative-nutrient-criteria-3_2013.pdf?sfvrsn=0.

Although this analysis is preliminary, we are finding that the solubility models in common use overestimate the amount of phosphate needed. For example, the graph in Figure 2 shows the solubility curves often cited and the data points are from actual lead coupons at steady state.[49] As seen, inorganic carbon values in the mid-range of around 20 mg C/L fall close to the curve for a dissolved inorganic carbon of 5 mg C/L while the data for the DIC of 15 mg C/L is actually below the curve for a DIC of 5 mg C/L. These results are not surprising given experience in the field but point out a difficulty with making decisions for the rule (e.g., the necessity of high orthophosphate doses) and individual treatment decisions based largely on an understanding of corrosion based on the available solubility curves.

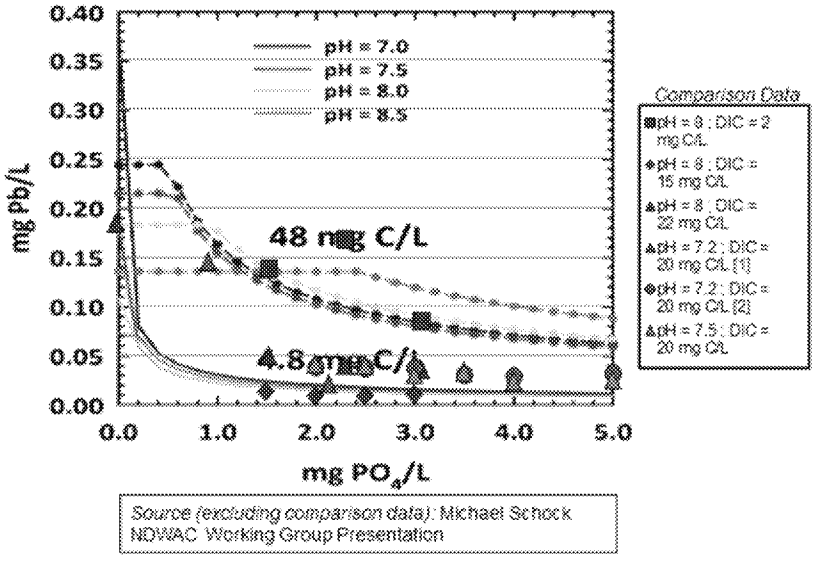

Figure 2: Theoretical lead solubility curves compared to benchtop tests using actual pipe materials.

The above example is not novel. Much earlier work came to a similar conclusion using a different methodology.[50] As Edwards et al. points out, other factors can have system-specific relevance. This point can also be extended to include the over use of corrosion control indices. Generalized corrosion control models are an important aspect of managing scaling and initial evaluations of water stability, but, alone, they are not sufficient to guide adjusting corrosion control.[51]

REFERENCING PRACTICE IN UNITED KINGDOM

EPA cannot reference guidance for treatment in the United Kingdom without a complete understanding of actual practice. The view that elevated phosphate doses (e.g., 1.3 - 2 mg/L as P [4 – 6 mg/L as PO_4] or higher) are critical to effectively manage lead often cites corrosion control practice in the United Kingdom. Unlike the United States, the bulk of the U.K. is served by 12 water companies. After contacting water systems and U.K.-based drinking water treatment consultants, there is good reason to believe that

[49] Cornwell Engineering Group, Personal correspondence February 14, 2018.
[50] Edwards, Marc; Jacobs, Sara; Dodrill, Donna. Desktop Guidance for Mitigating Pb and Cu Corrosion By-Products. Journal AWWA Vol. 91, Num. 5. P. 66-77. https://www.awwa.org/publications/journal-awwa/abstract/articleid/14051.aspx.
[51] Hill, Christopher. Importance of Corrosion Indices and How to Use Them. Water Quality Technology Conference, 2017.

the levels of phosphate applied in the U.K. are not as different from those currently used in the U.S. as typically described. Our survey efforts are not complete, but to-date, it seems that as an ongoing target, systems tend to focus on 1 mg/L as P (3 mg/L as PO_4), though the target can range from 0.4 – 1.5 mg/L as P (1.2 – 4.6 mg/L as PO_4) on a site-specific basis. Observations to-date emphasize the use of orthophosphate over other forms of phosphate primarily based on cost considerations. This is not markedly different from the range of orthophosphate addition here in the U.S. 0.2 – 1.0 mg/L as P (0.5 – 3.0 mg/L as PO_4).

PERIODIC RE-EVALUATION OF CORROSION CONTROL

Corrosion control has and should continue to evolve based on science and field experience. The NDWAC recommended a periodic re-evaluation of corrosion control as a mechanism to respond to new knowledge acquired through research and practice. As a practical matter, AWWA has a Manual of Practice for Internal Corrosion Control in Water Distribution Systems.[52] That manual is updated periodically to reflect new developments. Like AWWA standards, it is developed through a consensus process, but it is not an ANSI document. Historically, EPA has revised guidance relevant to the LCR, and that guidance has been considered by states and systems (e.g., guidance published in 1992, 1995, 1999, 2001, 2003, 2007, and 2016.)[53]

One of the underlying tenets of corrosion control is a commitment to and consistent execution of a strategy. If EPA were to expect systems to re-evaluate current corrosion control practice periodically with an affirmative decision by the State that the system is using the appropriate strategy, then that state review must:

1. Be grounded in a sound understanding of corrosion control,
2. Consider sufficient system-specific information to facilitate sound decision making,
3. Lead to changes in practice when there are substantial opportunities for additional reductions in observed lead release, and
4. Include explicit consideration of unintended consequences from change.

Because changing corrosion control should be done carefully. The revised LCR should incentivize water systems to continually evaluate corrosion control rather than focus on rote regulatory compliance.

Sanitary surveys could serve as a mechanism for periodic review of corrosion control practice. All public water systems are required to have period sanitary surveys. For community water systems, these reviews must occur at least once every three years. These regularly occurring reviews of system practices, could include a review of ongoing corrosion control. And, as with other items evaluated in the sanitary survey, the primacy agency could identify potential revisions to evaluate and initiate as warranted based on a more substantive evaluation, necessary consultation, and appropriate permitting.

SUSTAINABLE OPERATIONS

In costing corrosion control, EPA needs to recognize the need for additional changes in treatment that are triggered by substantial changes in corrosion control. "Optimized corrosion control treatment" is a phrase that EPA appears to be preparing to re-define in the LT-LCR. EPA and state interpretation of the current rule allow for the considerations beyond simply reducing lead and copper concentrations. That same

[52] AWWA, M58 Internal Corrosion Control in Water Distribution Systems, Second Edition, 2017.
[53] EPA, Compliance Guidance Documents available 1/26/2018 at https://www.epa.gov/dwreginfo/lead-and-copper-rule#additional-resources.

flexibility is necessary in the LT-LCR. Examples of additional considerations in EPA's most recent guidance include:

1. "black or red water complaints due to oxidation of iron and manganese in the distribution system"[54]
2. "potential to form scales on the interior of piping systems that may reduce the effective diameter of the pipes, resulting in loss of hydraulic capacity and increases in system headloss and operational costs"[55]
3. "disinfection performance and compliance with Surface Water Treatment Rules and possibly the Ground Water Rule"[56]
4. "raising the pH and DIC may cause calcium carbonate to precipitate in the distribution system, clogging hot water heaters and producing cloudy water.[57]
5. "... there are limitations to their application. Two factors that could limit the use of phosphate-based corrosion inhibitors are (1) reactions with aluminum, and (2) impacts on wastewater treatment plants."[58]

Recognizing considerations beyond regulatory compliance when selecting optimal corrosion control treatment for a system is critical to the sustainability of community water system efforts to reliably assure water quality within a matrix of multiple objectives, and simultaneous efforts to maintain and improve system performance on multiple topics.

Reliable supply of affordable treatment chemicals required. Phosphate addition is a treatment strategy that, if pursued, must be maintained into the future. At present phosphate is an international commodity for which the primary sources are off-shore and dependent on unencumbered trade.[59] There are mines in the United States, but the principal sources from a global perspective are Morocco and China.[60, 61] Water systems only account for a small fraction of phosphate use in the United States (about 3%); the most significant use and international driver for commodity pricing is agricultural applications, which is not only a much larger use but also a less challenging product to deliver.[62] While currently there are not any shortages in supply, drinking water systems have seen periods of dramatic price increases in phosphate and some supply disruptions at individual utilities.[63] For example, a survey of 47 U.S. water systems found that these systems experienced an average phosphoric acid cost increase of 233% over the period from January 2008 to January 2009.[64]

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[54] EPA, OCCT Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems, EPA 816-B-16-003, March 2016, p. 19.
[55] Ibid, p. 19.
[56] Ibid, p. 41.
[57] Ibid, p. 42.
[58] Ibid, p. 43.
[59] SEI, Sustainable Use of Phosphorus, October 2010.
[60] IFDC, World Phosphate Rock Reserves and Resources, 2010.
[61] USGS, Mineral Commodity Summaries 2017, Available 1/26/2018 at https://minerals.usgs.gov/minerals/pubs/mcs/2017/mcs2017.pdf.
[62] WRF, Supply of Critical Drinking Water and Wastewater Treatment Chemicals – A White Paper for Understanding Recent Chemical Price Increases and Shortages, 2009.
[63] Ibid
[64] Ibid

CONSECUTIVE SYSTEMS

Consecutive systems will bear costs of change to corrosion control practice as well as the wholesaler installing treatment. In organizing cost consequences for the LT-LCR, EPA faces a challenge like that presented by the disinfection byproducts and ground water rules. There are substantial dependencies between water wholesalers and consecutive systems. While each public water system (each PWSID) "stands alone" with respect to compliance, decisions made to optimize corrosion control for one system may or may not be the most cost-effective solution for other systems in the same extended network due to differences in home construction materials, condition of distribution systems, water age, and other factors. "Optimizing" for reducing lead and copper must be balanced across this extended network of systems on a local basis. Consequently, not only should the rule provide the necessary flexibility, but the Agency's economic analysis should reflect the associated costs for preliminary analysis, treatment, transition preparation, monitoring, customer outreach and oversight.

FINDING AND FIXING PROBLEMS IN CORROSION CONTROL

Exceeding community action level should trigger assessment and correction. One aspect of the current rule that has proved problematic is that systems that exceed the action level are triggered into a long list of action items. This list includes preliminary evaluation of corrosion control treatment. It appears that, at least in some instances, this lengthy process provides a window for the system to return to lead levels below the action level without having to complete an evaluation of corrosion control changes and make necessary corrections. The NDWAC recommendation that if investigation is triggered by the rule, then the evaluation should be fully completed, and the lessons learned be applied in corrective actions.

The details of the rule are important. The trigger for system-level evaluation and correction may exist separate from triggers for evaluation / additional support to individual homeowners who experience elevated lead levels. This concept of find-and-fix could be tied to system-specific water quality parameter monitoring plans, which are based on distribution system and water treatment process control monitoring. These plans would utilize statistical process control strategies to flag deviations that warrant investigation and corrective steps. It could also be triggered by multiple in-home tap samples exceeding a community "action level."

The framework utilized in the Revised Total Coliform Rule for assessment and correction of sanitary defects provides a useful parallel to find-and-fix under the LT-LCR. As with the RTCR, the process would begin with in-home sampling triggering a tiered response that first focuses on levels of lead in the structure, and based on the data, expands to include evaluation of system-wide issues.

Public Education

EPA should provide resources to support public outreach on lead risk and lead risk mitigation. Water systems should actively and transparently communicate with their customers, particularly customers with lead service lines, about lead risks and steps households can take to evaluate and reduce lead in drinking water. The NDWAC recommendations include development of a comprehensive resource to support communication with the public about lead and lead risk mitigation across all environmental exposures. Households need clear, holistic guidance on how to identify and reduce lead risks from all environmental exposures. Communicating to the public that lead risks need to be addressed and require action, while also helping the public recognize the timeframes and limitations of environmental exposure reduction strategies is a challenging task. Well-grounded and consistent communication materials that reflects the best information from CDC and other authoritative sources, is necessary to support revision of the LCR.

TARGETED OUTREACH TO CUSTOMERS WITH LEAD SERVICE LINES

Outreach to customers with lead service lines will need to use multiple delivery channels appropriate to that community as part of an ongoing communication program. The challenges associated with targeted outreach vary as a function of existing data systems, customer communication infrastructure, nature of the system's service area and customer behavior. Consequently, the NDWAC recommends the use of a comprehensive ongoing communication program. Some of the challenges of outreach targeted to customers with lead service line include:

1. Organizing outreach so that it reaches customers who are prepared to act, e.g., at the time of home purchase, when a home inspection report is available, when a new homebuyer is reviewing needed improvements. Unfortunately, the water system will not start a relationship with the new customer with respect to that address until after transfer of title.
2. Utilizing existing delivery mechanisms like bill stuffers, consumer confidence reports, and similar routine communication tools requires messaging that recognizes most customers do not have lead service lines.
3. Targeted messaging around lead service lines has two audiences: those who live in the home and those who own the home. Due to rentals and other housing situations, the primary point of contact for the water system may be different from the individuals in the home. Therefore, messages related to removing lead service lines may reach the appropriate individual but information about taking protective measures may not reach inhabitants.

NOTIFICATION OF EXCEEDING ACTION LEVEL

Notification under the WIIN Action should be to individual homes at which the water system has data that lead levels are elevated. EPA is required by the WIIN Act to address public notice. The WIIN Act does not have any accompanying report language that informs how to interpret its provisions, but it is clear from the resulting edits to SDWA that the 24-hour timeframe is limited to instances when there is a "potential to have serious adverse effects on human health as a result of short-term exposure."[65] This criterion is not consistent with the basis for the current LCR action level (i.e., communitywide 90th percentile concentration greater than 15 µg/L). It is not clear how EPA will utilize the ongoing analysis to identify a level of lead in water consistent with a short-term exposure scenario. Regardless of level, the implications of a 24-hour notification requirement include the following:

1. Ongoing water system public education programs about lead, currently only required of water systems that have exceeded the lead action level, will be necessary to provide context for households that receive this notice recommending immediate action, if such notices are to be impactful.
2. Water systems will need support from both state and local health experts to communicate the health effects of short-term exposures to lead and the appropriate action steps to take.

An alternative approach would be to focus on communicating with individual homes when observed lead concentrations are above the action level (i.e., homes in the compliance sample pool must be notified of elevated lead levels). This interpretation of the WIIN Act revisions would facilitate more targeted dialogue with occupants regarding observed lead levels in their home; a potentially more effective conversation.

Regardless of the numeric value of the action level, the implementation challenges include:

[65] SDWA, Sec. 1414(c)(2)(C)

1. An administrative burden on meeting notification requirement (e.g., assuring notice is provided, documenting successful notification, and backstopping primary mode of notification) limits when systems can take samples, thus prioritizing notification over collecting data in a timely or informative manner.
2. Need for additional administrative procedures, systems, and personnel to assure notice in time frame is achieved.
3. Close coordination with local public health staff with expertise in lead risk communication. Such coordination can be challenging in communities where the water and health departments exist within the same governing structure; it becomes increasingly difficult with separation in governance: e.g.,
    a. County health department, with town or village operated community water system,
    b. County or state health department with subdivision community water system,
    c. County subdivision with rural community water system owned or operated by a third-party provider (non-profit, cooperative, or investor-owned entity).
4. Notification by priority mail may not be possible within 24-hour timeframe, necessitating state acceptance of phone contact, email or other electronic media notification to affected households.
5. Rural and suburban communities have less access to priority mail delivery services requiring additional personnel hours to backstop documented delivery of required notice.
6. Administrative expectation for documenting notification limits the tools available for notification (e.g., a phone call, text message, or drive by interaction with customer absent further documentation may not suffice for regulatory compliance) and requires administrative systems and personnel time.

PUBLIC ACCESS TO INFORMATION

Results from In-Home Tap Sampling

Data should be readily available to the public without revealing exact address where sample was drawn.

Tap samples need to be drawn by residents to (1) assist the water system with compliance monitoring, (2) assist the water system in evaluating potential changes in treatment and (3) inform households of potential risks and protective actions. However, making data from sampling available to the public and connecting it to a specific structure may dissuade homeowners from collecting samples. Making all data from sampling available to the public is challenging, because the protocols for sampling may vary and lead to results that should not be compared directly. In Flint, individual addresses were revealed, but in presenting the data, considerable effort was taken to segregate it into comparable datasets.[66] It was necessary to (1) present pre-POU and post-POU data independently, (2) show compliance data monitoring separately, and (3) not present some data (for example, to-date lead service line profile data has not been presented in a readily accessible format).

Currently individual tap sample results are available to the public upon request. Beyond a local interest in transparency, the federal Freedom of Information Act as well as state and local policies require information release by publicly-owned water systems. Investor-owned water systems may have less certain legal requirements for release of information. In states where water systems submit individual LCR sample results, the data from all water systems is available through FOIA of the state program. What is often not made available under current practice is the exact street addresses associated with individual

[66] State of Michigan, Taking Action on Flint Water website, Available 2/1/2018 at http://www.michigan.gov/flintwater/0,6092,7-345-76292_76294_76297---,00.html.

sample results. This is primarily due to homeowner privacy concerns, and the need to recruit customers to participate in compliance monitoring.

EPA indicates it will be implementing PRIME in 2018. PRIME has been described as a vehicle for public access to individual observations submitted in compliance monitoring. It is not clear when EPA intends to fully implement PRIME in this manner. Currently, not all states maintain a Safe Drinking Water Information System record of actual observed lead values. In either a state or federal public data access strategy, the regulatory community would not only need to acquire and upload the data in a timely fashion, but it would also need to determine if the Agency (EPA or state) would take responsibility for publicizing lead and copper observations associated with particular addresses (e.g., privacy concerns, liability for imperfect data being presented, etc.).

Water systems currently summarize LCR compliance data in consumer confidence reports. CCRs are already viewed as dense technical documents by many members of the public, and adding tens to hundreds of individual lead observations would be at odds with ongoing efforts to improve them.

Water systems or states could make compliance monitoring data available through local websites, as the State of Michigan did and continues to do for Flint. Michigan posted both tabular data and maps of observed lead levels. EPA could engage Michigan to determine how much the state invested in developing and maintain public access to lead data through that website. It is worth noting that not all smaller water systems maintain a website or have access to the website for their local jurisdictions.

One of the failings of the current LCR is it may discourage sampling by the water system to facilitate diagnosis of water quality problems, particularly lead issues, in individual homes. Systems that take samples that:

1. Meet the general criteria for compliance data may be added to the compliance dataset by the State, even if multiple samples are from the same structure during an investigation of that structure.
2. Do not meet the criteria for use as compliance data, are expected to be judged by some as being deliberately drawn in an effort to misrepresent or hide lead occurrence.
3. Do not have a robust chain of custody and quality assurance prior to acceptance by the laboratory for analysis, can be added by the state into a system's compliance dataset.

Under the current rule, a few samples lead to (1) aggressive public education systemwide and (2) revisiting the fundamentals of corrosion control practice. Neither are insignificant challenges for a water system, hence an inability to directly assist individual homeowners. If the rule mandates public access to non-compliance data, then the rule will further discourage testing for lead by water systems and efforts by water systems to effectively engage customers.

Water Quality Parameter Monitoring

Providing the public WQP data should not be allowed to become a barrier to water systems expanding WQP monitoring. Water systems frequently provide basic information to customers, including generalized WQP data. This is data the public does find useful when caring for aquariums, deciding to install home treatment devices, planning the design of commercial / industrial process equipment, and other applications.

It is not clear what WQP data EPA anticipates providing to the public as a regulatory requirement. WQP monitoring as required by the current rule is infrequent and limited to a few locations. Providing the currently required data to the public in summary form would be feasible, particularly where the system has a website. This data as well as more frequent monitoring of relevant parameters are submitted to

the state in regular reports. The submitted data is available to the public currently through FOIA of the state or local water system. There are potentially security concerns with releasing detailed process control data to the public (e.g., ongoing chlorine concentrations if oxidation reduction potential was a WQP, etc.), so the provision of enhanced WQP monitoring as described by NDWAC may present challenges.

Other barriers and cost considerations that EPA will need to consider:

1. There is an opportunity to expand use of on-line monitoring devices, but
    a. Data from on-line instruments must be handled appropriately, with appropriate quality control and quality assurance prior to use by the water system or provision to the public.
    b. Presenting on-line monitoring to the public complicates the primary goal of increasing use of on-line devices for process control by placing an administrative focus on public access rather than utilization of the data stream.
    c. Effective use of on-line instrumentation for process control, regulatory triggers, and public awareness requires a commitment to instrument maintenance that is significantly higher than what might be employed for an initial demonstration of capability or a short-duration research project.
2. If WQPs (grab sample or on-line) are provided to the public, then information must be provided to illustrate the relevance of the data. Simply providing a data point at a given time and location is not informative unless one has a clear notion of what portion of the service area that data represents. Modelling and analysis necessary to present WQP data to the public in a manner that is informative to individual households would distract from the initial goal of gaining more understanding and control of WQPs in the distribution system.
3. Providing basic information to the public requires effective risk communication. Consumers face an array of do-it-yourself home treatment device options and ongoing news stories of studies and advocacy reports. In the absence of a cohesive public communication effort about what WQP data means, there is ample opportunity for consumers to misunderstand the implications of the data to which they would now have access.
4. Each of the above considerations has an associated cost component to overcoming.

Tap Sampling

The revised LCR should incentivize sampling and special studies to better understand corrosion control and make informed decisions about treatment changes.

Dramatic changes to the current in-home tap sample protocol will substantially delay revision of the LCR. The current sampling protocol is not consistent with modern standards for quality laboratory systems (e.g., inadequate chain-of-custody procedures, inability to know if samplers are employing proper sampling technique, and consequently lack of legal defensibility for the compliance laboratory).[67] Consequently, there is interest in changing the sampling protocol to address the current failings. Moving away from customer collected samples is not likely if the rule revision:

1. Continues to use the current LCR sample protocol (or an alternative stagnation sample),
2. Revises the sampling protocol to target water from the lead service line, or
3. Increases the number of required samples required and thus requiring access to more customers' kitchen taps to obtain the requisite number of samples.

[67] EPA, Manual Certification of Laboratories Analyzing Drinking Water 5th edition, Available 2/2/2018 at https://www.epa.gov/dwlabcert/laboratory-certification-manual-drinking-water.

If the purpose of compliance monitoring is solely to inform residents of lead levels at their taps, then these concerns are less troubling.

If the purpose of the sampling is consistent with the current LCR -- to trigger re-evaluation or installation of corrosion control treatment -- AWWA is not aware of any peer-reviewed studies to show how a new sampling protocol/increased sample pool would compare to the current protocol/sample pool.

EPA must clearly describe any required tap sample protocol. Samplers should be able to follow any tap sample monitoring and the protocol should be sufficient to eliminate "gaming" and forestall accusations of gaming sample results.

CURRENT SAMPLE PROTOCOL

Retaining current sample protocol as recently refined by EPA, may be the most expeditious option for EPA to pursue. The current sampling protocol, first liter following at least 6 hours stagnation, data has served community water systems well as a tool to reduce lead levels. The reductions in lead levels over the years has been well documented.[68]

Many water systems have been able to adjust their corrosion control program by assessing historical first liter samples. The sample procedure allows the system to compare data collected consistently over time and spatially because the samples are always collected the same way. Specific instructions bring some uniformity to the data facilitating this comparison. Multiple rounds of monitoring over time provides a historical benchmark for future actions. This historical data allows systems to spot changes either positive or negative and to make appropriate actions. Comparisons are relatively easily made between systems within a state when regulators want to make relative assessments of lead release across systems with similar water qualities.

First liter samples have also served to alert systems to major upsets. For example, the Flint 90th percentiles for first liter samples went over 100 µg/L. As orthophosphate and other WQ controls went into pace the improvements in first liter samples could be tracked and improvements seen as the 90th levels dropped to the current 6 µg/L level. A similar recognition, response, and downward trend occurred when Washington DC experienced elevated lead levels following its transition to chloramines.

While the first liter sample may not be the highest lead level found in samples from homes with lead lines, many homes and many cities do not have lead lines. Homes can still experience lead due to old brass, galvanized plumbing and lead solder. The first liter sample is actually very useful for sampling interior sources of lead.

Tap sample protocol representative of exposure

The current LCR sample protocol is not designed to be representative of exposure. Representing exposure will required more than changing when customers draw a one-liter sample. "Exposure" for risk assessment purposes occurs at three levels: individual, building and community. EPA has not provided information to understand which of these types of "exposure" this sampling framework would address. Consequently, it is not clear what combination of sample protocol, sample number, sample site location, and sample frequency the Agency is considering. As EPA considers presenting an LT-LCR monitoring plan as representative of exposure, it should:

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[68] Richard A. Brown, Nancy E. Mctigue, And David A. Cornwell, Strategies for assessing optimized corrosion control treatment of lead and copper, Journal AWWA Vol. 105 No. 5 pages 62 – 75, May 2013.

1. Appropriately match the sampling requirements to the objective for the monitoring (e.g., a sample to inform customers about lead levels in their water should be geared toward taking a sample of water likely to be consumed).
2. Clearly present how the data would be used in the regulation in a manner consistent with SDWA (e.g., not create a duty on community water systems that is beyond the bounds of water system ownership).
3. Identify opportunities to shift the new compliance monitoring requirement to one that can be executed by trained technicians within the framework outlined by EPA's laboratory certification guidance.

AWWA is not aware of any new guidance from EPA or others to provide insights into how sampling at a structure can best inform risk reduction steps by homeowners or landlords.

Households sample when consuming water

AWWA is reluctant to comment on a single aspect of tap sampling monitoring in isolation. Instructing consumers to take a tap sample when they are preparing food or getting a drink of water could substantially alter the LCR routine compliance monitoring dataset by reducing the period of stagnation prior to sampling.

It is not clear from EPA's comments how changing the sampling protocol in this way would be accompanied by other considerations in the rule revision:

1. How large an increase in the sample pool size to "make up for" the lack of certainty in minimum stagnation period?
2. A change in the actual protocol (e.g., is a first-draw, one-liter sample anticipated)?
3. A change in the households targeted for sampling (e.g., all homes in pool being homes with lead service lines)?
4. A single sample for lead and copper observations?
5. A change in the evaluation metric (e.g., 90th percentile value of 15 µg/L)?
6. A change in the implications of exceeding the evaluation metric?

All these considerations are relevant to the effectiveness of the compliance monitoring regime. Consequently, AWWA is reluctant to comment on a single aspect of monitoring. If EPA proceeds with evaluating this option, it is important for the Agency to communicate to the public:

1. That lead levels vary and a single observation from a tap does not adequately represent exposure to that household.
2. A community-wide assessment of lead levels does not mean that homes with lead sources (e.g., old brass fixtures, lead service lines, lead solder, etc.) will not observe higher levels, even if the LCR monitoring program is biased toward more challenging homes.

While communication around the current LCR sampling protocol is very challenging, there are similar challenges associated with this sampling protocol:

1. Risk management by the household should occur regardless of observed value in water and include basic steps to mitigate risk from other exposures (e.g., dust, paint, etc.)
2. The water system is taking steps to manage the corrosivity of the water, but absent removal of all sources of lead in contact with water, some risk remains.

LOCATION OF TAP SAMPLES

Tap sampling and the questions of number, location, frequency and protocols all stem from the purpose of sampling required under the rule. There are several acknowledged uses for tap samples:

1. As a check on the need for / adequacy of corrosion control treatment,
2. Understanding the nature of lead release in a system to inform improvements to corrosion control, and
3. To inform / motivate customer action.

There is general agreement that no one sampling strategy and protocol is ideal for all three of these objectives.

There is also broad agreement that sampling for copper at locations identified solely to maximize the opportunity to find elevated lead levels is unlikely to recognize higher copper levels that can be associated with very new structures containing copper plumbing.

Each of the specific sampling strategies about which EPA requested input represent a balance among competing objectives for mandatory compliance monitoring. When evaluating any of these approaches, it is important to realize:

1. Intra-structure variability in observed lead levels can be substantial—observed lead levels vary as a function of water use patterns in the structure and other factors,
2. Inter-structure variability is also observed -- lead levels vary as a function of plumbing materials used, workmanship of that installation, presence of water treatment devices, and other factors, and
3. Variability of samplers contributes to cumulative variability in dataset – the degree samplers adhere to protocols.

Homes with Lead Solder

Eliminate date range criteria in current rule for homes with lead solder that may be included in in-home tap sample pool. The current LCR specifies sampling from Tier 1 homes followed by Tier 2 and Tier 3 homes. To be in Tier 1 and 2, the home must either have a lead service line or "copper pipes with lead solder installed after 1982 (but before the effective date of your State's lead ban)."[69] Tier 3 homes must have solder installed before 1983. These date ranges are now more than 35 years old and their use is no longer consistent with the underlying logic for their inclusion in the rule.

Customer Requested Tap Samples

Customers should have access to reliable sources of tap samples. Water systems can provide this service or direct customers to reliable laboratories. At present, there are entrepreneurs offering water tests that provide inadequate results. These tests could lead customers to make poor decisions and waste money. EPA should provide clear national guidance for consumers on analytical methods and laboratories with appropriate skills and processes to provide reliable lead test results.

Customers are not requesting samples to understand corrosion control. They are interested in questions about their exposure and their plumbing. EPA should prepare a guide for fit-for-purpose sampling to inform households and assist water systems communicate with their customers.

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[69] EPA, Lead and Copper Rule Monitoring and Reporting Guidance for Public Water Systems: EPA 816-R-10-004, March 2010.

Tap Samples at Schools

The Lead Contamination Control Act is an existing statute that directs the management of lead in schools. The LCCA "*Directs each State to establish a program, within nine months of this Act's enactment, to assist LEAs* [local education agencies] *in testing for, and remedying, lead contamination in school drinking water from coolers and from other sources of lead contamination. Requires that testing results be made available for public inspection in LEA administrative offices.*"[70] EPA has developed extensive guidance to schools on lead in schools.[71] But, the EPA website indicates that currently "*There is no federal law requiring testing of drinking water in schools and childcare facilities, except for those that have and/or operate their own public water system …*"[72] The website does not provide a basis for this last statement.

If EPA were to modify the LCR to require monitoring of lead in schools, it would have to (1) describe the purpose for the sampling, (2) the sampling program required to achieve that purpose, and (3) the responsible party for that sampling program.

With respect to these three tasks before the Agency:

1. Community water systems will not be able to use the data acquired through sampling in school buildings as a useful gauge for managing system-wide corrosion control. Rather, sampling in schools is an opportunity to (1) identify fixtures that warrant active flushing or replacement, (2) assess the success of in-building / in-campus water quality management, and (3) gather information to provide for parents, students, and staff.
2. Taking a single sample from a school is not informative and, importantly, can be misleading. For this reason, the current EPA guidance outlines testing of all outlets in a school in a prioritized fashion and follow-up sampling to facilitate diagnosis and remediation. The purpose and utility of such sampling is much different from SDWA compliance sampling.
3. Most school buildings are large, and consequently, they are very unlikely to have lead service lines. Therefore, it seems unnecessary to include school structures in a water system's LCR sampling pool.
4. As schools are large buildings, their inclusion in the sample pool raises the question of what sampling protocol is appropriate, further complicating rule implementation and data analysis.
5. "Schools" is not limited to public schools. It includes private and religious schools of all sizes, financial stability, staffing levels, and instructional setting (e.g., owned or rented space, stand-alone or integrated into another structure, etc.).

EPA should update its guidance on managing lead in schools as part of its support for schools. Given the likely use of the data, it seems the responsible party for monitoring will be schools. This has implication for (1) preparedness of school staff and contractors, (2) development of state primacy agency systems to track school compliance, and (3) school budgets.

It is important to note that individual states have initiated monitoring for lead in schools and in most instances, have decided to focus on sampling initiatives for schools and/or childcare facilities through direct oversight of the schools. States are taking a number of different approaches that best fit their circumstances. Recent examples include California, Illinois, Massachusetts, New Jersey, New York, Utah,

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[70] Summary: H.R.4939 — 100th Congress (1987-1988), Available 2/2/2018 at https://www.congress.gov/bill/100th-congress/house-bill/4939.

[71] EPA, Lead in Drinking Water in Schools and Childcare Facilities, Available 2/2/2018 at https://www.epa.gov/dwreginfo/lead-drinking-water-schools-and-childcare-facilities.

[72] Ibid

and Washington.[73, 74, 75, 76, 77, 78, 79] None of the approaches initiated include sampling in schools as a component of LCR compliance monitoring.

NUMBER OF TAP SAMPLES

If EPA anticipates changing compliance monitoring, including increasing the number of tap samples required, it will need to communicate how the increased monitoring will advance the health risk reduction.
The sampling burden even under triennial monitoring is significant. These data represent only "compliance" samples and do not include observations from:

1. Special studies to inform corrosion control practice,
2. Lead service line replacement, or
3. Customer assistance samples.

Anecdotal reports and AWWA members' experience are that:

1. Small system waivers are available to systems with fewer than 3,300 persons, but these waivers are seldom granted.
2. Many community water systems are now on triennial monitoring, though some states like New Jersey have re-emphasized LCR monitoring and instituted a new round of annual monitoring in 2017.[80]

The NDWAC advised improvement of corrosion control would be best achieved through more water quality parameter monitoring both at the water treatment plant(s) and in the distribution system, rather than modifying the sampling protocol. Recent EPA compliance assistance has emphasized the role of special studies to improve system/state understanding of lead release in order to evaluate changes in water treatment or water supply. The WRF has funded research to better understand observed lead release after lead service line replacement, and the utility of monitoring in that specific context.[81]

Household action level

EPA has not demonstrated that it is able to undertake the required task based on the available information.
The NDWAC recommended development of a household action level. The presentation of EPA's analysis and the peer-review comments illustrate that developing a household action level continues to be challenging for the Agency (see Appendix A). It is clear EPA is finding it difficult to set a level that is consistent with the NDWAC recommendations, e.g., a level of lead in water that warrants action by a

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[73] 2017. California. Available 2/15/2018 at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/leadsamplinginschools.html.
[74] 2017. Illinois Public Act 99-0922. Available 2/15/2018 at http://www.dph.illinois.gov/content/school-water-testing.
[75] 2016. Massachusetts. Available 2/15/2018 at http://www.mass.gov/eea/agencies/massdep/water/drinking/lead-and-copper-in-school-drinking-water-sampling-results.html.
[76] 2016. New Jersey State Board of Education. Available 2/15/2018 at http://www.state.nj.us/education/lead/.
[77] 2016. New York Department of Health. Available 2/15/2018 at https://www.governor.ny.gov/sites/governor.ny.gov/files/atoms/files/LeadTestingRegs.pdf.
[78] 2017. Utah. Available 2/15/2018 at https://deq.utah.gov/Compliance/compliance/drinkingwater/lead-copper-rule/lead-sampling-in-schools.htm.
[79] 2016. Washington, Governor's Directive on Lead, 16-06 Department of Health Recommendations. Available 2/15/2018 at https://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/Contaminants/LeadinSchools.
[80] PROVIDE CITATION
[81] WRF, Evaluation of Flushing to Reduce Lead Levels – 4584, Project progress can be tracked at http://www.waterrf.org/Pages/Projects.aspx?PID=4584.

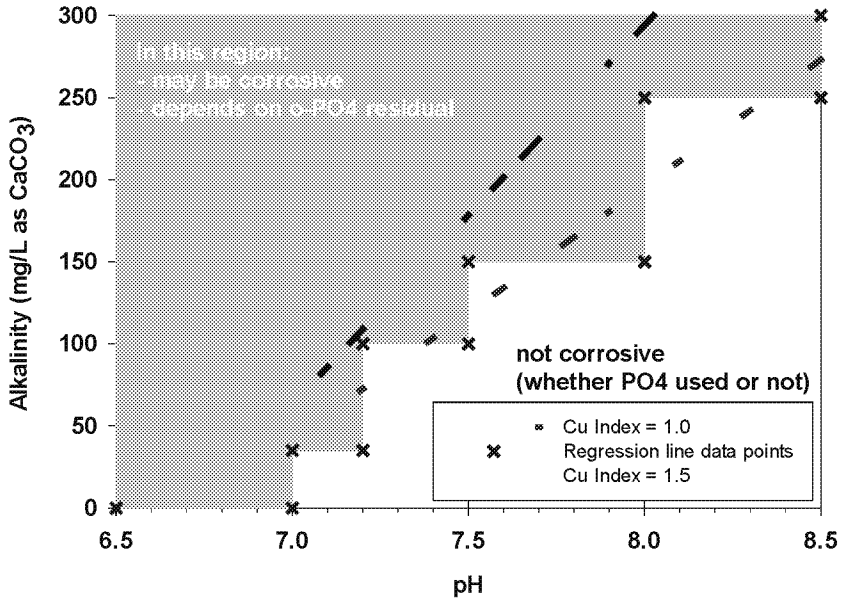
specific home above and beyond ongoing protective measures (i.e., corrosion control, lead service line replacement or other actions already being taken by home owner). While our societal goal is and should continue to be no exposure to lead, as a practical matter, parents and landlords need to know when lead levels in water represent an elevated risk to households, especially children. In the absence of a sound EPA analysis, using of "zero," "detectable lead," or a number below the community-wide action level as a household action level is not consistent with the balance of the LCR framework.

Copper

SCREEN FOR WATER AGGRESSIVE TO COPPER

Basing rule on a screen for water aggressive to copper will require different criteria than those proposed by NDWAC. During the NDWAC process, a preliminary classification of what water qualities would be corrosive to copper was developed with the idea that EPA would finalize the classification. Two preliminary classification charts were developed, one for strictly pH and alkalinity and one for systems using orthophosphate. The idea was that if a utility was classified as non-corrosive to copper, it would be relieved of many regulatory testing and sampling requirements. It was anticipated that most systems would be classified as non-corrosive to copper.

Figure 3 shows an example of the corrosivity classification that was developed for NDWAC. All pH and alkalinity combinations to the right of the shaded area would not be corrosive to copper. This figure also provides a basis for a simple index to determine a specific water quality's corrosiveness. The index is shown below the figure with any values having a Cu index < 1 being corrosive.



Note: Cu Index > 1 is defined as conducive to copper corrosion; For pH <7, water is corrosive to copper (irrespective of alkalinity); Cu Index = Alkalinity/regression = Alk/((A × pH) - b); A = 154.17 mg/L as CaCO3 / pH; b = 1,037.3 mg/L as CaCO3

Figure 3: Copper corrosivity index

AWWA conducted a survey of utilities to obtain water quality data and estimate the number of systems that would be classified as corrosive to copper. [82] The survey found that at the point of entry to the distribution system 50% of all systems (groundwater and surface water) and 70% of ground water systems surveyed would be classified, using the index, as corrosive to copper. That seemed like a large percentage and somewhat unrealistic since the U.S. generally does not have widespread copper problems. There was some concern if the survey was accurate.

Recently, the U.S. Geological Survey collected data on well water quality throughout the U.S. [83] The data base was for private and public wells. There was sufficient water quality data collected to allow calculation of the copper corrosion index for the wells. Figure 4 is a map by EPA region showing the results for the percentage of utilities on GW that are corrosive to copper according to the index as compared to the USGS results. The two are quite comparable. As seen in Table 1 by population size and totals, the overall U.S. corrosivity to copper by the survey was 70% and by USGS data it was 79%. Note that the survey is based on point-of-entry or distribution system and therefore represents treated groundwater, while the USGS data is raw well water. Treatment did not appear to alter the percentage significantly.

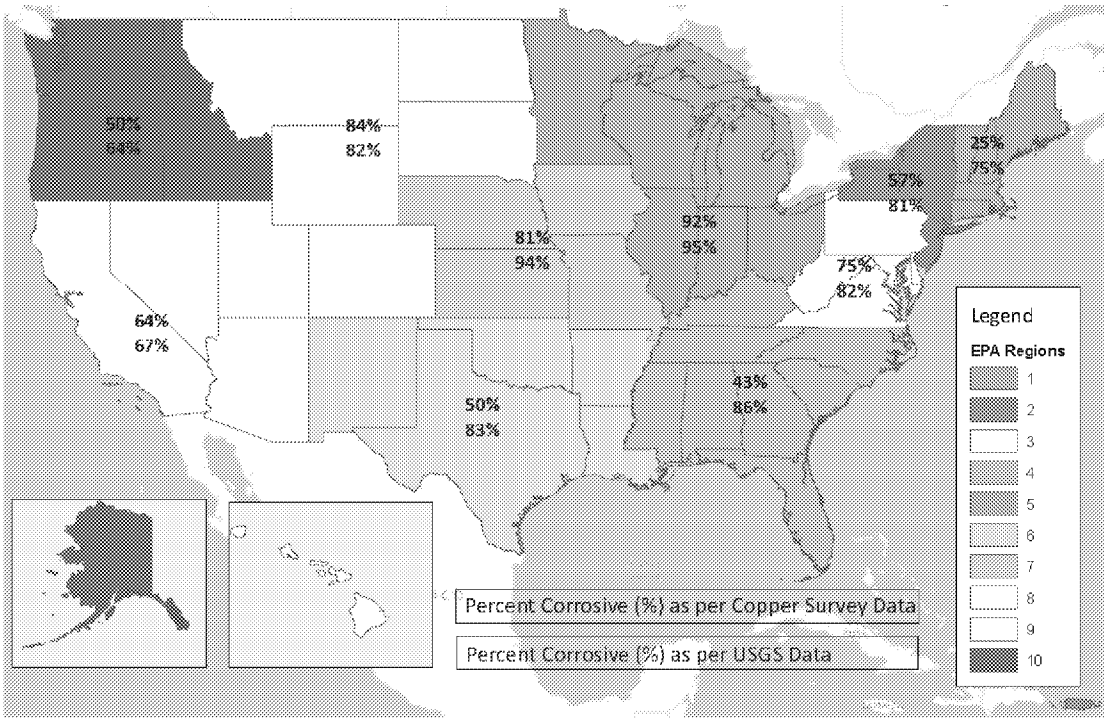


Figure 4: Groundwater Corrosive to Copper Using NDWAC Criteria (from Roth et al. and an analysis of data underlying USGS

[82] Roth et al., Copper Corrosion Under the Lead and Copper Rule Long-Term Revisions, Journal AWWA, April 2016, http://dx.doi.org/10.5942/jawwa.2016.108.0062.

[83] Belitz, Kenneth, Jurgens, B.C., and Johnson, T.D., 2016, Potential corrosivity of untreated groundwater in the United States: U.S. Geological Survey Scientific Investigations Report 2016–5092, 16 p., http://dx.doi.org/10.3133/sir20165092.

Population Class	Percent Corrosive (Cu - Index)			
	<10K	10-50K	>50K	Total
	Impact of PO_4 not included			
Cu Survey - POE	80%	56%	48%	71%
Cu Survey - DS	78%	53%	45%	69%
USGS				79%

Table 1: Percent Corrosive per Population Class for Copper Survey and USGS Data

The Roth et al. and USGS data raise an important question: "Is the NDWAC corrosivity classification correct, since it is not realistic that this many systems are experiencing high levels of copper?" The index is based on the solubility of Cu(II) for either cupric hydroxide or malachite. While solubility diagrams can be important in understanding reactions and interactions, they do not model the electrochemical reactions of corrosion or the scales that form on the pipe and reduce further copper release. Although preliminary in nature, a database on copper levels from fresh copper in various water qualities offers insight into utility of making decisions based solely on the current classification approach. Figure 5 is an example of two results. The smooth curves are the solubility values, and the two orange boxes are the experimental data. The experiment giving a copper level of 0.14 mg/L would be predicted to result in copper of about 5 mg/L, and the 0.09 data point would be predicted to be about 1.2 mg/L. Additional work will be needed to fully develop a reliable indicator of copper corrosivity, but it may be the current approach based on available solubility curves is overestimating potential copper levels.

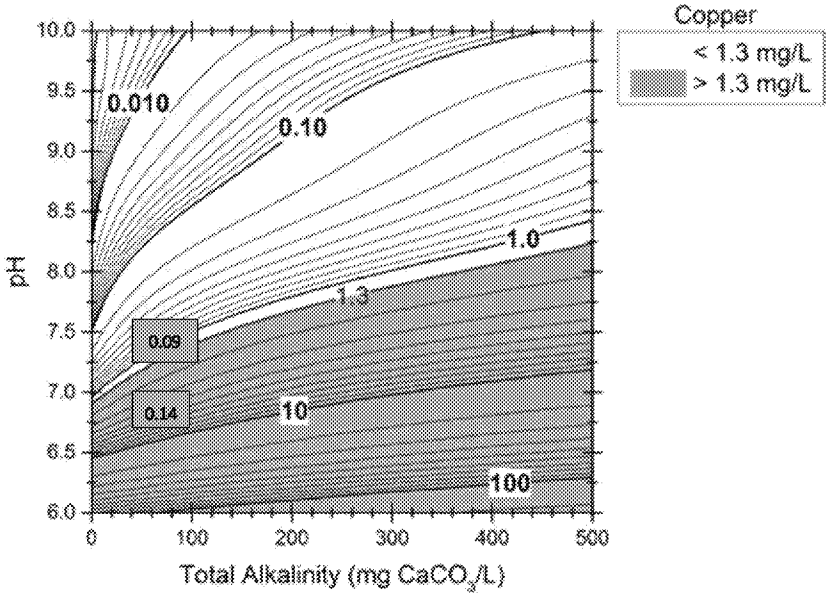


Figure 5: Theoretical copper solubility diagram with overlaid observations

While the USGS analysis suggests that the most corrosive ground waters are limited to the southeastern U.S., Mid-Atlantic and New England, the NDWAC criteria would classify the overwhelming majority of groundwater systems in all regions of the U.S. as corrosive to copper. Also, roughly 40% of systems that are corrosive in the Roth et al. were already applying phosphate and still considered corrosive, according to the NDWAC index. Implications of this analysis for EPA's analysis of LT-LCR are multiple:

1. The proposed change would require thousands of small water systems, many of which are located in rural areas, to re-evaluate corrosion control to control the corrosivity of their water to copper.
    a. A significant number of small systems with corrosion control in place would be directed to change corrosion control practice.
    b. A large number of small systems would be required to add corrosion control.
2. State programs would need to evaluate:
    a. Current decision-making processes to understand why current practice is leading to non-optimal corrosion control practice for copper as well as lead.
    b. A very large number of corrosion control studies, corrosion control treatment installations and permit revisions, with associated oversight of implementation schedules and compliance metrics.
    c. Oversight practices and staffing to an increased number of small water systems employing active treatment, particularly where addition of corrosion control becomes a threshold treatment that sets the stage for additional unit operations (e.g., manganese or iron removal, disinfection, etc.).
    d. Changes to operator certification for small systems to ensure adequate training to oversee more complex groundwater treatment.

AWWA supports the NDWAC recommendation to focus efforts to prevent release of copper into water where the water is corrosive to copper. However, when we consider the above two analyses in the context of observed copper levels from compliance monitoring, the data illustrate that the assumptions underpinning the NDWAC corrosivity criteria are very conservative and warrant refinement before such a framework is included in regulation.

COPPER – TRIGGERED ACTIONS

The marginal return in public health benefit must be sufficient to warrant new triggered requirements under the LCR. If a system's water is deemed to be corrosive, then required actions could take one or more forms, including public education, additional monitoring and corrosion control treatment. The NDWAC recommendations ask a threshold question: Is there a substantial opportunity for additional risk reduction by contemplating changes to the copper requirements? The NDWAC workgroup discussion also focused on aligning the final lead and copper monitoring and response framework in the rule so that it did not create conflicting objectives, undue burden or oversight challenges.

From a community water system perspective, both metals should be adequately managed. Moving forward, implementation challenges include:

1. Implementing and communicating to customers about a compliance monitoring dataset drawn from "fresh" copper (e.g., new homes), particularly in small rural communities where the number of "new" homes can be very limited.
2. Coordinating with local municipal building permit programs where a water system (public, investor owned/operated, non-incorporated rural subdivision) does not have an immediate governmental tie to that department.

3. Absence of local government planning/building permit information systems that align street addresses with water system service area boundaries.
4. Effectively identifying new-home buyers/renters of newly constructed homes that have copper plumbing and reaching them in a timely fashion with information on the importance of allowing copper to passivate and how to improve water quality in new homes.

PUBLIC EDUCATION ON COPPER

Providing informational material to new customers, plumbers, and developers on the release of copper prior to passivation is an educational opportunity for EPA and water systems. There are opportunities to provide general communication materials on copper passivation. NDWAC recommended a strong reliance on public education as the next step in improving copper risk reduction. Given the nature of the sensitive subpopulation for copper, the need to include a public education requirement on copper in drinking water in the LCR revisions will depend on the initial evaluation of the threshold question as to the risk reduction opportunity afforded by increased focus on copper in the LCR.

MODIFY TAP SAMPLING TO REQUIRE SEPARATE SAMPLING SITES FOR COPPER

The appeal of a workable copper corrosivity index is that it reduces the challenge of developing a separate tap sampling protocol for copper. Answering the question of whether a dedicated sample pool is necessary for copper is highly dependent on the balance of the rule option being considered. If the rule option requires weighting the sample pool heavily toward structures with lead service lines, then unpassivated copper is less likely to be present than in other alternatives. Again, the threshold question is whether there is a need for a more sensitive copper monitoring sample in most systems given the opportunity for health risk reduction:

1. Not all systems have significant numbers of lead service lines,
2. There is the opportunity to enhance risk reduction through public education targeting structures with fresh copper piping, and
3. The amount of installed copper pipe has decreased substantially since LCR was first promulgated (see Figure 6, tons of tube sold to all uses as a surrogate for use in plumbing alone).

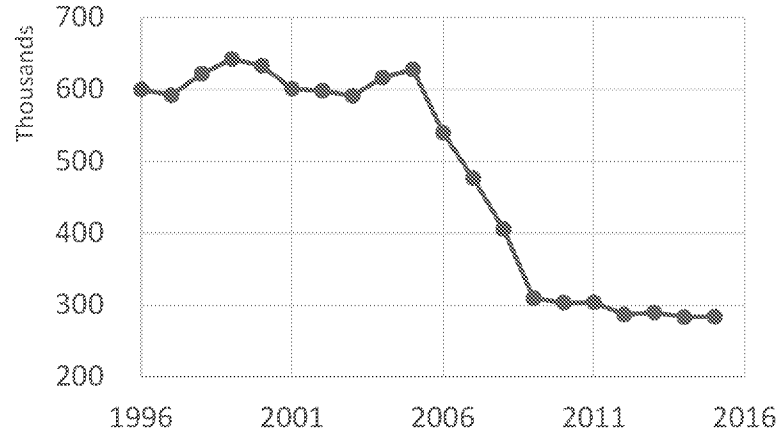


Figure 6: Tons of copper tube consumption in end-use markets[84]

[84] Copper Development Association, Annual Data 2017, Copper Supply & Consumption — 1996–2016. 2017, Available 2/16/2018 at www.copper.org/resources/market_data/pdfs/annual_data.pdf.

Appendix A. Observations on EPA Modelling to Calculate a Household Action Level

The following are observations regarding EPA's development of a household action level, prepared by Dr. Douglas Crawford-Brown.

RELIANCE ON LCR COMPLIANCE MONITORING DATA

I assume here that some variant of Figures 4A and 4B from the EPA's Environmental Health Perspectives paper would form the basis of any proposed health-based benchmark. If Figure B is used – since it involves aggregate exposure assessment and not only exposure via water – The water concentration corresponding an aggregate BLL value of 5 ug/dL in the 97.5th percentile is approximately 4 ugPb/Lwater.

However, this figure relies on use of the Six-Year review data on Pb in water. This is not a representative sample of the US population, but rather a sample of first draw results in a subpopulation identified by water providers as being most at risk from waterborne Pb. The three approaches being considered by the EPA in establishing a health-based benchmark, however, all rely on the national exposures.

Data presented by the EPA in the supporting documents for the EHP paper suggest a ratio of first draw concentration over daily average water concentration of between 2 and 4. It is unknown how biased (high) the sampled population of homes is within the overall distribution of homes. At the least, therefore, the 4 ugPb/Lwater value mentioned above should be raised to between 8 and 16 ugPb/Lwater based solely on the issue of using a database of first draw samples. This range encompasses the value of 15 ugPb/Lwater currently forming the basis of risk mitigation decisions under the LCR.

RELIABILITY OF ESTIMATE AT EXTREMES OF EXPOSURE DISTRIBUTION

Additionally, Figures 4Aand 4B reflect exposures at the 97.5th percentile. While it would be highly protective to use such a high percentile value, Figure 2 demonstrates that the curve of percentile versus BLL is characterized by a very high slope above the 90th percentile, being almost vertical. Very small errors in the curve, introduced by small errors in the uptake rates for the different pathways, would result in very large shifts in the water concentration associated with a given BLL (3.5 or 5 ug/dL) at this percentile. Use of the 95th percentile would increase the benchmark concentration further above the range of 8 to 16 ugPb/Lwater mentioned above (see Table 1 of the EHP paper, comparing the 95th and 97.5th percentile values).

This issue, coupled with that in item 1 above, suggests that the current value of 15 ugPb/Lwater as an 'action level' of some kind is already protective of the 'representative child' mentioned directly in Approaches 1 and 2 of the Modeling Review Panel charges.

REPRESENTATIVE CHILD OR ANOTHER TARGET SUBGROUP

Continuing with the issue of the nature of the Six-Year review water data, it is not defined anywhere in the EPA risk assessment (including the EHP paper mentioned above) what specific subpopulation is represented by those data in regard to waterborne exposures. Again, the values in the database are clearly dominated by first draw samples (known to be higher on average than a true nationally representative sample) in homes suspected of being at greater-than-average risk of waterborne Pb exposures. This is not consistent with the idea of using a 'representative child' in Approaches 1 and 2, and does not produce an accurate probabilistic analysis under the methods in the EHP paper.

While the AWWA has been able to fully reproduce the results of the EHP paper, including the Monte Carlo (probabilistic) analysis, the EHP paper does not describe the nature of the subpopulation exposed to water at these levels, or the percentile of the US population of children represented in the probabilistic results in the paper. Instead, the EHP paper provides the 95th and 97.5th (and other) percentiles for the SAMPLED population under the Six-Year review data, which is not the same as a nationally representative sample. In establishing a health benchmark based on any of the three proposed Approaches, the EPA should consider how it will enhance the database of water exposures to reflect the nationally-representative population characteristics mentioned in the three Approaches.

TRANSLATING BLOOD LEAD LEVEL TO IQ DECREMENT

The underlying health concern for Pb exposure of children is the impact on IQ during development. The epidemiological studies cited by the EPA use BLL value and IQ as the regression variables. However, the IQ measure is in children at the upper end of ages considered in the current analyses (including the EHP paper), as is the exposure (or dose) measure of BLL.

From these epidemiological studies, one can discern the value of the BLL that corresponds to a given increment of IQ, relative to very low BLL values. That is scientifically sound methodology. However, the EHP paper (and related documents) calculate the BLL at other, younger, ages, such as 0 to 6 months and 1 to 2 years.

Based on usual regulatory practice, there will be a tendency to use the value of the BLL associated with a given IQ decrement (as determined from the higher childhood ages noted above), and apply this limiting value to the two younger age groups, keeping all age groups below the assigned BLL. This would not be correct because the impact of BLL on IQ is cumulative over the period from birth (in fact, from fetus) to the age at which the BLL-IQ relationship was measured. This relationship already includes the impact of exposures at the younger ages. It is more scientifically correct, therefore, to assess the BLL throughout the period from birth (or fetus) to the age of measurement of IQ in the epidemiological studies.

COMPARING BENCHMARK APPROACHES

Continuing with the issue of the non-representative nature of the current water concentration database used in EPA analyses, consider the three health benchmark Approaches under consideration at the EPA:

The level of lead in drinking water that results in an individual infant or child's probability of an Elevated Blood Lead Level (EBLL) being increased by 1 or 5 percent.

The level of lead in drinking water that results in an individual infant or child's BLL increasing by 0.5 or 1 µg/dL.

The level of lead in drinking water that results in the 95th or 97.5th percentile of predicted BLLs in the U.S. population of infants or children being equal to 3.5 or 5 µg/dL.

Note that Approach 3, which is the Approach used in the EPA's EHP paper mentioned above, requires the representative national distribution (which is not currently available). However, Approaches 1 and 2 do not, as they seek a maximum water Pb concentration consistent with the stated aim. In addition, Approach 1 formulates the benchmark in terms of a percentage increase in BLL, which has little scientific basis and would be difficult to justify publicly as it is not related to any specific health outcome. Approach 2 is therefore the only one of the three that is both scientifically defensible (being related to a numerical decrease in IQ amongst a nationally representative population) and avoids the need for a representative water concentration distribution.

Approach 2 also comes closest to the recommendation of the NDWAC if one considers a 'representative' or 'average' child's increase in BLL. Using the regression equations underlying Figure 4A of the EHP paper, the water concentration that produces an increment of 1 ug/dL at the 97.5th percentile is 7.4 ugPb/Lwater (3.7 ugPb/Lwater for 0.5 ug/dL). However, these two values are for an individual at the 97.5th percentile, and therefore not 'representative'. Table 1 of the EHP paper displays the BLL values calculated for the 50th (representative) and 97.5th percentiles in the case of aggregate exposure. The ratio of these two values (97.5th/50th) is approximately 4.6/1.3 or 3.5. The water concentration corresponding to a 1 ug/dL increment in the 50th (representative) percentile is therefore 26 ugPb/Lwater (13 ugPb/Lwater for 0.5 ug/dL increment). If one considers only variability due to water uptake, these values are approximately 20 ugPb/Lwater (10 ugPb/Lwater for 0.5 ug/dL increment).

USE OF RESULTING VALUE

Bear in mind also that all of the above potential target values refer to a volume-weighted average of water concentration in exposed individuals, and not a 'first-draw' sample. This is consistent with the nature of the exposure index in the epidemiological studies. The target value (or health benchmark, or whatever term is used in the end) of water concentration therefore should be compared against this volume-weighted average rather than a 'first-draw' value.

Prepared by Dr. Douglas Crawford-Brown

Dr. Douglas Crawford-Brown is Professor Emeritus of Environmental Science and Policy at the University of North Carolina - Chapel Hill, where he was founding Director of the UNC Institute for the Environment. He moved to the UK in 2007, becoming Director of the University of Cambridge Centre for Climate Change Mitigation Research. He retired in 2016 to focus on delivery of sustainability solutions globally, relocating to California. He has more than 35 years of experience in all aspects of environmental, energy, climate change and sustainability work. This includes advanced research, education, policy advising and stakeholder engagement, with past projects involving partners in business, industry, government, academia and NGOs. He has served on a wide array of state, national and international committees and has provided advice and training in the US, UK, EU, France, Abu Dhabi, Dubai, Japan, India, Mexico, Austria, Taiwan, Thailand and China. These public service activities include membership on the USEPA's National Pollution Prevention and Toxics Advisory Committee, National Drinking Water Advisory Committee, Clean Air Scientific Advisory Committee, and Endocrine Screening and Testing Advisory Committee; on the American Water Works Association Technical Advisory Workgroup; on the ILSI Expert Panel on Modeling Pesticide Concentrations in Water Supplies and the ILSI Committee on Aggregate Risk Assessment Issues in Surface and Groundwater Pesticide Contamination; on the UK's HM Treasury Engineering Interdependency Expert Group, the Climate Change Commission Climate Change Risk Assessment team and OFWAT's Regulatory Futures Panel; and on the International Commission on Radiological Protection Task Group on Age Dependent Metabolism and Dosimetry.

Message

From: Smith, Wil [wsmith@epri.com]
Sent: 7/12/2018 5:31:11 PM
CC: Hunter, David [DHUNTER@epri.com]; Smith, Wil [wsmith@epri.com]
Subject: Reminder: July 19 EPRI Washington Seminar - Fuels of The Future
Attachments: ATT00001.txt; EPRI Washington Seminar - Fuels of the Future.pdf; IEA-EPRI Cross Border Workshop - DRAFT AGENDA EXT 2018-07-12.pdf

Dear Colleague,

The next EPRI Washington Seminar, co-hosted by the International Energy Agency (IEA), will take place Thursday, July 19, on the "Fuels of the Future". **For those who have not yet registered there are still a few slots available; please click here to register.** The seminar will take an in-depth look at the potential fuel use and make-up of the future, with a specific focus on electrification in the US and Asia and implications for the petroleum sector. Lunch will be provided. The agenda is attached.

July 19: EPRI-IEA Washington Seminar: *Fuels of the Future*
11:30 am to 2:00 pm
EPRI Washington DC Office
1325 G St. NW, Suite 1080 Washington, DC 20005
Please register!

You may also be interested in additional upcoming EPRI events below:

August 20: EPRI/ IEA Workshop on Cross-Border Energy and Capacity Trading (Agenda Attached)
Long Beach, CA

EPRI is pleased to join the IEA in hosting this day-long workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing relevant IEA member countries and other stakeholders to learn from the CAISO-Mexico example and bring their own experiences to bear. This workshop will be co-located with Electrification 2018. The agenda is attached. **To register please click here.**

August 20-23: Electrification 2018
International Conference and Exposition
Long Beach Convention Center, Long Beach, CA

EPRI's biggest event of the year, Electrification 2018, will be a 3 day international conference and exposition taking place in Long Beach, CA, Aug 20-23. The conference will explore the critical issues, benefits, and opportunities of electrification with an unparalleled collection of industry experts, providing an opportunity to:

- Learn about the capabilities and potential of today's electric technologies

- Understand the disruptive benefits and impacts of emerging electric technologies
- Discuss key policy, regulatory, and environmental issues
- Participate in expert training sessions and other professional development opportunities
- Experience a diverse array of technologies in our exposition hall
- Network with industry, government, and academic leaders to form collaborations and help build the future of electrification

Please register here.

November 6-8: 5th Annual EPRI-IEA Challenges in Electricity Decarbonization Expert Workshop/ 18th Annual EPRI-IEA-IETA GHG Emissions Trading Workshop
Paris, France

The 5th Annual EPRI-IEA Challenges in Electricity Decarbonization Expert Workshop, taking place November 7-8 in Paris, France, will focus on electrification. This workshop brings together senior officials from OECD countries, representatives from industry, analysts and researchers from academia and non-governmental organisations, and other relevant stakeholders to discuss developments in power sector decarbonisation. This year's topics include:

- New directions in electrification
- Implications of electrification on air quality
- Electrification in countries with static demand growth
- Electrification in countries with dynamic demand growth
- Electrification of the transport sector
- Security implications of electrification

The workshop will be immediately preceded by the 18th EPRI-IEA-IETA GHG Emissions Trading Workshop, taking place November 6-7 in the same venue.

Please register your interest in attending either or both workshops here.

We hope you can join us for some or all of these events!

Regards,

Wil Smith
Government & External Relations Associate
Electric Power Research Institute
1325 G ST NW Suite 1080
Washington, DC 20005
Tel: Ex. 6
Email: wsmith@epri.com

David E. Hunter, Ph.D.
Sr. Government and External Representative
Electric Power Research Institute
1325 G ST NW Suite 1080
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Tel: Ex. 6 (m)
Fax: 202-293-6187
Email: dhunter@epri.com

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

International Energy Agency

EPRI Washington Seminar Series: Fuels of the Future

Thursday, July 19, 2018

1325 G St. NW, Suite 1080 Washington, DC 20005

Numerous changes within the energy sector could significantly impact both the type of fuel and the manner in which it is used in the future. For example, EPRI's US National Electrification Assessment (April 2018) shows that electricity as a share of end use technologies could increase from 21% today to as much as 47% by 2050. While this increased adoption of electric technologies occurs in a variety of sectors including buildings and industrial processes, the growth is primarily driven by transportation. In combination with efficiency improvements, this electrification could reduce petroleum use in the US transportation sector by nearly 60% between 2015 and 2050.

Energy sector changes impacting future fuel use are not limited to the US. In fact, changes in transportation and electrification in China and India have the potential to significantly reshape the global energy landscape.

This EPRI Washington Seminar, co-hosted by the International Energy Agency, will take an in-depth look at the potential fuel use and make-up of the future, with a specific focus on electrification in the US and Asia and implications for the petroleum sector. We invite policymakers, energy stakeholders, and customers to join our expert presenters in sharing insight into the fuels of the future.

Thursday, July 19, 2018

11:30 am – 2:00 pm

Lunch will be provided

1325 G St. NW, Suite 1080 Washington DC

Together . . . Shaping the Future of Electricity

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EPRI Washington Seminar Series: Fuels of the Future

Agenda

THURSDAY, JULY 19, 2018		
TIME	**TOPIC**	**PRESENTER**
11:30 a.m.	*Networking Lunch*	
12:00 p.m.	Welcome and Introductions	*David Hunter, Senior Government and External Representative, EPRI*
12:10 p.m.	US Electrification and its Implications for Long-term Fuel Consumption	*John Bistline, Principal Technical Leader, Energy and Environmental Analysis, EPRI*
12:35 p.m.	Global Energy Futures: Implications for Emerging Economies	*Matt Wittenstein, Sr. Energy Analyst, International Energy Agency*
1:00 p.m.	Energy Future Outlook for Oil and Gas	*Kevin Book, Managing Director, Clearview Energy Partners, LLC*
1:25 p.m.	Discussion and Q&A	
2:00 p.m.	End	

WASHINGTON, DC OFFICE
1325 G Street NW Suite 1080, Washington, DC 20005 USA • 202.293.7518 • Customer Service 800.313.3774 • www.epri.com

DRAFT

Cross-border Energy and Capacity Trading

Intra- and international experiences in the Western Interconnection

August 20th 2018
Hyatt Regency Long Beach
200 South Pine Avenue
Long Beach, California, USA
(Held on the side of the Electrification 2018 international conference)

Power system integration can be a tool for improving electricity security, reducing system costs, and enabling the integration of variable renewable resources. For example, rising penetrations of variable renewable generation in the Western Interconnection is driving increased regional collaboration, for example through the development of the Western Energy Imbalance Market (WEIM). One question that has arisen is the extent to which the potential benefits of regional collaboration would extend to greater integration of Mexico's Baja California power system with the California Independent System Operator (CAISO) system in the United States.

In this context, the International Energy Agency (IEA) and Electric Power Research Institute (EPRI) are jointly organizing a workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing other relevant IEA member countries to learn from the CAISO-Mexico example, and bring their own experiences to bear.

Background

The first stage of the IEA's work on "Electricity Security Across Borders" has focused on a "stock-taking" exercise in the form of a series of case studies. Two common elements have emerged from these case studies. First, successfully integrating large shares of variable renewables requires increased real-time cross-border collaboration. Second, there is a growing interest in establishing the trade of *capacity* across borders. Capacity trading is of particular relevance to the question of electricity security, as without trade in capacity jurisdictions are less likely to rely on their neighbours to meet system needs in times of stress. This can lead to overdevelopment of domestic or local capacity, which can in turn impact the cross-border trade of energy.

Through the organisation of this workshop, the IEA and EPRI seek to highlight lessons learned through various case studies to an audience interested in better understanding the potential impact of cross-border capacity trading. The IEA and EPRI will encourage input from Mexico, the United States, and a relevant group of expert stakeholders, allowing these lessons learned to not only inform the question of cross-border energy trading along the U.S. Mexico border and elsewhere.

The meeting will be informal in nature and held under Chatham House Rule. Attendance is by invitation only.

Draft Agenda

07:30 – 08:30	**BREAKFAST AND REGISTRATION**
08:30 – 09:00	Opening remarks • **Peter FRASER**, Head of Gas, Coal and Power Markets Division, IEA • **Anda RAY**, Senior Vice President, External Relations, EPRI
SESSION 1	**BENEFITS AND CHALLENGES OF COORDINATED PLANNING**
09:00 – 10:30	Power system planners around the world have long recognised the benefits of regional power system integration. At the same time, cross-border integration requires coordinated planning and operations. This session will look at examples from North America and Europe in order to highlight the benefits and challenges of regional integration. *Moderator:* **David HUNTER**, Senior Government and External Representative, EPRI *Panelists:* • Why integrate power systems? Lessons from Electricity Security Across Borders **Matthew WITTENSTEIN**, Senior Electricity Analyst, IEA • Regional power system planning: Examples from North America **John TABER**, Technical Leader, EPRI • The North American Renewable Integration Study **Greg BRINKMAN**, Researcher, Grid Systems Analysis Group, NREL • Mexico's participation in the Western Interconnection **Eduardo ARRIOLA**, Subdirector for Generation, CFE *Followed by discussion*
10:30 – 11:00	**COFFEE BREAK**
SESSION 2	**CROSS-BORDER ENERGY TRADING: PART 1**
11:00 – 12:30	This session will focus on the current experiences in energy trading among relevant market participants. In this context we distinguish the trading of *electicity* (or "energy") from other cross-border arrangements, such as the sharing of reserves or the trading of *capacity* (which is discussed in a later session). Existing market arrangements within the US and between the US and its neighbors will be discussed, as well as the potential evolution of market arrangements going forward. Particular emphasis will be placed on exploring both the economic and security benefits of energy trading. *Moderator:* **Peter FRASER**, Head of Gas, Coal and Power Markets Division, IEA *Panelists:* • Implementation and benefits of the EIM: The perspective from CAISO **Roberto BAYETTI**, Director of QA, Architecture and Model Management, CAISO • Power trade between RTOs/ISOs in the Eastern Interconnection **TBD** • Perspectives on joining the WEIM: the view from Mexico **Marcos VALENZUELA**, Centro Nacional de Control de Energía (CENACE) *Followed by discussion*
12:30 – 13:30	**LUNCH**

SESSION 3	CROSS-BORDER ENERGY TRADING: PART 2
13:30 – 15:00	This session continues the discussion on cross-border energy trading, building on the conversation from the previous session and bringing in new voices. *Moderator:* **Matthew WITTENSTEIN**, Senior Electricity Analyst, IEA *Panelists:* • Development of the WEIM: Drivers of integration and technical challenges **Mark ROTHLEDER**, Vice President, Market Quality and Renewable Integration, CAISO • Regulatory and policy drivers of cross-border integration **Scott MILLER**, Executive Director, Western Power Trading Forum • Canada and the WEIM **Mike MACDOUGALL**, Vice President, Trade Policy and IT, Powerex *Followed by discussion*
15:00 – 15:30	COFFEE BREAK
SESSION 4	ESTABLISHING CROSS-BORDER CAPACITY TRADING
15:30 – 17:00	The final session of this workshop will be a deep-dive into what would be required to establish cross-border capacity trading between Mexico and CAISO. Relevant examples will be brought in from other US markets and international experiences. *Moderator:* **TBD,** EPRI *Panelists:* • Technical and legal changes required to trade capacity with Mexico **TBD**, CAISO • Capacity trading between ISOs/RTOs – technical requirements and existing procedures **Craig GLAZER**, Vice President – Federal Government Policy, PJM • Technical and legal changes required to import capacity to Mexico **Ivan CAJEME VILLARREAL**, Secretaría de Energía de Mexico (SENER) *Followed by discussion*
17:00	Closing remarks
	FOLLOWED BY RECEPTION

Message

From: Smith, Wil [wsmith@epri.com]
Sent: 12/6/2017 7:19:00 PM
CC: Hunter, David [DHUNTER@epri.com]
Subject: Tuesday, Dec 12th: Understanding Impacts of High Renewable Penetration: An EPRI, DOE, NREL, EPA, EIA Multi-Model Exploration
Attachments: Agenda EPRI DOE NREL EIA EPA Renewable Scenarios Modeling.pdf

Dear Colleague,

As a reminder, "Understanding Impacts of High Renewable Penetration: An EPRI, DOE, NREL, EPA, EIA Multi-Model Exploration" will take place this coming Tuesday, December 12th, from 8:30 am to 1:15 pm at the Capitol Hilton in Washington, DC.

We are pushing capacity, so if you have not yet registered please do so asap to Wil Smith, wsmith@epri.com.

Agenda and additional details attached.

David
David E. Hunter, Ph.D.
Sr. Government and External Representative
Electric Power Research Institute
1325 G ST NW Suite 1080
Washington, DC 20005
Tel: Ex. 6 (m)
Fax: 202-293-6187
Email: dhunter@epri.com

Understanding Impacts of High Renewable Penetration: An EPRI, DOE, NREL, EPA, EIA Multi-Model Exploration

December 12, 2017

The Capitol Hilton, 1001 16th ST NW, Washington DC

Wind and solar deployment in the United States has grown at unprecedented rates in recent years. Over the past decade new capacity installations have been comprised almost solely of new wind, solar, and natural gas-based technologies. This growth and accompanying rapid technological progress have led operating wind capacity (82 GW) to surpass hydropower as the leading renewable technology on an installed capacity basis. Meanwhile new solar installation records (15 GW) were broken in 2016.

Whether this growth trajectory will continue is a key question for policy-makers and industry stakeholders. It is also a challenging question, given significant uncertainties surrounding competing technologies, demand growth, policies, and the degree of continued technology changes. U.S. power sector capacity expansion models are widely used to navigate this uncertainty and inform policy making, investment decisions, technology assessments, and evaluations of drivers and impacts of electric sector evolution.

Capacity expansion models represent a complex power system over long time-scales, typically decades. Doing so requires many simplifications. Tradeoffs between detail and computational tractability are required. The location-dependence, variability, and uncertainty of renewable energy add to the modeling challenges and, at high renewable energy penetrations, might call into question the validity of existing simplifications in the models.

To address these challenges, four national-scale capacity expansion modeling teams—from the Electric Power Research Institute, the Energy Information Administration, the Environmental Protection Agency, and the National Renewable Energy Laboratory—participated in a research project supported by the U.S. Department of Energy to compare modeling methods and results under high-penetration variable renewable energy scenarios.

This seminar will present findings and insights from the four modeling teams and Department of Energy. Speakers will discuss insights into high-penetration renewable scenarios and the strengths, limitations, and opportunities from the four capacity expansion models used. These findings will help analysts, policy-makers, and stakeholders better understand and interpret results from these modeling tools.

Tuesday, December 12, 2017

8:30 am – 1:15 pm

Lunch will be provided

The Capitol Hilton, 1001 16th ST NW, Washington DC

RSVP name, title, and company to: wsmith@epri.com

Understanding Impacts of High Renewable Penetration: An EPRI, DOE, NREL, EPA, EIA Multi-Model Exploration

Agenda

TUESDAY, DECEMBER 12, 2017		
TIME	**TOPIC**	**PRESENTER**
8:30 a.m.	*Continental Breakfast*	
9:00 a.m.	Welcome and Introductions	*David Hunter, Senior Government and External Representative, EPRI*
9:10 a.m.	The Importance of Modeling Renewable Energy: Policy and Modeling Considerations	*Steve Capanna, Director, Strategic Priorities and Impact Analysis, DOE*
9:20 a.m.	Capacity Expansion Models and the Electricity Sector: Impact of the EPRI, EIA, NEMS, and EPA models	*Francisco de la Chesnaye, Head, Energy and Environment Analysis, EPRI*
Session 1	**A Multi-Model Renewables Exploration: Study Design and Results** *Moderator: David Hunter, EPRI*	
9:30 a.m.	EPRI, DOE, NREL, EPA, EIA Variable Renewable Energy Multi-Model Project: Overview and Insights	*Wesley Cole, Energy System Modeler and Analyst, NREL*
9:50 a.m.	Insights into the Future of Variable Renewable Energy: A Multi-Model Perspective of the U.S. Electricity System	*John Bistline, Senior Technical Leader, EPRI*
10:10 am.	Discussion	
10:30 a.m.	*Coffee Break*	
Session 2	**Modelling High-Penetration Renewables: Insights and Perspectives** *Moderator: Christopher Namovicz, Team Leader for Renewable Electricity Analysis, EIA*	
11:00 a.m.	Insights from NEMS: 3 Keys to Renewables Modeling: Resolution, Resolution, and Resolution	*Cara Marcy, Renewable Electricity Analyst, EIA*
11:15 a.m.	Insights from IPM	*Ryan Sims, Economist, EPA*
11:30 a.m.	Insights from ReEDS: Better Models = Better Projections	*Bethany Frew, Energy Analyst, NREL*
11:45 a.m.	Insights from US-REGEN: The Importance of Capturing Renewable Co-Variation with Load	*David Young, Principal Technical Leader, EPRI*
12:00 p.m.	*Discussion*	
12:15 p.m.	*Networking Lunch*	
1:15 p.m.	*End*	

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 3/7/2018 4:39:55 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Nota Bene
Attachments: Rate of Water Main Breaks Up Utah State U..pdf

FYI

GTM

Study Says Pipe Failures Cause for Concern: Break Rates for Almost Half of U.S. Water Mains Up More Than 40% in Six Years

SOURCE Utah State University

LOGAN, Utah, March 6, 2018 /PRNewswire/ -- Utah State University's (USU) Buried Structures Laboratory has published a second comprehensive study on break rates of the most commonly used water pipe materials titled, "Water Main Break Rates In the USA and Canada: A Comprehensive Study." The Buried Structures Laboratory has a large scale testing facility for pipes and underground structures. USU is also home to the Utah Water Research Laboratory (UWRL), which has been a world leader in environmental research and water policy for over 50 years. UWRL is the oldest university-based water research facility in the U.S.

Dr. Steven Folkman, co-author of *Buried Pipe Design* and author of a 2012 USU water main break report, has completed a new pipe materials survey in which over 300 utilities responded, representing approximately 200,000 miles of installed water mains. The 2018 study was able to get respondents from 48 states in the U.S. and 7 out of 10 provinces in Canada, representing a 49% increase in survey responses and 45% more miles of pipe compared to the 2012 study, increasing its statistical validity. Utilities that provided data serve a population of over 52 million people, representing 14.5% of the total population of the U.S. and Canada. The survey recorded 23,803 pipe failures that needed repairs which is a significant basis for break data. This is one of the largest surveys conducted on water main breaks and the results give an accurate representation of water pipe condition and operation in North America. The report can assist in revising pipe service life assumptions used in the past.

Water main break rates are an important calculation to assess pipe performance and durability, and are the most critical metric used in water infrastructure asset management as well as pipe repair and replacement decision-making. "This report provides greater insight into the drivers of the aging water infrastructure crisis and offers data which utilities can use to benchmark pipe material performance. It will be a valuable asset management planning tool for water utilities," says Dr. Folkman.

Overall, break rates have increased 27% in the past six years. Utilities should be concerned that break rates for cast iron (CI) and asbestos cement (AC) pipes, which together represent almost half of the installed water mains in North America, have increased 46% and 43%, respectively, since 2012. Together, CI and AC pipes are mostly responsible for the spike in pipe failures. CI and AC pipes are no longer manufactured and are now reaching the end of their expected lives.

The study also discusses how water main failure rates for CI and AC pipes could increase exponentially over time. "One could envision a rapid increase in break rates in the near future for cast iron and asbestos cement pipes. Utilities across the country would need to rapidly accelerate their pipe replacement schedules to avoid potentially serious economic and social impacts. If a break rate doubles the economic impact is significant: one would need to double the number of personnel repairing failures along with supplies and materials while loss of treated water increases. Societal impacts would be devastating if the break rates reached exponential levels," says Dr. Folkman.

A critical new finding is that smaller municipal utilities have twice the water main break rates as larger utilities. "With less revenues and resources, smaller municipalities will need to use the most cost-effective and durable pipe materials available to address pipe renewal and rehabilitation requirements. Larger municipal utilities, however, are not faring much better, since the rate at which they are replacing the pipes that are now beyond their useful lives is inadequate," says Folkman.

According to the survey, an average of 0.8% of installed pipe is replaced each year across the country. This equates to a 125-year national pipe replacement schedule. Pipe replacement rates should be between 1% and 1.6%, equivalent to 100-year and 60-year replacement schedules, respectively. In general pipe replacement rates need to increase.

A reconfirmed major finding is that polyvinyl chloride (PVC) pipe has the lowest overall break rate when compared to cast iron, ductile iron, concrete, steel and asbestos cement pipes. PVC was also the pipe material with the lowest break rate in USU's 2012 study.

Corrosion can be a major cause of water main breaks with 75% of all utilities reporting corrosive soil conditions. This study has shown that cast iron pipe in a high corrosion soil has over 20 times the break rate than one in a low corrosion environment. Similarly, ductile iron pipe in a high corrosion soil has over 10 times the break rate than one in a low corrosion soil.

Other national benchmark findings include:

- Nationwide, one mile of installed water main serves 308 people;
- 85% of water pipes are less than 12 inches in diameter;
- The percentage of water mains over 50 years old has increased from 22% to 28% in the past six years;
- Pipe material usage varies significantly over geographic regions, suggesting pipe selection and use is based on historical preference versus comparative cost analysis or environmental conditions;
- Since 2012 the percentage of installed water mains which are beyond their useful lives has doubled from 8% to 16%;
- Cast iron (CI) pipes represent the largest pipe material inventory and 82% of all CI pipes are over 50 years old;
- Construction-related failures were equivalent for both PVC and ductile iron pipes, pointing to the need to improve construction practices for underground infrastructure regarding installation, location services and inspection;
- Conservation benchmarks include a national drop in average supply pressure to 69 psi (from 77 psi in 2012), which is well below the maximum operating pressure of water mains, extending pipe life as well as reducing leaks and breaks;
- Average daily gallons per day per person is 137, which suggests successful water conservation efforts across the country;
- Estimated average water loss due to leakage is 10%, showing that pressure reduction, leak detection and pipe replacement have contributed to reducing water loss in water distribution systems.

To view the report, including the full set of key findings and its methodology, click here.

This comprehensive study contributes to the continuing efforts of the EPA's Aging Water Infrastructure (AWI) research, Virginia Tech's Sustainable Water Infrastructure Management (SWIM) Program, the U.S. Conference of Mayors' Water Council and the asset management and water infrastructure condition assessment efforts of the American Water Works Association (AWWA) and American Society of Civil Engineers (ASCE).

Dr. Folkman is a registered professional engineer, a member of the American Water Works Association (AWWA) and a member of the Transportation Research Board Committee on Subsurface Soil-Structure Interaction. He has oversight of USU's Buried Structures Laboratory.

CONTACT: Justin Finnegan 646-756-3711 or jfinnegan@shiftcomm.com

Message

From: info@nacwa.org [info@nacwa.org]
Sent: 10/20/2017 4:47:44 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Password Reset

Dear D. Lee,

your MY NACWA password has been reset.

Thank You.

Message

From: membership@nacwa.org [membership@nacwa.org]
Sent: 10/20/2017 4:44:47 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Your Request

Dear D. Lee Forsgren,

We have received your password request. Please follow the link below to reset your password:
click here

If you did not make this request, please contact us immediately.

Thank you

Message

From: Fotouhi, David [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=FEBAF0D56AAB43F8A9174B18218C1182-FOTOUHI, DA]
Sent: 10/26/2017 1:01:43 PM
To: Brent Fewell [brent.fewell@earthandwatergroup.com]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; michael@nawc.com [Michael@nawc.com]
Subject: RE: Meeting Request

Brent: I would be glad to meet. My scheduler, Carla, will be reaching out to find a time that works.

Best,

David

David Fotouhi

Deputy General Counsel
Office of General Counsel
U.S. Environmental Protection Agency
Tel: +1 202.564.1976
fotouhi.david@epa.gov

From: Brent Fewell [mailto:brent.fewell@earthandwatergroup.com]
Sent: Wednesday, October 25, 2017 1:53 PM
To: Fotouhi, David <Fotouhi.David@epa.gov>
Cc: Forsgren, Lee <Forsgren.Lee@epa.gov>; michael@nawc.com
Subject: Meeting Request

Hi David,

Michael Deane and I were hoping to find some time on your calendar to meet as a follow-on to a recent meeting with Lee Forsgren. The topic involves a legal interpretation involving the Clean Water Act and private ownership of domestic wastewater treatment plants. Happy to work with your scheduler to find a mutually convenient time.

Brent

Brent Fewell, Esq. | Earth & Water Law Group
1455 Pennsylvania Ave., NW, Suite 400, Washington, DC 20004
Ex. 6 (o) | Ex. 6 (c) | www.earthandwatergroup.com

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Message

From: info@nacwa.org [info@nacwa.org]
Sent: 10/24/2017 4:28:28 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Thank You for your 2017 National Clean Water Law Seminar Registration!

Dear Lee:

Thank you for registering for the 2017 National Clean Water Law Seminar - Savannah, GA, November 14-16, 2017. If you used a credit card to pay for the registration, your credit card has been charged.

Payment Method:
Confirmation Number: 52942
Registration Fee: 0.00

If you would like to register a guest or a spouse (registration is complimentary), please visit www.nacwa.org/reg to submit them, or contact NACWA's National Office at 202.833.2672 if you have any additional questions. (as always, access to all NACWA events is included with your registration and complimentary guest registration is intended solely for spouses/domestic partners or members of a registrant's immediate family and cannot be used to register professional colleagues).

To make your hotel accommodations, please contact the Hyatt Regency Savannah in Savannah, GA directly at 912.238.1234 and mention that you are a NACWA Attendee in order to receive the special meeting rate of $165. In order to receive this discounted rate, be sure to make your reservation by Monday, October 23rd, while rooms are available.

Interested in attending the National Water Enforcement Workshop which immediately follows the Law Seminar? Please visit www.nacwa.org/17enforcement to receive a $50 discount for registering for both!

Thank you again for your registration. We look forward to seeing you in Savannah, GA!

NACWA

Message

From: info@nacwa.org [info@nacwa.org]
Sent: 10/24/2017 4:28:28 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: payflow@nacwa.org
Subject: NACWA Order Confirmation: Invoice #52942

This message is to confirm the receipt of the below order.

Customer: D. Lee Forsgren
Date: 10/24/2017

Invoice #: 52942
Invoice Date: 10/24/2017 12:28:26 PM

Total: 0.00
Payment Amount: 0.00
Balance: 0.00

Notes:

Bill To:

D. Lee Forsgren
Deputy Assistant Administrator
U.S. Environmental Protection Agency Office of Water
William Jefferson Clinton Building
1200 Pennsylvania Ave., N.W.
Room 3219 WJCE
Washington, DC 20460-0001

Payment Method:

Customer	Qty	Item	Price	Discount	Taxes	Shipping	Sub-Total	Paid	Balance
Forsgren D. Lee	1.00	2017 Law Seminar (Complimentary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Message

From: Matthew Holmes [Matt@nrwa.org]
Sent: 11/9/2017 6:29:57 PM
To: Matthew Holmes [Matt@nrwa.org]
Subject: NRWA Apprenticeship Signing Ceremony | November 14, 3:30pm
Attachments: NRWA Apprenticeship Signing Agenda.pdf; NRWA Apprenticeship Media Advisory.pdf

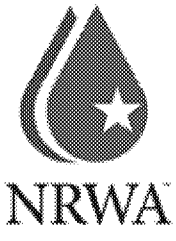
Good afternoon,

The National Rural Water Association in partnership with the United States Department of Labor will hold a ceremonial signing of new National Guideline Apprenticeship Standards for Water and Wastewater Specialists on November 14 at 3:30pm. CoBank, rural America's cooperative bank, will announce $250,000 in underwriting to help establish the program. NRWA State Affiliates will be present to celebrate the establishment of several Registered Apprenticeship programs under the national standards. Many other important congressional offices, agencies, and partners of Rural Water will be on hand to add their support. The creation of this career pathway will be of great benefit to the next generation water industry workforce in rural America.

The event will take place on the rooftop of 101 Constitution Avenue N.W. in Washington, D.C. Please see the attached materials for additional information. Thank you all for your support of the water industry, and we hope to see you next Tuesday.

Thanks,

Matthew Holmes
Deputy CEO
National Rural Water Association
Ex. 6 | www.nrwa.org



NATIONAL
RURAL WATER
ASSOCIATION
NRWA *America's Largest Utility Membership*
2915 S. 13th Street, Duncan, OK 73533
580.252.0629 | nrwa.org

MEDIA ADVISORY

NRWA to Partner with Department of Labor on Apprenticeship Program

The National Rural Water Association, the nation's largest water utility association with more than 31,000 members, will hold a ceremonial signing in conjunction with the United States Department of Labor Nov. 14 at 3:30 p.m. local time on the rooftop of 101 Constitution Avenue NW, to launch a new nation-wide apprenticeship program.

The DOL will provide support for the NRWA as it continues to build the **WaterPro Apprenticeship Program**, which is set to become a nationally-recognized standard.

Twelve NRWA state affiliates will jointly make the announcement at training events for water and wastewater operations specialists as they look to register their own programs with the NRWA's national guideline standard. The announcement and events will commemorate National Apprenticeship Week 2017 and will highlight the need for a national water sector apprenticeship initiative.

CoBank, a cooperative bank serving agribusinesses, rural infrastructure providers and Farm Credit associations throughout the United States, will underwrite $250,000 to help establish the program.

Media are invited to attend the signing ceremony. Sam Wade, the CEO of the NRWA, John Ladd, the Administrator of the Office of Apprenticeship for the DOL, leaders of several NRWA state affiliates and rural water leaders from CoBank will be available for interviews after the ceremonial signing.

If planning to attend, contact Jacob Morgan, corporate communications manager, CoBank at Ex. 6 or email jmorgan@cobank.com.

-30-

More about the NRWA and the **WaterPro Apprenticeship Program**

It takes more than 380,000 highly skilled water and wastewater personnel to ensure the public supply of safe drinking water and to protect our lakes, streams and groundwater. Advancements in water treatment and supply technology have increased the skills and training required of this workforce. Water professionals are ultimately responsible for meeting stringent regulatory standards, replacing aging infrastructure, recruiting and training new operations specialists, and responding to and recovering from disasters.

In addition to increasing professional demands, utilities will soon be forced to replace many of their most experienced employees. Over the next decade, the water sector is expected to lose between 30 and 50 percent of the workforce to retirement. Many of these employees have worked at the same utility for the majority of their careers, and they will depart with decades of valuable institutional knowledge.

NRWA and State Affiliates currently provide training on operator certification, financial sustainability, environmental compliance, utility management and governance to 80,000 water professionals annually in all 50 states. Last year, over 55,000 on-site consultations were delivered by NRWA's technical experts for water quality, energy efficiency, source water protection, technical assistance and emergency response.

The WaterPro Apprenticeship program will initially be tailored to water system operations specialists and wastewater system operations specialists. Additional apprenticeships programs are in the works for water utility system customer service personnel and technical assistance specialists.

NRWA

The
National Rural Water Association
and the
U.S. Department of Labor
invite you to the
signing ceremony of the
NRWA Apprenticeship Program
for water and wastewater specialists

November 14, 2017
3:30 pm
101 Constitution Avenue, NW
Rooftop
Washington, D. C.

www.waterprocommunity.org/rsvp

Welcome & Remarks – Sam Wade, NRWA CEO

- John V. Ladd – Administrator, USDOL Office of Apprenticeship
- Steven Fletcher – President, National Rural Water Association
- Congressional Comments
- Anne Hazlett – Assistant to the Secretary for Rural Development, USDA

NRWA Apprenticeship Program Signing Ceremony

Underwriting Support for Water Careers through Apprenticeship

- Christopher Shaffner – Sector Vice President, CoBank

Closing Remarks – Appreciation of Partners

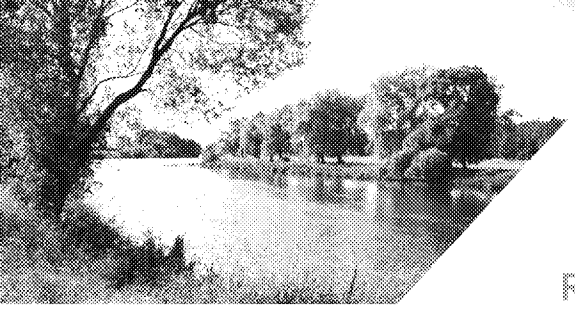
- Matthew Holmes – Deputy CEO, National Rural Water Association

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 11/15/2017 7:30:35 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: CoBank article on rural water systems
Attachments: CoBank on combining rural water systems.pdf

FYI.

GTM



CoBANK
KNOWLEDGE EXCHANGE

RURAL INFRASTRUCTURE BRIEFINGS

October 2017

When Rural Water Systems Combine

Consolidation may offer benefits for the nation's rural water industry, but it's also triggered debate on its rationale, approaches and community impact

These briefings showcase different facets of the rural infrastructure industries: power, energy, and utilities; water utilities; and communications.

Inside this Issue...

Is consolidation in your water system's future? Who should determine whether it's the right or wrong move for your utility – or even for your community? And how should a potential consolidation unfold?

These questions are at the heart of a growing discussion across the nation's rural water industry. As water utilities wrestle with increasing regulatory compliance and costly infrastructure needs, many are considering whether consolidation, also referred to as regionalization or partnering, could help them meet their challenges. Proponents say consolidation can help rural water systems leverage economies of scale and available expertise to make better use of resources and opportunities.

But not everyone agrees on the rationale or approach to consolidation. Many worry that consolidation will strip local control from a community or customer base. Others refute the idea that small water systems can't take care of their own business or run quality operations on their own. Others caution about proceeding without careful thought of unintended consequences.

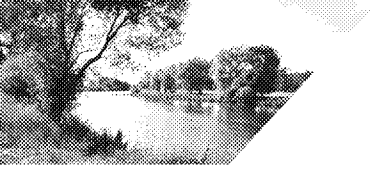
Differing points of view have increased controversy about consolidation and led to tension among industry leaders.

Rural America's consolidation trend

Consolidation, of course, is not a new trend. It's been occurring among U.S. businesses for decades, whether in the form of unifications, mergers or acquisitions. But in rural America, the consolidation pace has picked up significantly in recent years. Farm supply companies, dairy and grain cooperatives, Farm Credit Associations and other agricultural businesses are merging at a high rate of consolidation not seen since the late 1990s and early 2000s, according to Chuck Conner, president and CEO of the National Council of Farmer Cooperatives.

In fact, the rural water industry itself also has been consolidating. In Kentucky alone, the number of water systems has fallen from 2,000 in 1979 to 400 today, largely due to consolidation. Many of the Midwest's regional water systems are the result of mergers and alliances.

Regardless of the industry, these consolidations all share a need for more: more economies of scale, more capital to acquire assets and sophisticated technology, more resources and ability to better serve their members.



Consolidation benefits

For rural water systems, consolidation can help spread debt service as well as administrative and operational costs over a larger customer base, says Jim LaPlant, CEO and engineer for Iowa Regional Utilities Association (IRUA). Based in Newton, Iowa, the not-for-profit regional water and wastewater system serves more than 60 small communities.

> *"It can make sense to partner with a neighboring system. But it's essential that communities agree that it's for the good of the residents.*

Among the other pros of consolidation, adds LaPlant, is its ability to allow regional water systems to take advantage of bulk purchasing opportunities. It also gives them the ability to afford and attract highly specialized employees who can provide value with in-house engineering, technical consulting, accounting, public relations and other functions. Consolidation also enables regional water systems to develop multiple alternate sources of supply, "which provides added versatility in operations and service reliability," he says.

Moreover, systems that have consolidated into regional utilities have enhanced economic development by providing services to rural subdivisions, business parks, and ethanol and biodiesel plants. Regional systems can also budget and implement positive public relations programs that can raise the image and acceptance of the drinking water industry, LaPlant notes.

"We are seeing strong interest in consolidation in small communities and unincorporated areas that have older well-water supplies and distribution systems," he says. "In many instances, these small systems are governed by an older council or board, and usually have an older operator who is ready to retire. In many instances, younger generations are not interested in the time and dedication it takes to keep these systems viable."

Consolidation caution

Consolidation, however, has its downside. "Regional systems are a lot of hard work," LaPlant says.

He should know. IRUA has undertaken an aggressive and determined effort to grow and partner since the late 1970s. Through regionalization, it has expanded well beyond its original 950 miles of pipeline and 2,000 customers. Today, it serves 15,500 customers, including 1,000 for sewer services. Spread out over 18 counties in central and northeast Iowa, it now counts 5,000 miles of distribution pipeline. IRUA purchases water from four municipal water sources and owns a 3 million-gallon-per-day membrane treatment plant. It has taken commitment by IRUA's board and staff "to meet all the challenges in expanding our services," notes LaPlant.

But consolidation brings other concerns, and some industry leaders have been calling for caution when it's touted as the answer to the rural water industry's challenges. Among them is Matt Holmes, deputy CEO of the National Rural Water Association (NRWA), the nation's largest community-based drinking water utility organization. Based in Duncan, Oklahoma, NRWA's 49 affiliated state rural water associations represent 31,000 utility-system members across the country.

"We understand there will be consolidation in the rural water industry," Holmes acknowledges. "It can make sense to partner with a neighboring system. But it's essential that communities agree that it's for the good of the residents, that it's not a top-down push. It should be a local decision.

"Water is about control," he adds. "It's about the economic vitality of a community and the public health of its citizens. It's important for people to have a say in how it's handled. They have to understand that checks and balances must be put into place so that their water resource continues to be managed in the best interests of the community."

Holmes is also concerned about repeated assertions that smaller water systems need to consolidate because they can't meet regulatory requirements. "There's no compelling data that smaller systems have a larger number of violations," he says. "People say smaller systems represent the majority of violations, but that's

because they represent some 90 percent of the nation's water systems. They are the majority of systems."

Steve Fletcher, manager of Illinois-based Washington County Water Company, also contradicts claims that smaller water companies can't continue to operate themselves today and so must depend on a union with another system. Washington County Water serves 5,600 customers and three towns.

"Just because a system is small doesn't mean it can't take care of its own business," says Fletcher, who is also president of NRWA. "There are avenues for small towns to get help."

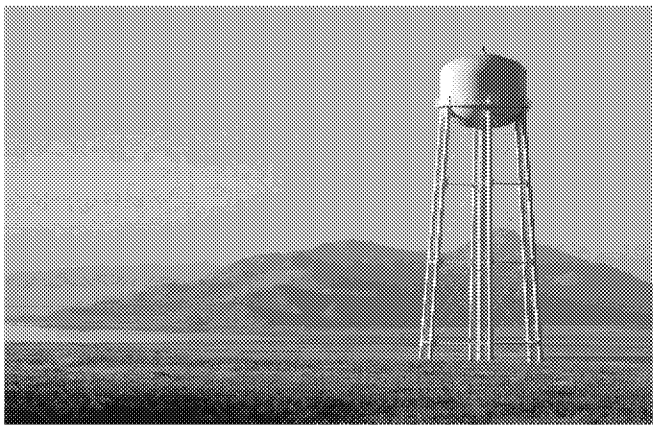
NRWA, he notes, has proposed a provision for the 2018 farm bill that provides financial incentives to communities that lack the capacity to provide services to their immediate residents. "This would allow contiguous neighbors and utilities outside the underserved area to receive a direct subsidized loan to provide service to that community," Fletcher says.

He further believes small towns derive their identity in part from local businesses. For many communities, the local water utility belongs to the constellation of businesses that helps form a town's character. Its role is all the more valued because it provides one of the life's most essential resources. When a consolidation swallows up a local business pillar, some fear a community's cultural values and local control begin to erode.

"Many towns don't want to lose their identity," Fletcher says. "Many have already lost their local school and other businesses. They don't want to lose anything else."

NRWA's Holmes also emphasizes that rural water systems often underestimate consolidation's cost and complexity. For example, water utilities must be aware of the hurdles of moving water over broader areas. "Water is extremely heavy and costly to move," Holmes says. That intensifies the challenges of engineering, digging lines underground, pumping, elevation changes, treatment and regulatory issues that must be addressed when water systems consolidate or regionalize.

Holmes also notes that among regional systems that distribute water over long distances, water often stays in pipelines longer. "Disinfection agents can react with



natural organic matter and produce harmful disinfection byproducts," he says.

"I encourage any water system that's considering consolidation or partnering with another water system to engage a third party to help them navigate that decision," says Holmes. "You're making a decision that will last for years. It behooves you to get professional advice."

Such professional help could come from attorneys, CPAs, engineering firms and consultants – especially those without a financial interest in the project. The University of North Carolina Environmental Finance Center provides information for small water-system management. Industry organizations such as NRWA and the Association of Regional Water Organizations (ARWO) also can help small water systems navigate consolidation decisions.

Unique challenges of the rural water industry

The rural water industry struggles with unique challenges that can complicate the question of consolidation.

For starters, there are the sheer number and geography of rural water systems: some 50,000 in the U.S., spread out across all 50 states. Ninety-two percent of them serve small communities of 10,000 or less. Many are seeing declining populations and aging workforces. At the same time, they're also facing increasing capital costs to maintain and replace infrastructure and provide necessary services. Rural water systems often rely on federal funding, whether through grants or loans, to meet those needs.

But that federal assistance may be in jeopardy. In its proposed 2018 budget, the Trump Administration has recommended cutting farm bill programs by $231 billion. This includes substantial reductions in USDA's Rural Development agency, limiting aid to rural water systems and eliminating a program that funds rural water and wastewater infrastructure. Those proposed cuts have left many wondering if small water systems, many of which are already struggling financially, can remain independent. NRWA, with the backing of several U.S. senators, has voiced its concern over these proposed cuts.

Another challenge is that too few rural water utilities charge their customers the full cost of supplying safe drinking water. That often results in neglected repairs and upgrades to their water systems.

"Many local officials keep rates low so they will get re-elected," says Bill Teichmiller, CEO of EJ Water Cooperative in Dieterich, Illinois. "But that sets up the town to not have enough money for future repairs and maintenance."

Randy Van Dyke, CEO of Iowa Lakes Regional Water (ILRW), agrees. "Sometimes those actual costs could amount to $100 per month per home, compared to the current $10," he says. "Most water systems don't want to see rate adjustments, so they kick the can down the road."

The industry also struggles with three key issues that may lead water systems to consider consolidation, says IRUA's LaPlant.

"One is a lack of planning to adequately provide capacity for unserved or underserved rural areas," LaPlant says. "The second is the loss of skills and institutional knowledge due to the retirement of a generation of funding specialists who looked for partnerships and regional solutions when water projects were being considered. The third is the lack of a meaningful or value engineering process that confirms the best water project is being considered from a life-cycle cost standpoint."

Many small water systems don't have the human resources, whether it's the board or staff, to meet the challenge of owning and operating complex water treatment and distribution systems, he adds. Consolidation or partnerships can be the answer.

> *"Most water systems don't want to see rate adjustments, so they kick the can down the road.*

LaPlant serves on the board of ARWO, a not-for-profit group formed in 2016 to represent regional water and wastewater systems and advance their means for knowledge exchange.

"National drinking water organizations such as ARWO are sending the message to Congress and regulatory agencies, such as EPA, that regional water systems have the capacity and track record of success to be considered first when projects are evaluated," LaPlant says.

He also points out that a regional utility is a team effort "but there isn't a game without adequate, affordable funding."

Federal focus on water system partnerships

Those who advocate for consolidation and industry partnerships have found a proponent in the Trump Administration. In January 2017, the Environmental Protection Agency (EPA) hosted a daylong meeting in Washington, D.C. on "Water System Partnerships." The meeting, which included LaPlant, Teichmiller and Van Dyke, focused on efforts to bolster partnership activities, when it makes sense, for the nation's drinking water industry.

"This Administration is asking people to embrace long-term resiliency and sustainability," says ILRW's Van Dyke. "Consolidation is going to continue because costs in the 21st century, for both water and wastewater systems, are becoming more significant. Regional water systems are equipped to provide a number of solutions for a community."

Some rural water leaders worry that government agencies can force consolidation. A Safe Drinking Water Act (SDWA) violation may even dictate the timing of a consolidation. Certainly, the drinking water industry has come under the spotlight in the wake of the lead-tainted water crisis in Flint, Michigan, which surfaced in 2015. One outcome

of that focus is congressional bill H.R. 3387, introduced in July 2017 to amend the SDWA to improve public water systems and enhance compliance. Among its provisions is an allowance for states to force consolidation if a water system cannot comply with regulations.

Nevertheless, the federal government also recognizes that small rural water systems need help with regulatory compliance. In July 2017, the U.S. EPA reestablished a policy to provide on-site assistance to the country's small drinking-water utilities to help them comply with federal environmental regulations. EPA's decision directs the agency to fund technical assistance through the Grassroots Rural and Small Community Water Systems Assistance Act, enacted in December 2015. It marked an important change in EPA policy, since full-time, on-site technicians were eliminated in 2012 when Congress gave EPA discretion over the operation of the program. EPA's move drew praise from NRWA.

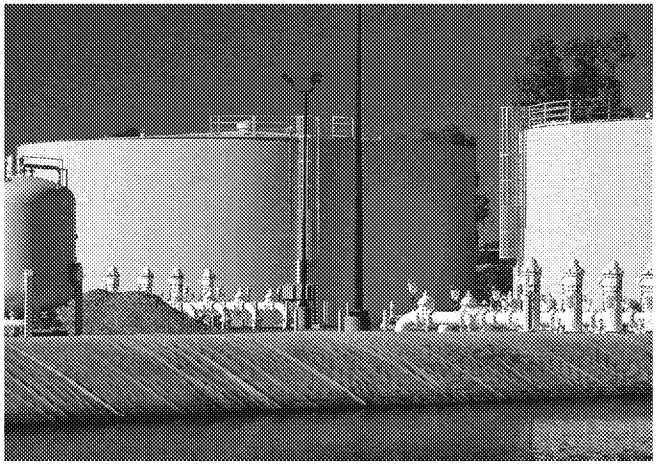
Consolidation's many forms

Consolidation in the rural water industry can encompass a wide range of options, from simple to complex. It can reflect the formation of a new water association by several neighboring systems. It can refer to the merger of a single rural utility with another water company or even with a neighboring municipality.

One consolidation scenario could involve one water system taking over all responsibility and costs for operating another water utility. That could include providing a whole new water source for customers in a neighboring community and building a new distribution system to deliver the water to that area.

Another example might consist of one water system providing another with infrastructure renovation, such as treatment plant backwash improvements, water tower maintenance and reducing distribution system water loss.

Consolidation can also mean partnering with another water system simply to provide services. For example, a water system continues to operate and maintain its distribution system but contracts with another utility for regulatory compliance, billing, meter reading or other services. Likewise, partnering may only involve assisting with emergency preparedness.



Among rural water systems that have grown through consolidation is Arkansas-based Conway County Regional Water Distribution District (CCRWDD). Formed in 1977, the nonprofit later purchased a neighboring water system. It also built out the water infrastructure for the city of Conway. In 1986, when three nearby county water systems asked CCRWDD to supply them with water and services, it did.

"That consolidation of services not only eased their burden of regulatory compliance," says CCRWDD operations manager Steve Wear. "It also was more cost-effective for them to purchase water from us than build their own water treatment facility."

Those consolidation moves increased CCRWDD's base from 1,100 to 25,000 customers, raising the company's revenues. "Because we added so many customers, we haven't had a residential rate increase since 1986," he says.

Wear believes a rural water system may be ready to consider partnering or consolidating with another system if it's having repeated issues with its board of directors, facilities, water quality or supply. Such issues can go on for years because government agencies often "throw money at the problems of a water system," he says. "Five years later, the water system is back asking for more money because the facility or equipment hasn't been maintained."

Partnering with a municipality

Another rural water system with considerable experience with consolidation is Iowa Lakes Regional Water (ILRW), where Van Dyke is CEO. Based in Spencer, Iowa, the water utility formed in the early 1980s as a not-for-profit rural water system, serving just 926 farms and rural homes. Today, ILRW partners with about 30 small towns, spread over 10,000 square miles of northwest Iowa and southwest Minnesota. It serves more than 5,200 water and wastewater customers, representing a population of 15,000 people.

In some cases, ILRW supplies water to partnering towns. In other cases, it simply provides services such as billing and revenue collections, meter reading, regulatory compliance and emergency management. One of its newer partners is Ayrshire, Iowa.

In late 2015, Ayrshire's city leaders reached out to ILRW for help in resolving several problems. The year before, Ayrshire had received notice from the Iowa Department of Natural Resources that the city had violated the federal Clean Water Act with its water treatment plant backwash discharge into a nearby creek. The city hired an engineering firm to review the problem and find a solution. That study revealed costs of as much as $80,000 to bring the city into compliance. In addition, water tower maintenance would cost an additional $60,000. Moreover, the city's water distribution system had a water loss of more than 60 percent, which also would require significant expenditures to resolve. On top of that, the city's only water plant operator was about to retire.

In response to the city's call for help, ILRW presented three options. Ultimately, the city chose the most complete option: ILRW would provide Ayrshire with a new water source and distribution system with full fire protection, and it would restore and upgrade the city's water tower in perpetuity, all at no cost to the city. In turn, ILRW would consider all residents of the city of Ayrshire as rural water members who would share the same rates as all other ILRW members.

"This was a successful merger and consolidation effort," says Van Dyke, ILRW's CEO since 1980.

"When two entities look at consolidation, the first thing people get anxious about is giving up control," he adds. "They may also be looking at a big jump in costs. Many times, decision-makers resist because they haven't been given enough information to see the big picture. They may not see what's coming down the road, such as the impact of a newly regulated contaminant or a multi-year drought. Most of the time, communities are slow to be forward-thinking about the real life-cycle of their facilities and equipment, and the costs to maintain or upgrade them."

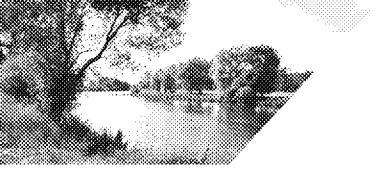
It can take years to cultivate a partnership, he adds. A minimum of eight to 12 months is needed to sit down with a community, evaluate its water system and determine how the entities can work together.

"Consolidation has to be what's best for people at the grassroots level," says Van Dyke. "It can never be regulated or mandated."

EJ Water's Teichmiller also believes consolidation can benefit rural water systems. It's a trend already taking place among private water companies, where large tracts of acquisitions are underway. He agrees that consolidation must be decided at the local level. "It's critical to hold town hall meetings to walk through the pros and cons of consolidation so the community can make an informed decision," he says.

But to help make those decisions, he believes local leaders must be educated, not just about the complexity of consolidation but also about economic development and leadership. They need to plan for their communities 10, 20 or 30 years ahead. That educational push is underway both at EJ Water and at the new ARWO, where Teichmiller serves as president.

"Customer expectations are dramatically increasing," Teichmiller says. "We've called it the Amazon affect. Customers are expecting social media engagement. How will small towns engage with this new tool when most are operating with part-time staffs in the office? Many towns are struggling to meet tomorrow's expectations. It's grown harder to stay sustainable and viable if you're a small town. It's a national epidemic."



Kentucky's consolidation lessons

If any state knows about regionalization in the water industry, it's Kentucky.

"Kentucky has a number of regionalization efforts that have been successful," says Gary Larimore, executive director of the Kentucky Rural Water Association.

Several systems there are interconnected to purchase wholesale water as well as for emergencies. Other systems share common offices, management and operational personnel but have separate boards. The state has six regional water commissions formed to provide wholesale water to utilities.

"The Logan-Todd County Regional Water Commission is an excellent example of strong leadership, public involvement, good communication and patience," Larimore says. "This successful effort took over 10 years from start to finish."

Kentucky's few forced regionalization efforts continue to struggle with board, management and operational issues. "These were all the issues that the consolidations and mergers were supposed to resolve," notes Larimore. "There continues to be mistrust among the local elected officials, water system board members and staff. The system continues to struggle with regulatory compliance. The customers of the systems have lost all confidence in the abilities of the local water system leaders to provide them with safe drinking water."

The forced mergers were an attempt by regulatory agencies and local county officials to achieve better efficiency and regulatory compliance, he says. Unfortunately, the local leaders never communicated with or convinced the public that the merger would resolve the problems. "Public buy-in is essential to the success of any regionalization effort," Larimore says. "In reality, the problems remained the same. Merging the systems only merged the problems."

Ultimately, Kentucky has learned that rural water systems need a very good reason to regionalize. Will the community or public be better served by the new system? What are the added benefits a community will receive from this new entity?

"We should not be regionalizing simply because we think it is a good idea," notes Larimore. "There must be an obvious and overriding reason or need to consolidate. Every situation should be viewed independently, and decisions should be based on what is best for the customers. Simply merging or consolidating systems will not necessarily give you a better system. It may only give you one large, bad system." ■

CoBank thanks the following for the information they provided for this report:

Phil Combs, general manager, Alpha-Talbott Utility District, Jefferson City, Tennessee

Steve Fletcher, manager, Washington County Water Co., Nashville, Illinois

Hector Gonzalez, government affairs manager, El Paso Water Utilities, El Paso, Texas

Matt Holmes, deputy CEO, National Rural Water Association, Duncan, Oklahoma

Gary Larimore, executive director, Kentucky Rural Water Association, Bowling Green, Kentucky

Jim LaPlant, CEO and engineer, Iowa Regional Utilities Association, Newton, Iowa

Bill Teichmiller, CEO, EJ Water Cooperative, Dieterich, Illinois, and president, Association of Regional Water Organizations

Randy Van Dyke, CEO, Iowa Lakes Regional Water, Spencer, Iowa

Steve Wear, operations manager, Conway County Regional Water Distribution District, Morrilton, Arkansas

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 11/15/2017 4:32:51 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: AWWA House Testimony re Hurricane Response
Attachments: AWWA testimony - hurricane response - Nov 14 2017.pdf

Our AWWA Texas Section director, Mike Howe, did a fine job with this testimony. It demonstrates the effectiveness of the water utility sector's approach to mutual aid in a crisis. A copy of the testimony is attached for your information.

Thank you for your interest.

Tracy Mehan

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
Ex. 6 (direct)
(cell)

Attachment

American Water Works Association
Dedicated to the World's Most Important Resource®

Government Affairs Office
1300 Eye Street NW
Suite 701W
Washington, DC 20005-3314
T 202.628.8303
F 202.628.2846

Response and Recovery to Environmental Concerns

from the 2017 Hurricane Season

Presented by
Mike Howe
Executive Director
Texas Section, American Water Works Association

Before the House Subcommittee on the Environment
Nov. 14, 2017

Good morning, Chairman Shimkus and members of the subcommittee. My name is Mike Howe and I serve as executive director of the Texas Section of AWWA and as administrator of the Texas Water/Wastewater Agency Response Network, or TXWARN. The mission of TXWARN is to support and promote statewide emergency preparedness, disaster response and mutual aid assistance for public and private water and wastewater utilities. The TXWARN program is part of a national water utility initiative to build a mutual aid and assistance network among water utilities following the devastation brought about by Hurricane Katrina. The framework for the Water/Wastewater Agency Response Network (WARN) originated with utilities in California after the 1991 East Bay Hills Firestorm. The catalyst for a national WARN initiative began with the 2004 hurricane season that devastated Florida with three major storms (Charley, Frances, Jeanne) and the subsequent 2005 season that included Katrina, Rita and Wilma.

The scale of the water infrastructure needs associated with these incidents were beyond those ever previously observed in the sector. In the aftermath of Katrina, it was apparent that coordination and prioritization of water utility needs was disjointed under the existing National Response Framework. Given this limitation, there was recognition within the sector that a "utilities helping utilities" process must be developed to overcome the limitations of the NRF and build on the lessons learned from California and our brethren in the power sector.

AWWA spearheaded the WARN initiative and collaborated with the U.S. Environmental Protection Agency (EPA), state primacy agencies, the National Emergency Managers Association and sector partners to facilitate the growth of WARN from two state programs in 2005 to the 50 programs we have today. The strength and power of WARN includes the economies of scale it provides as a force multiplier in mobilizing specialized resources to expedite the recovery of water and wastewater services.

This requires close coordination with state partners, relationships that TXWARN has fostered since 2005 with the Texas Commission on Environmental Quality (TCEQ) and with the State Emergency Operations Center. Membership in TXWARN free to all public and private utilities in Texas, and when a response is needed, it will work to assist whenever possible and the resources are available. TXWARN is the largest utility-to-utility mutual aid program of its type with more than 1,200 utility members that provide services to 78% of Texas residents. The Texas Section of AWWA manages TXWARN and on TXWARNs behalf, receives some funding from TCEQ via the state revolving loan fund to facilitate trainings and exercises. This small investment has helped build the operational knowledge between all stakeholders that was essential in effectively responding to Hurricane Harvey.

Many Texas water systems were really put to the test when Hurricane Harvey made landfall as a Category 4 hurricane in Nueces and Aransas Counties on August 25, and meandered to the northeast over the upper Texas coast for four days. According to National Oceanic and Atmospheric Administration, Harvey was the wettest hurricane in U.S. history, with rainfall accumulations of 40-61 inches in southeast Texas and southwest Louisiana.

We activated the TXWARN system on August 23, as the storm approached. We initiated the process of preparing our support teams for requests, based on the predicted overnight landfall August 25. Ground zero for Hurricane Harvey with the small coastal town of Port Aransas. At daylight, the local water utility manager, who did not evacuate, assessed the significant damage to the community and the water system. Power was out for the town's water pumps, one of the water supply lines from Corpus Christi was out of service, and the majority of water connections serving the structures in the community were leaking.

As Harvey crossed Aransas Bay, it also impacted Corpus Christi, and brought significant damage to Rockport's wastewater collection and treatment system as well.

The first major request for TXWARN came early Sunday morning via a third party on behalf of the utility in Port Aransas. Prior to allowing evacuees to return, it was essential that the water system was operational. TXWARN contacted the San Antonio Water System (SAWS), located a little more than two hours away, and its management agreed to send equipment and manpower to support Port Aransas. In less than 24 hours, SAWS had deployed 20 field staff to Port Aransas, and by Friday, they had restored service in that community. Adding to the complexity of recovery was the need to clear debris before performing any water utility work, such as leak repairs. In addition, living conditions for responding utilities are limited, meaning some of the crews slept in their trucks. Work

progressed each day from sunup to sundown, so San Antonio rotated crews for safety reasons.

SAWS also agreed to respond in Rockport, doing similar work on its water system, and restoring the wastewater system as well. That work included significant electrical rewiring, particularly in areas that experienced heavy flooding. This is difficult and time-consuming work, TXWARN arranged to relieve SAWS crews after 10 days with crews from Austin Water Utility.

During this time, Harvey transitioned from a destructive hurricane into a major flooding incident covering most of East-Central and Central Texas. News reports illustrated the overall impact, but water utilities throughout the area felt that impact in unique ways.

Staff at the City of Houston's Northeast water plant diverted flood waters from its filter galleries so it could continue operations without interruption. It is notable and a testimony to the utility staff's resilience that the City of Houston's water operations were never interrupted during Harvey. Unfortunately flood waters overwhelmed some of the the city's wastewater operations, but those services were restored as quickly as possible once flood water receded and it was for safe access to the facilities again.

In some instances, it was impossible to complete damage assessment at utilities in Southeast Texas until flood waters receded. However, TXWARN continued to respond to the utilities in the Coastal Bend area. As flooding subsided, TXWARN did move assessment teams and repair crews into Southeast Texas to assist utilities with short-term restoration efforts. Keep in mind our mission is to assist with the immediate response and recovery efforts to restore essential water utility services so utilities are able to plan their long-term recovery as needed. It is worth noting that at least one utility has decided to

abandon its own local wastewater treatment plant and contract with a nearby utility for future services. Rebuilding its facility is cost prohibitive.

During the nearly two-week response period TXWARN was fully activated, including the Labor Day weekend, it managed more than 50 requests for assistance. We worked very closely with other associations and with our regulatory agency, the TCEQ. We worked equally as close with our State Emergency Operations Center, with an understanding of its greater role in the overall response. We attribute our overall success in these working relationships to the fact that we have operated TXWARN for 12 years, since shortly after Hurricane Katrina.

While we are pleased with our response operations during Hurricane Harvey, there is always room for improvement. Specifically, I would call your attention to inconsistencies in how the needs of the water sector are prioritized and coordinated as part of the National Response Framework (NRF). The current organizational structure of the NRF is largely reflective of the 1992 Federal Response Plan prepared by Federal Emergency Management Agency (FEMA). The experiences of the water sector with myriad incidents since Hurricane Katrina suggest that this current model requires a thorough review and update to ensure that the critical lifeline services provided by the water sector in every community are addressed in the most expeditous and efficient manner possible. The loss of drinking water and wastewater services compounds the complexity of response actions and can impact the ability of responders to sustain shelters, hospitals and other emergency services. Therefore, prioritizing the recovery of water and wastewater service, if impacted, is paramount to preserving public health and restoring a community's economic vitality following an incident.

Opportunities to Enhance Response Coordination in the Water Sector

The expansion of the WARN program around the country has proven its effectiveness in expediting utility responses to multiple incidents, ranging from wildfires and earthquakes in California to flooding from North Dakota to North Carolina to hurricanes from Texas to New York. Given this emerging capability, the water sector has found that the organizational structure for federal support as defined in the National Response Framework creates inefficiencies in coordination and communication needs, especially during large-scale events such as Superstorm Sandy or Hurricane Maria. This disaggregated approach to federal support, as illustrated in Figure 1 attached to this written testimony, means that no single entity at the federal level has total responsibility for the water mission. It also makes it very difficult to establish a common operating picture, which has implications for informing other sectors and responders about potential resource needs within an impacted community or region.

This issue has been highlighted by the National Infrastructure Advisory Council (NIAC) as follows:

> **NIAC, July 2009, Framework for Dealing with Disasters and Related Interdependencies**
>
> **Finding**: The National Response Framework (NRF) lays out a structure to restore identified key infrastructures and functions for community recovery through 15 Emergency Support Functions (ESFs). Each function or infrastructure under an ESF has a clear priority and path for connection to emergency response decision makers as well as a supporting agency at the Federal level to support its recovery and management during a crisis. State and local response plans reflect parallel structures for NRF ESFs for coordination purposes. Currently, the Water Sector is supported as a subordinate

function to four different ESFs under the NRF. Under this structure water and wastewater services does not have sufficient visibility with leadership or resources necessary to support these other ESFs.

Recommendation: *Addressing Needed Water Services Recovery Mechanisms.*

- DHS should elevate Water Services to its own ESF within the NRF to achieve higher prioritization of water systems during emergency response. At the State level, emergency managers can apply current structures to match changes to the NRF, in a manner most efficient to them. These changes should be applied during the next NRF review cycle, and in the interim, FEMA should consolidate responsibility for water services support under EPA or U.S. Army Corps of Engineers.

NIAC, June 2016, Water Sector Resilience Final Report and Recommendations

Finding: Under the National Response Framework, water responsibilities are distributed across four Emergency Support Functions (ESFs) and multiple Federal agencies. This can result in water being excluded from unified command or interagency coordination, and can create confusion during response and recovery efforts that can impede water service recovery during disaster.

Recommendation: *Fortify Water Sector response and recovery capabilities.*

- The Secretary of Homeland Security should direct the administrator of FEMA to consolidate Federal emergency response roles and responsibilities for water into a single ESF within the Annex to the National Response Framework. This would improve coordination and reduce confusion, improve information sharing and communication, and alleviate over-taxing of resources within the Water Sector.
- EPA should increase funding to expand the successful mutual aid program, WARN, to facilitate regional collaboration of events that extend across jurisdictions and reinforce the program as a successful model for addressing the full spectrum of resilience and physical and cyber asset challenges.

Implementing the NIAC recommendations would be consistent with the approach applied in the NRF for similar critical infrastructure such as transportation (ESF 1), communications (ESF 2) and energy (ESF 12).

We urge Congress, with its oversight jurisdiction and responsibilities, to direct FEMA to reconsider how the National Response Framework is used to support disaster response and recovery in the water sector. This will be vital to protecting public and environmental health in the communities we serve in future disasters.

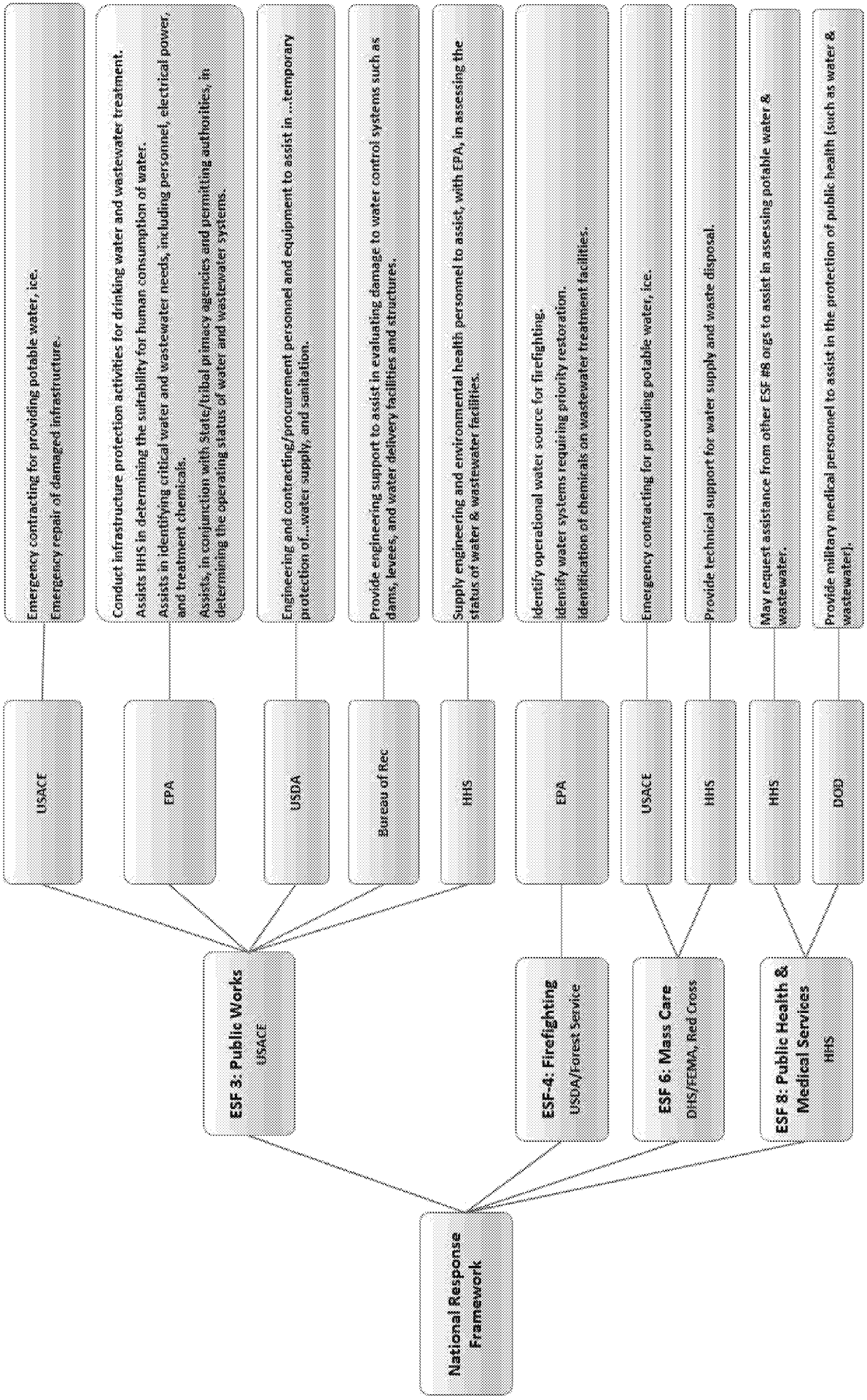
What is the American Water Works Association?

The American Water Works Association (AWWA) is an international, nonprofit, scientific and educational society dedicated to providing total water solutions and assuring the effective management of water. Founded in 1881, the association is the largest organization of water professionals in the world.

Our membership includes more than 3,900 utilities that supply roughly 80 percent of the nation's drinking water and treat almost half of the nation's wastewater. Our 50,000 members represent the full spectrum of the water community: public water and wastewater systems, environmental advocates, scientists, academicians, and others who hold a genuine interest in water, our most important resource. AWWA unites the diverse water community to advance public health, safety, the economy, and the environment.

###

Figure 1. Matrixed Approach to Federal Support for the Water Sector



Message

From: Amanda Waters [AWaters@nacwa.org]
Sent: 11/9/2017 3:39:38 PM
To: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: See You Next Week in Savannah!
Attachments: Speaker Dinner RSVP List.docx

Good morning Crystal. I just spoke with Lee and I am following up with some additional information for next week.

- Lee is planning to attend NACWA's Roaring 20s Reception from 6:00-7:00 pm on Tuesday, November 14. The address is: *Belford's Savannah, 315 W. St Julian St., Savannah, GA 31401*
- He will also be our guest of honor at the Law Seminar Speaker Dinner starting at 7:30 on Tuesday at the Old Pink House (see details below)
- CLE List – Looks like our application with Virginia is still pending regarding the amount of credits that will be offered.
- My cell phone number is 202-870-0427 should Lee need to reach me in Savannah.
- We have this short bio for Lee. Please review and send me any revisions as soon as possible.

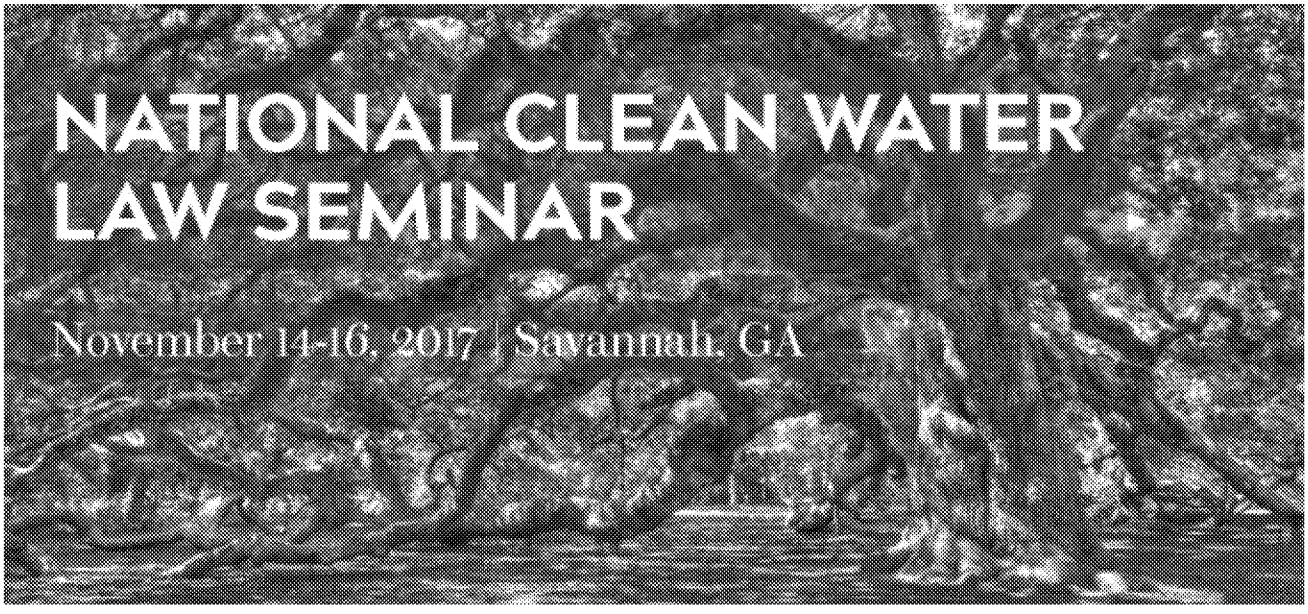
> **Dennis Lee Forgren, Jr.**
> Deputy Assistant Administrator, Office of Water
> US Environmental Protection Agency
> Washington, DC
>
> **Dennis "Lee" Forsgren** joined the Environmental Protection Agency on June 19th, 2017 as the Deputy Assistant Administrator for the Office of Water. His background includes legal and policy guidance in areas such as energy, water resources, and natural resource management, along with work on Capitol Hill. In addition, he worked as the Assistant Administrator for Legislative Affairs at NASA between 2003 and 2005.

Thanks so much.

Warm regards,

Amanda J. Waters | National Association of Clean Water Agencies | General Counsel | **Ex. 6** cell | awaters@nacwa.org | @amandawaters99 | Visit us at www.nacwa.org

Join us for the *National Clean Water Law Seminar*, November 14-16, and *National Water Enforcement Workshop*, November 16-17, in Savannah, GA!



We look forward to seeing you next week for NACWA's 2017 *National Clean Water Law Seminar*. Please refer to this e-mail as you plan your stay!

Before Leaving Home

What to Pack - Business casual attire should serve you well – check here to see what weather will be waiting for you in Savannah, GA!

Plan Your Stay in Savannah – Be sure to check out the Participant List, Agenda, Speaker Handouts and a list of things to do in Savannah. On Tuesday night, enter the prohibition era and enjoy the Roaring 20s Reception. Feel free to come in costume, or we will help you dress the part! The next morning, drag yourself out of bed and join the early risers at 6:30 am in the lobby for a scenic Savannah sunrise run.

Download the NACWA Events App – NACWA strives to be as environmentally-friendly as possible, so we encourage you to bring your tablet or laptop and download the NACWA Events App. The App, available for Apple and Android mobile devices, includes the agenda, speaker presentations and biographies, a participants list and more. Internet access will be available throughout the meeting rooms during the *Seminar*.

Upon Arrival

Ground Transportation – The Hyatt Regency Savannah is approximately 8 miles from the Savannah Hilton Head International Airport (SAV). The Hotel does not offer a complimentary shuttle; however, there are several transportation alternatives including: taxi (to the Hotel is approximately $28 and will take 20 minutes); K Shuttle ($20 one-way or $30 roundtrip); or rental car (valet and self-parking are available at the Hotel).

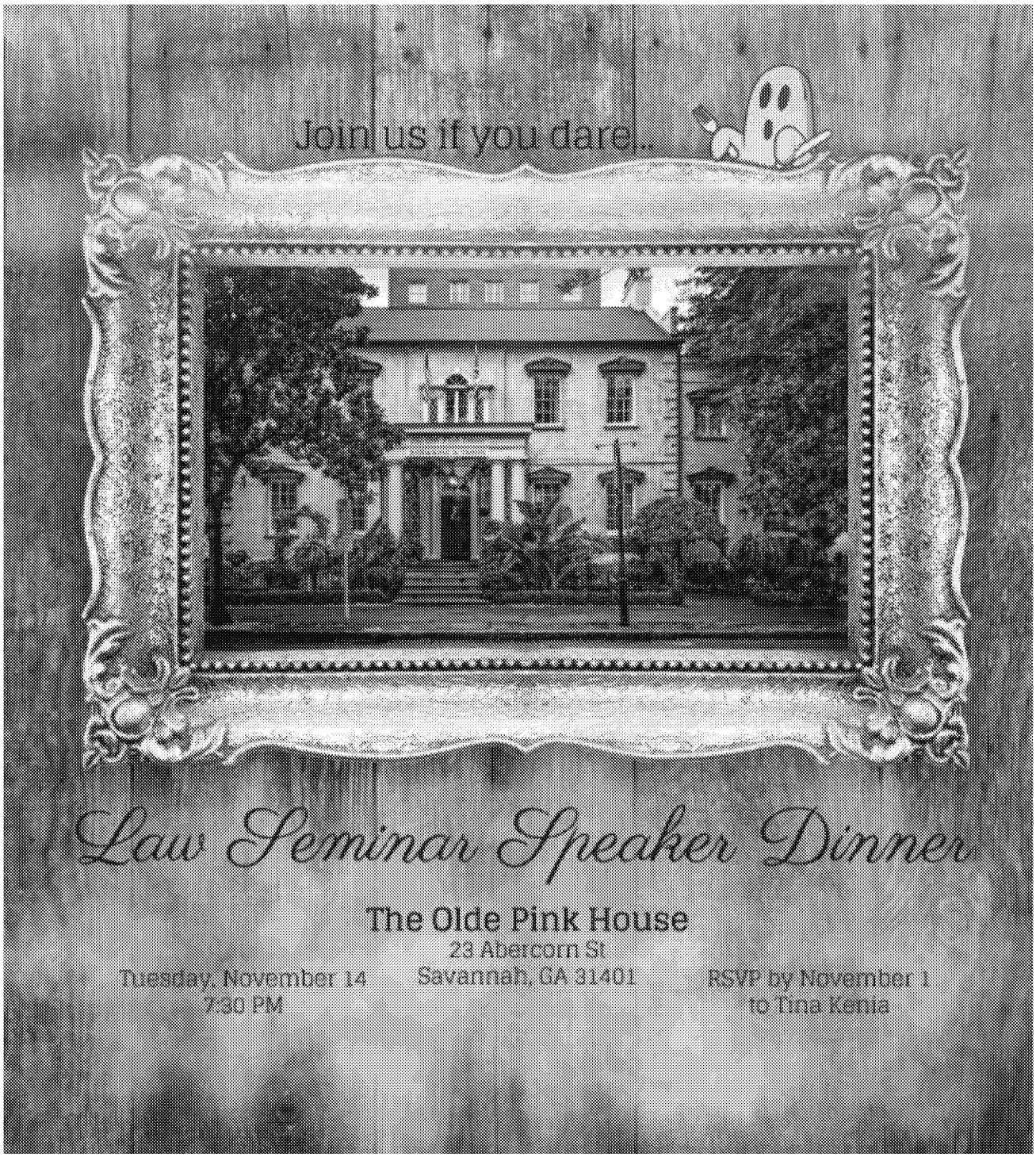
Registration – Meet your colleagues and pick up your name badge beginning on Tuesday at 8:30 am at Registration on the 2nd Floor of the Hyatt Regency Savannah. Don't forget to stop by the registration desk each day to sign-in for your CLE Credit. The *National Water Enforcement Workshop* will be immediately following the *Law Seminar*, so if you haven't registered yet, it is not too late to join us for another day!

Safe Travels!

Thank you in advance for attending the 2017 *National Clean Water Law Seminar*! Travel safe, and as always, if we can be of any assistance, please contact us at 202.833.2672 or info@nacwa.org.

See you in Savannah!

Halloween may be over, but NACWA's Law Seminar Speaker Dinner offers another near-term opportunity to commune with the spirits (i.e., ghosts and/or libations). The Olde Pink House is considered by unnamed, unreliable, and self-serving sources to be one of the most haunted buildings in Savannah. It is said that the food is so good at the OPH that James Habersham Jr. who built the house in 1771 often makes an appearance at dinner time. See for yourself – join your fellow speakers, NACWA staff and Mr. Habersham for dinner.



National Association of Clean Water Agencies
1816 Jefferson Place, NW, Washington, DC 20036, (202) 833-2672
www.nacwa.org

Speaker Dinner RSVP List:

RSVP	First_Name	Last_Name	Company
Yes	Joel	Beauvais	Latham & Watkins, LLP
Yes	Samuel	Brown	Hunton & Williams, LLP
Yes	Michelle	Bushman	
Yes	Liam	Cavanaugh	
Yes	Mickey	Conway	Metro Wastewater Reclamation District
Yes	Justin	Curtis	AquaLaw PLC
Yes	Andrew	Etter	Squire Patton Boggs (US) LLP
Yes	Ashley	Etter	
Yes	Paul	Freeman	Eversheds Sutherland
Yes	Nathan	Gardner-Andrews	NACWA
Yes	David Allan	Gates	Mitchell Williams
Yes	Karen	Hansen	Beveridge & Diamond, P.C.
Yes	Jennifer	Harrington	Narragansett Bay Commission
Yes	Chris	Hornback	NACWA
Yes	Tina	Kenia	
Yes	Adam	Krantz	NACWA
Yes	Roberta	Larson	California Association of Sanitation Agencies
Yes	Daniel	McLawhorn	City of Raleigh
Yes	Louis	McMahon	McMahon DeGulis LLP
Yes	Hilary	Meltzer	NYC Department of Law
Yes	Jon	Mueller	Chesapeake Bay Foundation
Yes	Susan	Myers	Metropolitan St. Louis Sewer District
Yes	Tim	Myers	Spouse
Yes	Christopher	Pomeroy	AquaLaw PLC
Yes	Erika	Powers	Barnes & Thornburg LLP
Yes	Jonathan	Rak	McGuireWoods, LLP
Yes	Patrick	Serfass	American Biogas Council
Yes	Erica	Spitzig	NACWA
Yes	Amanda	Waters	NACWA
Yes	LaJuana	Wilcher	English Lucas Priest & Owsley, LLP

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 10/10/2017 5:56:46 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: AWWA on the Farm Bill

AWWA PRESS RELEASE

AWWA calls for Farm Bill measures that protect drinking water sources, encourage partnerships

October 10, 2017

(WASHINGTON, DC) – With excess nutrients impacting water quality nationwide, the American Water Works Association (AWWA) today urged U.S. Congress to use the upcoming Farm Bill reauthorization to help farmers and water utilities work together to protect the nation's drinking water.

Large algal blooms resulting from nutrients have threatened water quality throughout the country, including shutting down the drinking water supply for the entire city of Toledo, Ohio, in 2014.

"Water utilities and farmers are eager to collaborate on projects that protect public health and the environment, reduce the cost of water treatment and help farmers succeed," said Tracy Mehan, AWWA executive director of government affairs. "Our nation's farmers do heroic work to put food on the tables of Americans every day. There's an opportunity through the Farm Bill to encourage partnerships that allow them to meet their production goals while protecting our nation's drinking water."

The U.S. Department of Agriculture provides funding to encourage implementing conservation practices on agricultural land. While these programs have been effective at addressing a host of environmental issues, historically they have been under-utilized in tackling drinking water concerns. AWWA is advocating that the reauthorized Farm Bill:

- Provide robust overall funding for the conservation title.
- Emphasize protecting water to safeguard public health.
- Expand opportunities for the Natural Resources Conservation Service (NRCS) to work with water systems to prioritize activities in each state.
- Increase benefits for farmers who employ practices that benefit downstream water quality.
- Ensure at least 10 percent of conservation program funds, Title 2 in the Farm Bill, is focused on the protection of drinking water.

"As we work to complete a new Farm Bill in the coming year, we need to identify and provide financial and technical resources to landowners and land managers to protect and conserve our natural resources," said John Larson, Senior Vice President of Policy and Programs at American Farmland Trust. "Collaboration with the American Water Works Association to identify opportunities for farmers and ranchers to protect drinking water for communities helps to build a larger coalition of supporters for conservation and the Farm Bill."

Innovative water utilities are already partnering with farming operations to protect their water supplies using programs such as the Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), Agricultural Conservation Easement Program (ACEP) and the Regional Conservation Partnership Program (RCPP). In Northwest Arkansas, an alliance of agricultural, water and environmental stakeholders received $4.3 million from NRCS and provided another $4.3 million in local and state contributions – both cash and in-kind – to rehabilitate a river and implement on-farm conservation practices.

"The Farm Bill currently provides the best opportunity to bring significant resources to the table to protect drinking water," said Alan Fortenberry, CEO of Beaver Water District, Ark., a key leader in the Arkansas alliance.

In Cedar Rapids, Iowa, the utility is working with 15 partners – including the Iowa Soybean Association – to adopt practices that protect the city's water supply. The partners are contributing $2.3 million in technical and financial assistance and the NRCS is providing another $2.1 million.

AWWA, the largest association of water professionals in the world, is sharing case studies that highlight agriculture-utility collaborations through its publications, conferences and other learning opportunities. The Farm Bill work – and the broader issue of protecting water supplies – will be among the key issues AWWA members bring to Capitol Hill next spring during the 2018 Water Matters! Fly In.

###

Established in 1881, the American Water Works Association is the largest nonprofit, scientific and educational association dedicated to managing and treating water, the world's most important resource. With approximately 50,000 members, AWWA provides solutions to improve public health, protect the environment, strengthen the economy and enhance our quality of life.

American Water Works Association
Dedicated to the World's Most Important Resource ®

Message

From: Matthew Holmes [Matt@nrwa.org]
Sent: 10/27/2017 8:18:41 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Greenwalt, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6c13775b8f424e90802669b87b135024-Greenwalt,]
Subject: NRWA Apprenticeship Program Signing Ceremony | November 14
Attachments: NRWA Apprenticeship Invite.pdf

Good afternoon Lee and Sarah,

There will be a ceremonial signing of the NRWA/DOL Apprenticeship Program for the water and wastewater industry at 101 Constitution Ave. NW on Tuesday, November 14th at 3:30 pm. Ten State Rural Water Associations have or in the process of registering their own programs under NRWA's National Guideline Standard, and Indiana is leading the charge by signing up the first four apprentices. We view this effort as a major step in the development of a future qualified workforce for rural and small systems.

We would like to invite you to this ceremonial signing, designed to provide national exposure to the effort. We invite your participation if your schedule allows, and of course anyone from the agency is more than welcome. This event is occurring during National Apprenticeship Week. A list of supporting organizations is below, as well as invited dignitaries. We are following up with House and Senate members now. Just let me know if you have any questions.

Thank you,

Matthew Holmes
Deputy CEO
National Rural Water Association
Ex. 6 | www.nrwa.org

R. Alexander Acosta, Secretary of Labor (Invited)
John V. Ladd, Administrator, Office of Apprenticeship & Training Administration
Jose Velasquez, Deputy Administrator, Office of Apprenticeship
Anne Hazlett, Assistant to the Secretary for Rural Development, USDA
Tom Halverson, CEO, CoBank – will announce a major funding contribution in support water/wastewater apprentices in rural America – a public-private partner
Jim Matheson, CEO, National Rural Electric Cooperative Association - partnering in support of critical infrastructure in the energy sector
Alan Roberson, CEO, Association of State Drinking Water Administrators - in recognition of the need to fill the shortage of certified operators

The

National Rural Water Association

and the

U.S. Department of Labor

invite you to the

signing ceremony of the

NRWA Apprenticeship Program

for water and wastewater specialists

November 14, 2017

3:30 pm

101 Constitution Avenue, NW

Rooftop

Washington, D. C.

www.waterprocommunity.org/rsvp

Message

From: Grevatt, Peter [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D3CAA0C39EBE44CB9D3AE44DA7543733-GREVATT, PETER]
Sent: 10/27/2017 6:41:48 PM
To: Roberson, Alan [aroberson@asdwa.org]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Burneson, Eric [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2cacb9a8d49f49af80531e9e2ccb9018-eburneso]
CC: Jeanne Bennett-Bailey [Ex. 6]; svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Tracy Mehan [tmehan@awwa.org]; Hanson, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=976b280c3eaf4e50b91a25d75466cf3c-Hanson, Andrew]
Subject: RE: Study on the health benefits of EPA's arsenic regulation

Yes, we have this one. Thanks for sharing Alan!

From: Roberson, Alan [mailto:aroberson@asdwa.org]
Sent: Friday, October 27, 2017 2:20 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Shapiro, Mike <Shapiro.Mike@epa.gov>; Grevatt, Peter <Grevatt.Peter@epa.gov>; Burneson, Eric <Burneson.Eric@epa.gov>
Cc: Jeanne Bennett-Bailey <[Ex. 6]>; svia@awwa.org; Tracy Mehan <tmehan@awwa.org>; Hanson, Andrew <Hanson.Andrew@epa.gov>
Subject: Study on the health benefits of EPA's arsenic regulation

Lee and Mike and Peter and Eric, I don't know if you have seen the recently published study in the Lancet on the health benefits of EPA's arsenic regulation. Not being an epidemiologist, it's hard for me to really evaluate the methods but I can get the jist of the study from the conclusions and I found to be quite interesting.

Have a good weekend. Alan

****

J. Alan Roberson, P.E.
Executive Director

Association of State Drinking Water Administrators (ASDWA)
1401 Wilson Blvd. - Suite 1225
Arlington, VA 22209

Office: [Ex. 6]

Message

From: Amanda Waters [AWaters@nacwa.org]
Sent: 10/5/2017 4:00:00 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Adam Krantz [AKrantz@nacwa.org]; Chris Hornback [CHornback@nacwa.org]
Subject: RE: NACWA National Clean Water Law Seminar - Invitation to Speak
Attachments: 2017-09-28Forsgren_letter.pdf

Mr. Forsgren,
Per your request, I have attached the invitation letter. We would be honored to have you join us in Savannah.

Amanda J. Waters | National Association of Clean Water Agencies | General Counsel Ex. 6
cell | awaters@nacwa.org | @amandawaters99 |Visit us at www.nacwa.org

Join us for the *National Clean Water Law Seminar*, November 14-16, and *National Water Enforcement Workshop*, November 16-17, in Savannah, GA!

From: Amanda Waters
Sent: Friday, September 29, 2017 11:42 AM
To: 'Forsgren.Lee@epa.gov' <Forsgren.Lee@epa.gov>
Subject: NACWA National Clean Water Law Seminar - Invitation to Speak

Dear Mr. Forsgren,
Please find attached an invitation to provide the keynote address at NACWA's 2017 National Clean Water Law Seminar: A Seminar for Public Agency Attorneys & Managers, which will be held November 14-16, 2017, at the Hyatt Regency Savannah in Savannah, GA. Your thoughtful consideration of this request is greatly appreciated.

Sincerely,

Amanda J. Waters | National Association of Clean Water Agencies | General Counsel | Ex. 6
cell | awaters@nacwa.org | @amandawaters99 |Visit us at www.nacwa.org

Join us for the *National Clean Water Law Seminar*, November 14-16, and *National Water Enforcement Workshop*, November 16-17, in Savannah, GA!

NACWA
A Clear Commitment to America's Waters

September 29, 2017

Dennis Lee Forsgren, Jr.
Deputy Assistant Administrator
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N.W.
Mail Code: 2310A
Washington, DC 20460

Dear Mr. Forsgren:

On behalf of the National Association of Clean Water Agencies (NACWA), I invite you to provide the Keynote Address at NACWA's 2017 *National Clean Water Law Seminar: A Seminar for Public Agency Attorneys & Managers*, which will be held November 14-16, 2017, at the Hyatt Regency Savannah in Savannah, GA.

The Keynote Address is scheduled for 12:00 pm ET on Wednesday, November 15.

This *Seminar* has become an indispensable tool for clean water practitioners due to its thorough examination of key clean water legal and regulatory challenges and opportunities. Attendees would greatly benefit from your wisdom and experience. We would like you to share the Agency's priorities relevant to those challenges, including those relating to infrastructure financing, improving industry transparency, and adaptation planning. We would be happy to revise the scope based on what you would like to cover.

We have set aside 30 minutes for the Keynote Address with time reserved afterward for questions and answers. We would be honored if you could join us to present your unique perspective at this valuable national conference.

Thank you very much for your time and consideration of this request. If you have any questions, please do not hesitate to contact me at Ex. 6 or *awaters@nacwa.org*. I look forward to hearing from you.

Sincerely,

Amanda Waters
General Counsel

National Association of
Clean Water Agencies
1816 Jefferson Place, NW
Washington DC 20036-2505

p 202.833.2672 f 202.833.4657
www.nacwa.org · info@nacwa.org

Message

From: Kevin Morley [KMorley@awwa.org]
Sent: 9/20/2017 6:20:21 PM
To: Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Burneson, Eric [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2cacb9a8d49f49af80531e9e2ccb9018-eburneso]; Hernandez-Quinones, Samuel [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=4c46d56b82f143df82f81d322bd109d7-Hernandez-Quinones, Samuel]; Tracy Mehan [tmehan@awwa.org]; svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]
Subject: Request for comment period extension RE: Draft MCLG Approach for Perchlorate
Attachments: AWWA MCLG Approach Comment Extension Request.pdf

This message is being transmitted on behalf G. Tracy Mehan, III, regarding AWWA's request for a 45-day comment period extension for the draft report, "Proposed Approaches to Inform the Derivation of a Maximum Contaminant Level Goal for Perchlorate in Drinking Water".

Thank you.

Kevin M. Morley, PhD
American Water Works Association
Manager, Federal Relations
1300 Eye Street, NW Suite 701W
Washington, DC 20005
D: Ex. 6

American Water Works Association

Dedicated to the World's Most Important Resource®

Government Affairs Office
1300 Eye **Street NW**, Suite 701W
Washington, DC 20005-3314
T 202.628.8303
F 202.628.2846

September 20, 2017

SUBMITTED VIA E-MAIL

Mr. Michael H. Shapiro,
U.S. Environmental Protection Agency
Office of Water
1200 Pennsylvania Ave., NW
Washington, D.C. 20460

RE: Request for Comment Period Extension on the draft report entitled, "Proposed Approaches to Inform the Derivation of a Maximum Contaminant Level Goal for Perchlorate in Drinking Water (82 FR 43354; EPA–HQ–OW–2016–0438)

Dear Mr. Shapiro:

The American Water Works Association (AWWA) respectfully requests that EPA extend the comment period on the draft report, "Proposed Approaches to Inform the Derivation of a Maximum Contaminant Level Goal for Perchlorate in Drinking Water", by 45-days to December 14, 2017. Given the complexity of the revisions in the Biologically Based Dose-Response (BBDR) model, we believe that a 90-day comment period in necessary to provide a reasonable opportunity for public review and comment.

We support EPA's responsiveness to elvaluating the recommendations made by the peer review panel in January 2017. Both the public and the next peer review panel will benefit from additional time to examine the modifications and technical assumptions embedded in the new BBDR model. We respectfully request a 45-day extension to support the public's consideration of the BBDR models scientific rigor and efficacy.

We would appreciate a response to this request as soon as possible. Should you have questions or would like to discuss this matter, please contact me (tmehan@awwa.org) or Kevin Morley (kmorley@awwa.org).

Yours Sincerely,

G. Tracy Mehan, III
Executive Director – Government Affairs

cc: Lee Forsgren – EPA, OW
Peter Grevatt – EPA, OGWDW
Eric Burneson – EPA, OGWDW
Samuel Hernandez – EPA, OGWDW

Message

From: Fox, Jessica [JFox@epri.com]
Sent: 9/27/2017 3:05:46 PM
To: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Rose, Bob [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f346adaaeaa640cf96014ec0f1eab610-BROSE]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]
Subject: RE: Keynote Invitation: Ohio River Basin Water Quality Trading Project
Attachments: RE: Keynote Invitation: Ohio River Basin Water Quality Trading Project

Lee,

I would like to confirm you for the event below, October 26th for the Ohio River Basin Water Quality Trading Project. We were able to arrange the event for a day that was free on your schedule and I believe you may already have the date held. The invitation is going out today, but I have not received final confirmation and I don't want to list you inappropriately.

If you could let me know if it is acceptable to list you as a speaker, that would be very helpful. We can always make adjustments as things come up at the last moment.

Jessica

Jessica Fox | Senior Program Manager | EPRI - Environment | Ex. 6 | jfox@epri.com | www.epri.com/sustainability | http://wqt.epri.com

Together...Shaping the Future of Electricity

From: Fox, Jessica
Sent: Tuesday, August 29, 2017 12:25 PM
To: Penman.Crystal@epa.gov; forsgren.lee@epa.gov
Cc: Rose, Bob <Rose.Bob@epa.gov>; shapiro.mike@epa.gov
Subject: Keynote Invitation: Ohio River Basin Water Quality Trading Project

Dear Lee,

I'm writing to invite you to provide a keynote address at the signing of the second amendment to the Ohio River Basin Water Quality Trading Project.

EPA has been advancing Water Quality Trading as an important approach to protecting water, leveraging private capital, and supporting local communities. Since 2011, I have been leading the world's largest pilot project on water quality trading with active participation of Ohio, Indiana, and Kentucky: Ohio River Basin Water Quality Trading Project. This project has been covered by Wall Street Journal, Public Radio, The Economist, Bloomberg, and many others. This project won the coveted United States Water Prize in 2015 and proceeded to release another round of private funding to landowners through 2018. You can see a short project summary video here: YouTube channel!

As part of our commitment to optimum effectiveness, efficiency and environmental improvement, we are proceeding with the second amendment to the Trading Plan. All signatories, the direct reports to the governors in Ohio, Indiana, and Kentucky, are in concurrence and ready to proceed. *As Assistant Deputy Administrator of Water, we are interested*

in you attending the in-person signing of this amendment. For background, EPA Deputy Administrator (Bob Perciasepe) attended the original trading plan signing (2012) as well as the pivotal first credit transaction event (2014).

Value: The event will occur on a farm we funded to plant 30 acres of forest near a corn-soy rotation. It will include the opportunity for the signatories to plant a tree together – symbolizing the continuing commitment to work together to support farmers, protect water quality and ecosystems, and accelerate the innovative injection of private money into local economies and watersheds. Media will be invited per preferences of the signatories.

The event will be invite-only, paired with media coverage per guidance from the speakers and signatories. We are considering dates in October as determined by the speakers and signatories availability.

Could you please advise if you would be available to attend and speak at such an event?

DRAFT agenda:

10:00am Arrive at farm on southeast side of Columbus, OH (30 minutes from Columbus Airport)
10:30am Opening Speakers (options: EPA, USDA, US Endowment for Forestry)
11:30 am Signing and Photo planting a tree together, symbolic of the states working together.
12:00 pm Lunch with Keynote speaker (EPA)
1:00 pm Property Tour (vernal pools, corn-soy rotation, forest, biodiversity)
2:00 pm Depart

Sincerely,

Jessica

Jessica Fox
Senior Program Manager

Electric Power Research Institute
3420 Hillview Avenue | Palo Alto, CA 94304
Tel: Ex. 6
Email: jfox@epri.com

www.epri.com/sustainability
http://wqt.epri.com
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Message

From: Fox, Jessica [JFox@epri.com]
Sent: 8/30/2017 8:47:46 PM
To: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
CC: Rose, Bob [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f346adaaeaa640cf96014ec0f1eab610-BROSE]
Subject: RE: Keynote Invitation: Ohio River Basin Water Quality Trading Project
Attachments: EPA Speaker Request Form.docx

Crystal,

Please find attached the completed speaker request form. We are narrowing on October 26th as the event date near Columbus, OH. Does that work for Lee?

Also, if issues arise for Lee's availability and/or EPA would like to send Mike Shapiro, that would be appropriate on our side.

Jessica

Jessica Fox | Senior Program Manager | EPRI - Environment | Ex. 6 | jfox@epri.com | www.epri.com/sustainability | http://wqt.epri.com

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From: Penman, Crystal [mailto:Penman.Crystal@epa.gov]
Sent: Wednesday, August 30, 2017 11:24 AM
To: Fox, Jessica <JFox@epri.com>
Subject: [EXTERNAL] RE: Keynote Invitation: Ohio River Basin Water Quality Trading Project

Thank you for the invitation to have Lee speak at the Ohio River Basin Water Quality Trading Project. Although Lee is interested in attending this event, his calendar is quite full for October. The only dates where Lee would not be available is October 9-13 and 18-19. Attached is our speaker request form for you to fill out and return as soon as possible if this event falls on a date that Lee would be available. Thank you.

Crystal Penman
Program Specialist
Office of Water
Immediate Office
U.S. Environmental Protection Agency
Work: 202-564-3318
Penman.Crystal@epa.gov

From: Fox, Jessica [mailto:JFox@epri.com]
Sent: Tuesday, August 29, 2017 3:25 PM
To: Penman, Crystal <Penman.Crystal@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>
Cc: Rose, Bob <Rose.Bob@epa.gov>; Shapiro, Mike <Shapiro.Mike@epa.gov>
Subject: Keynote Invitation: Ohio River Basin Water Quality Trading Project

Dear Lee,

I'm writing to invite you to provide a keynote address at the signing of the second amendment to the Ohio River Basin Water Quality Trading Project.

EPA has been advancing Water Quality Trading as an important approach to protecting water, leveraging private capital, and supporting local communities. Since 2011, I have been leading the world's largest pilot project on water quality trading with active participation of Ohio, Indiana, and Kentucky: Ohio River Basin Water Quality Trading Project. This project has been covered by Wall Street Journal, Public Radio, The Economist, Bloomberg, and many others. This project won the coveted United States Water Prize in 2015 and proceeded to release another round of private funding to landowners through 2018. You can see a short project summary video here: YouTube channel!

As part of our commitment to optimum effectiveness, efficiency and environmental improvement, we are proceeding with the second amendment to the Trading Plan. All signatories, the direct reports to the governors in Ohio, Indiana, and Kentucky, are in concurrence and ready to proceed. *As Assistant Deputy Administrator of Water, we are interested in you attending the in-person signing of this amendment.* For background, EPA Deputy Administrator (Bob Perciasepe) attended the original trading plan signing (2012) as well as the pivotal first credit transaction event (2014).

Value: The event will occur on a farm we funded to plant 30 acres of forest near a corn-soy rotation. It will include the opportunity for the signatories to plant a tree together – symbolizing the continuing commitment to work together to support farmers, protect water quality and ecosystems, and accelerate the innovative injection of private money into local economies and watersheds. Media will be invited per preferences of the signatories.

The event will be invite-only, paired with media coverage per guidance from the speakers and signatories. We are considering dates in October as determined by the speakers and signatories availability.

Could you please advise if you would be available to attend and speak at such an event?

DRAFT agenda:

10:00am Arrive at farm on southeast side of Columbus, OH (30 minutes from Columbus Airport)
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11:30 am Signing and Photo planting a tree together, symbolic of the states working together.
12:00 pm Lunch with Keynote speaker (EPA)
1:00 pm Property Tour (vernal pools, corn-soy rotation, forest, biodiversity)
2:00 pm Depart

Sincerely,

Jessica

Jessica Fox
Senior Program Manager

Electric Power Research Institute
3420 Hillview Avenue | Palo Alto, CA 94304
Tel: Ex. 6
Email: jfox@epri.com

www.epri.com/sustainability
http://wqt.epri.com
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this message is not intended to be an electronic signature, instrument or anything that may form a legally binding agreement with EPRI. If you are not the intended recipient, please contact the sender by reply email and permanently delete all copies of this message. Please be advised that the message and its contents may be disclosed, accessed and reviewed by the sender's email system administrator and/or provider. ***

OFFICE OF WATER SPEAKER REQUEST FORM

U.S. Environmental Protection Agency

Deadline for Acceptance:	September 15, 2017
Event Title:	*Ohio River Basin Water Quality Trading Project – Amendment Signing*
Speech Date:	October 26, 2017
Is the Above Date Flexible:	Yes.
Speech Time & Duration:	12:00 noon. 15-20 minutes (Times are flexible)
Speaker Requested:	Lee Ferguson or Mike Shapiro
Event Location:	30 minutes southeast of Columbus, Ohio.
Open Press/Closed Press:	Open Press
Is Event Webcast/Recorded/Transcribed:	No
Purpose of the Event:	Execute amendment to Ohio River Basin Water Quality Trading Plan, on-site farm tour with a funded project. Value Statement: The project is an excellent example of proactively leaning forward to support farmers, protect water quality and ecosystems, and accelerate the innovative injection of private money into local economies and watersheds.
Speech Topic:	Water Quality; Watershed Protection; Environmental Markets; Need for innovation and collaboration between agencies and stakeholders to legitimately advance water protection in a way that also incentives economies.
Requested Presentation Format:	Speech
Speech/Presentation Duration:	15-20 minutes
Audience:	Invited guests only. Estimate 50-65 people attending, plus media.
Event/Organization Web Site:	http://wqt.epri.com
Event Agenda/Program:	10:00am Arrive at farm on southeast side of Columbus, OH (30 minutes from Columbus Airport) 10:30am Opening Speaker: 11:30 am Amendment Signing and Photos **12:00 pm Lunch & Keynote speaker:** **D. Lee Forsgren, *Assistant Deputy Administrator of Water*, USEPA** 1:00 pm Property Tour (vernal pools, corn-soy rotation, forest, biodiversity) 2:00 pm Depart
Notable Guests Attending:	R. Bruce Scott, Deputy Secretary, Kentucky Department of Environmental Protection Dan Daniels, Director, Ohio Department of Natural Resources Craig Butler, Director, Ohio EPA

OFFICE OF WATER SPEAKER REQUEST FORM

U.S. Environmental Protection Agency

Bruno Pigott, Commissioner, Indiana Department of Environmental Management
Melissa Rekeweg, Director (Acting), Indiana State Department of Agriculture

---

Point of Contact: Jessica Fox, Sr. Program Manager, Electric Power Research Institute. jfox@epri.com. Ex. 6

Message

From: Michael Deane [Michael@nawc.com]
Sent: 9/15/2017 9:57:49 PM
To: Brent Fewell [brent.fewell@earthandwatergroup.com]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: Meeting with NAWC

Thank you, Lee. I agree with Brent – wonderful country! Ex. 6

Ex. 6

Regards,

Michael

Michael Deane
Executive Director
National Association of Water Companies
Ex. 6
Michael@nawc.com

From: Brent Fewell [mailto:brent.fewell@earthandwatergroup.com]
Sent: Friday, September 15, 2017 5:44 PM
To: Forsgren, Lee <forsgren.lee@epa.gov>; Penman, Crystal <penman.crystal@epa.gov>
Cc: Michael Deane <Michael@nawc.com>
Subject: Re: Meeting with NAWC

Lucky you - beautiful country, but thorny issue. Take your fly rod with you.

We'll work with Crystal. Enjoy your weekend.

Get Outlook for iOS

From: Forsgren, Lee <Forsgren.Lee@epa.gov>
Sent: Friday, September 15, 2017 5:33:20 PM
To: Brent Fewell; Penman, Crystal
Cc: Michael Deane
Subject: RE: Meeting with NAWC

Brent,

Unfortunately I have to do several public hearings in Alaska on Bristol Bay and will be out all that week. Crystal will try to find a time that works as soon as possible.

Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water

Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Brent Fewell [mailto:brent.fewell@earthandwatergroup.com]
Sent: Friday, September 15, 2017 5:28 PM
To: Penman, Crystal <Penman.Crystal@epa.gov>
Cc: Michael Deane <Michael@nawc.com>; Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Meeting with NAWC

Hi Crystal,

I wanted to circle back and see if Michael and I could reschedule a meeting with Lee to discuss issues of private sector ownership of POTWs. The week of Oct. 9 is fairly flexible for us. Many thanks for your assistance.

Have a great weekend.

Brent

Brent Fewell, Esq. | Earth & Water Group
1455 Pennsylvania Ave., NW, Suite 400, Washington, DC 20004
Ex. 6 (o) | Ex. 6 (c) | www.earthandwatergroup.com

Earth & Water Law LLC
SOLUTIONS FOR BUSINESS AND THE PLANET

-----Original Appointment-----
From: Penman.Crystal@epa.gov [mailto:Penman.Crystal@epa.gov] **On Behalf Of** Forsgren, Lee
Sent: Friday, September 8, 2017 9:08 AM
To: Brent Fewell; Campbell, Ann
Cc: Michael Deane
Subject: Canceled: Meeting with Brent Fewell
When: Monday, September 11, 2017 10:00 AM-10:45 AM (UTC-05:00) Eastern Time (US & Canada).
Where: 1201 Constitution Ave NW, Washington DC 20004 WJCE 3219B Please call 202-564-5700 for escort
Importance: High

Brent Fewell
Michael Dean @ NAWC

Message

From: Brent Fewell [brent.fewell@earthandwatergroup.com]
Sent: 9/15/2017 9:44:08 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
CC: Michael Deane [michael@nawc.com]
Subject: Re: Meeting with NAWC

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Subject: RE: Meeting with NAWC

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D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
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Phone: 202-564-5700
Forsgren.Lee@epa.gov

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Cc: Michael Deane <Michael@nawc.com>; Forsgren, Lee <Forsgren.Lee@epa.gov>
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Where: 1201 Constitution Ave NW, Washington DC 20004 WJCE 3219B Please call 202-564-5700 for escort
Importance: High

Brent Fewell
Michael Dean @ NAWC

Message

From: Brent Fewell [brent.fewell@earthandwatergroup.com]
Sent: 9/15/2017 9:27:37 PM
To: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
CC: Michael Deane [Michael@nawc.com]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Meeting with NAWC

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Have a great weekend.

Brent

Brent Fewell, Esq. | Earth & Water Group
1455 Pennsylvania Ave., NW, Suite 400, Washington, DC 20004
Ex. 6 (o) | Ex. 6 (c) | www.earthandwatergroup.com

Earth & Water Law LLC
SOLUTIONS FOR BUSINESS AND THE PLANET

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From: Penman.Crystal@epa.gov [mailto:Penman.Crystal@epa.gov] **On Behalf Of** Forsgren, Lee
Sent: Friday, September 8, 2017 9:08 AM
To: Brent Fewell; Campbell, Ann
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Subject: Canceled: Meeting with Brent Fewell
When: Monday, September 11, 2017 10:00 AM-10:45 AM (UTC-05:00) Eastern Time (US & Canada).
Where: 1201 Constitution Ave NW, Washington DC 20004 WJCE 3219B Please call 202-564-5700 for escort
Importance: High

Brent Fewell
Michael Dean @ NAWC

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 9/7/2017 9:35:25 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]
Subject: FW: Could you all contact Rep Meng?

From: Gross, Hillary [mailto:Hillary.Gross@mail.house.gov]
Sent: Thursday, September 07, 2017 4:27 PM
To: Tracy Mehan <tmehan@awwa.org>; Dolan, Meredith (Gourash) <meredith.dolan@mail.house.gov>; David LaFrance <dlafrance@awwa.org>; Greg Kail <GKail@awwa.org>; Kurt Vause <Kurt.Vause@awwu.biz>; David D. Weihrauch <dweihrauch@cityofoxford.org>
Subject: RE: Could you all contact Rep Meng?

Tracy,

Wanted to let you know my boss is going to speak against the Amendment on the floor when it comes up in the next hour or so. Thank you again for flagging this for us!

Hillary

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Thursday, September 07, 2017 10:56 AM
To: Gross, Hillary <Hillary.Gross@mail.house.gov>; Dolan, Meredith (Gourash) <meredith.dolan@mail.house.gov>; David LaFrance <dlafrance@awwa.org>; Greg Kail <GKail@awwa.org>; Kurt Vause <Kurt.Vause@awwu.biz>; David D. Weihrauch <dweihrauch@cityofoxford.org>
Subject: RE: Could you all contact Rep Meng?

Nor ours! We will persevere from our end. Thank you for your following up on this.

Tracy

From: Gross, Hillary [mailto:Hillary.Gross@mail.house.gov]
Sent: Thursday, September 07, 2017 10:54 AM
To: Tracy Mehan <tmehan@awwa.org>; Dolan, Meredith (Gourash) <meredith.dolan@mail.house.gov>; David LaFrance <dlafrance@awwa.org>; Greg Kail <GKail@awwa.org>; Kurt Vause <Kurt.Vause@awwu.biz>; David D. Weihrauch <dweihrauch@cityofoxford.org>
Subject: RE: Could you all contact Rep Meng?

Their rational is the Committee Report language directs $5 million of the total $30 million for administrative expenses, which is $3 million more than last years enacted level. Since FY 18 will be the first year EPA will actually issue loans, I

think we can all agree there will be administrative costs to carry out the program and this explanation doesn't assuage our concerns with the Amendment.

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Thursday, September 07, 2017 10:47 AM
To: Gross, Hillary <Hillary.Gross@mail.house.gov>; Dolan, Meredith (Gourash) <meredith.dolan@mail.house.gov>; David LaFrance <dlafrance@awwa.org>; Greg Kail <GKail@awwa.org>; Kurt Vause <Kurt.Vause@awwu.biz>; David D. Weihrauch <dweihrauch@cityofoxford.org>
Subject: RE: Could you all contact Rep Meng?

Most grateful.

Tracy

From: Gross, Hillary [mailto:Hillary.Gross@mail.house.gov]
Sent: Thursday, September 07, 2017 10:44 AM
To: Tracy Mehan <tmehan@awwa.org>; Dolan, Meredith (Gourash) <meredith.dolan@mail.house.gov>; David LaFrance <dlafrance@awwa.org>; Greg Kail <GKail@awwa.org>; Kurt Vause <Kurt.Vause@awwu.biz>; David D. Weihrauch <dweihrauch@cityofoxford.org>
Subject: RE: Could you all contact Rep Meng?

Hi Tracy,

I just tried giving Rep. Meng's LD a call but he wasn't available so I sent an email explaining our serious concerns and the importance of WIFIA. I asked him to return my call to discuss further. I will let you know!

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Thursday, September 07, 2017 10:35 AM
To: Dolan, Meredith (Gourash) <meredith.dolan@mail.house.gov>; David LaFrance <dlafrance@awwa.org>; Greg Kail <GKail@awwa.org>; Kurt Vause <Kurt.Vause@awwu.biz>; David D. Weihrauch <dweihrauch@cityofoxford.org>
Cc: Gross, Hillary <Hillary.Gross@mail.house.gov>
Subject: RE: Could you all contact Rep Meng?

Thanks for your help, Meredith.

Tracy

From: Dolan, Meredith (Gourash) [mailto:meredith.dolan@mail.house.gov]
Sent: Thursday, September 07, 2017 10:34 AM
To: Tracy Mehan <tmehan@awwa.org>; David LaFrance <dlafrance@awwa.org>; Greg Kail <GKail@awwa.org>; Kurt Vause <Kurt.Vause@awwu.biz>; David D. Weihrauch <dweihrauch@cityofoxford.org>
Cc: Gross, Hillary <Hillary.Gross@mail.house.gov>
Subject: RE: Could you all contact Rep Meng?

Hi Tracy,

Thanks for sending over and flagging this issue for us. Looping in Hillary Gross, our legislative director, to make a call over to the Congresswoman's office and check in. We will circle back when we learn more.

Best,

Meredith

Meredith Gourash Dolan
Chief of Staff
Congressman Bob Gibbs (OH-07)
2446 Rayburn House Office Building
Washington, D.C. 20515
Phone: Ex. 6

OFFICE OF CONGRESSMAN
BOB GIBBS
PROUDLY SERVING THE PEOPLE OF OHIO'S SEVENTH DISTRICT

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Thursday, September 07, 2017 10:21 AM
To: David LaFrance; Greg Kail; Kurt Vause; David D. Weihrauch; Dolan, Meredith (Gourash)
Subject: FW: Could you all contact Rep Meng?

From: Tommy Holmes
Sent: Thursday, September 07, 2017 10:17 AM
To: PAUL RUSH <PRush@dep.nyc.gov>
Cc: Tracy Mehan <tmehan@awwa.org>; Steve Via <SVia@awwa.org>; Doersch, Patricia <patricia.doersch@squirepb.com>
Subject: Could you all contact Rep Meng?

Good morning, Paul!

The House Rules Committee, which determines what amendments can be taken up on the House floor when a bill is up for debate, has considered in order an amendment to take $1 million from WIFIA and send it to the National Parks Service. It is by Rep. Grace Meng, who represents Queens. Could you have your DC office put in a call to her and see what's up, and ask her to leave WIFIA alone? They could point out that the nation's need to reinvest in its water infrastructure has strong support on both sides of the aisle and in the minds of the public, so this is not the time to take away money from an infrastructure tool that has more applicants than it has money for already. I have attached a description of the amendment and inserted text below. Maybe she could withdraw her amendment.

Thanks,
Tommy

Tommy Holmes
Legislative Director
American Water Works Association
1300 Eye St. NW
Suite 701W
Washington, DC 20005 USA
Office 202.628.8303 | **Direct** Ex. 6
Mobile Ex. 6
tholmes@awwa.org | www.awwa.org

Interior-Environment Amendments in Order on Spending Bill

CQ Staff

The House Rules Committee on Wednesday made the following Interior-Environment amendments in order for debate on the fiscal 2018 omnibus spending bill (HR 3354):

- Reps. Martha McSally, R-Ariz., and Paul Gosar, R-Ariz., that would increase funding for BLM Forest Management by $316,000, offset by an equal reduction to BLM Management.
- Rep. Raul M. Grijalva, D-Ariz., that would increase funding for Superfund by $12 million, offset by an equal reduction to BLM Management.
- Rep. Darren Soto, D-Fla., that would reduce by $500,000, then increase by the same amount, funding for National Wildlife Refuge System. The amendment is intended to direct funding to the management of invasive species.
- Rep. Vern Buchanan, R-Fla., that would U.S. Fish and Wildlife Resource Management by $3 million, offset by and equal reduction to **EPA**» Departmental Operations.
- Reps. Don Bacon, R-Neb., and Gosar, that would increase funding for US Fish and Wildlife Resource Management by 4 million, offset by an equal reduction to the agency's land acquisition account.
- Rep. Brian Mast, R-Fla., that would increase funding for USGS Survey by $1 million, offset by an equal reduction to U.S. Fish and Wildlife Management.
- Rep. Joe Courtney, D-Conn., and four other Democrats, that would reduce funding by $300,000, then increase by the same amount, funding for the National Park Service. The amendment is intended to direct funding for operation of the National Park System for the New England Scenic Trail.
- McSally and Gosar, that would increase funding for the National Park Service by $10 million, offset by an equal reduction to «**EPA**» Management.
- Rep. David Cicilline, D-R.I., that would increase funding for the National Park System by $2 million, offset by an equal reduction to the agency's Operation account.
- Reps. James E. Clyburn, D-S.C., and Alma Adams, D-N.C., that would increase funding for Historically Black Colleges and Universities by $2 million, offset by an equal reduction to the Secretary's office.
- Rep. Denny Heck, D-Wash., and five other Democrats, that would prohibit funds from supporting "sanctuary cities" that prevent law enforcement officials from executing immigration laws.
- **Rep. Grace Meng, D-N.Y., that would increase funding for the National Park Service by $1 million, offset by an equal reduction to the Water Infrastructure Finance and Innovation Program.**
- Rep. Morgan Griffith, R-Va., that would increase the number of Appalachian states eligible for grants for the reclamation of abandoned mine lands to be used for economic and community development from 3 to 6.
- Griffith, R-Va., that would increase funding for «**EPA**» Environmental Programs and Management by $80 million, and reduce funding for Abandoned Mine Reclamation Fund for $75 million.
- Rep. Glenn Thompson, R-Pa., that would increase funding for the Abandoned Mine Land Reclamation program by $32 million, offset by an equal reduction to «**EPA**» Management.
- Rep. Tom O'Halleran, D-Ariz., that would increase funding for BIA construction by $10 million, offset by an equal reduction to Interior Department operations.
- Dels. Stacey Plaskett, D-V.I., and Madeleine Z. Bordallo, D-Guam, that would increase funding for Insular Affairs Assistance to Territories by $1 million, offset by an equal reduction to Interior Department operations. ……

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Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 8/7/2017 6:00:50 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: Re: WIFIA

Thanks Tracy.

Sent from my iPhone

On Aug 7, 2017, at 3:27 AM, Tracy Mehan <tmehan@awwa.org> wrote:

> Lee,
>
> Thanks, again, for taking the time to visit with me. Let me know if you ever require any kind of briefing from our team here at AWWA.
>
> I was very pleased to discuss WIFIA with you (among other pressing issues) and thought you might find the attached op-ed of interest.
>
> All the best.
>
> Tracy
>
> G. Tracy Mehan, III
> Executive Director, Government Affairs
> American Water Works Association
> **Ex. 6** (cell)
>
> Attachment

<MehanOpEdWIFIA.pdf>

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 7/5/2017 4:32:55 PM
To: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Patricia Chism [pchism@awwa.org]
Subject: RE: Meeting with AWWA

Great! It looks like we have a time to meet.

From: Penman, Crystal
Sent: Wednesday, July 5, 2017 12:28 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Patricia Chism <pchism@awwa.org>
Subject: RE: Meeting with AWWA

11am will work.

Crystal Penman
Program Specialist
Office of Water
Immediate Office
U.S. Environmental Protection Agency
Work: 202-564-3318
Penman.Crystal@epa.gov

From: Forsgren, Lee
Sent: Wednesday, July 5, 2017 12:24 PM
To: Patricia Chism <pchism@awwa.org>
Cc: Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: Meeting with AWWA

Crystal,

Does that time work with my schedule?

Lee

-----Original Appointment-----
From: Patricia Chism [mailto:pchism@awwa.org]
Sent: Wednesday, July 5, 2017 12:21 PM
To: Forsgren, Lee
Subject: New Time Proposed: Meeting with AWWA
When: Monday, July 31, 2017 10:00 AM-10:45 AM (UTC-05:00) Eastern Time (US & Canada).
Where: EPA 1201 Constitution Ave NW, Washington DC 20640 WJCE 3219B Please call 202-564-5700 for escort

Tracy has a staff meeting from 9:30am to 10:30am. Would 11am work?

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 6/30/2017 9:47:06 PM
To: Tracy Mehan [tmehan@awwa.org]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Patricia Chism [pchism@awwa.org]
Subject: RE: Congratulations

Look forward to getting together.

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Friday, June 30, 2017 5:20 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Cc: Penman, Crystal <Penman.Crystal@epa.gov>; Patricia Chism <pchism@awwa.org>
Subject: RE: Congratulations

As I said, Lee, when you get settled (or at least reasonably so).

Patty Chism of our office can work with Crystal on scheduling. I am copying her on this note to facilitate communication.

Thanks, again.

Tracy

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Friday, June 30, 2017 5:14 PM
To: Tracy Mehan <tmehan@awwa.org>
Cc: Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: Congratulations

Tracy,

Thank you very much. I would love to have the opportunity to sit down with you. As you might guess my schedule is a little busy with all that is happening and the efforts by the wonderful staff in the office of water trying to get me up to speed. I have copied Crystal Penman who will work with you to find a time for us to get together.

Have a great 4th of July yourself.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700

Forsgren.Lee@epa.gov

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Friday, June 30, 2017 3:01 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Congratulations

Dear Lee,

Congratulations on your new appointment in the Office of Water, my favorite office at the agency. I think you will enjoy working with all the fine folks there.

After you get settled in, I would be happy to drop by to provide you with any information you might find helpful relative to AWWA, SDWA, infrastructure finance and the like.

Good luck with the new job and have a great 4th of July.

Tracy

G. Tracy Mehan, III
Executive Director, Government Affairs
American Water Works Association
1300 Eye Street, N.W., Suite 701W
Washington, D.C. 20005
Ex. 6 (cell)
tmehan@awwa.org

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Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 1/31/2018 9:42:10 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: RE: LSLR estimates as to number and cost

Thanks Tracy!

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Wednesday, January 31, 2018 4:15 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: LSLR estimates as to number and cost

Lee,

For your information.

Tracy

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 7/23/2018 12:25:54 PM
To: Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; OW-OGWDW-EVERYONE [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=07a3941911ef4d93be64e4ae91a7d471-OW-OGWDW-EVERYONE]
CC: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Drinkard, Andrea [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=808a6b7b65bf447f93dad2f510feaf61-ADRINKAR]; McDonough, Owen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=10a92c71b552413694fed6fa08522f4f-McDonough,]; Wildeman, Anna [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=05dd0af69bfa40429e438b7646502b99-Wildeman, A]; Dennis, Allison [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9bf7959058b241fab18e564e9c957b56-ADennis]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Goodin, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eac342f280a4b9db4079c81f66d1913-JGoodin]; Best-Wong, Benita [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6ee79b3d0fc0429b99f2c05481b0b957-bbestwon]; Nagle, Deborah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33888a2bbe8f48aeb4ad9cc54259fb4e-dnagle]; tmehan@awwa.org; Diane VanDe Hei [dvandehei@amwa.net]; lthorp@cleanwater.org; Alan Roberson - AWWA (ARoberson@asdwa.org) [ARoberson@asdwa.org]; sam@nrwa.org; Sam Sankar [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user442aad82]; Nathan Ohle (nohle@rcap.org) [nohle@rcap.org]; Lousberg, Macara [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=e589fdabe6374c5987d0184b43fb5c57-MLousber]; Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Stevens, Robert [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9ffb88906e1b4d419d0615a19c13c9dc-Stevens, Robert]; Torrez, Alfredo [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5c5450041bab4612a5a491571ac357b4-Torrez, Alfredo]; Moraff, Kenneth [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b6170ef3baef40c3bdecab56fd74b07a-Moraff, Kenneth]; Laureano, Javier [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b852b8bb7f54ef3bd266dd9f8f77ad4-Laureano, J]; Lueckenhoff, Dominique [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f0c0739371f9474c8abb685a920d6d83-Dluecken]; Gettle, Jeaneanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d8e72aa7e1894faea44006fd9f22b637-Gettle, Jeaneanne]; Holst, Linda [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=97e4a65addd9494fa193c98dd5d12b55-LHolst]; Garcia, David [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f0a9d226635746338d68d71576583e6a-Garcia, David]; Robichaud, Jeffery [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8d521d2cd48e4b2e9ceeec4c9cb648e1-ROBICHAUD, JEFFERY]; O'Connor, Darcy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=80eedae64ae54ed395e72f0cbb29da48-OConnor, Darcy]; Torres, Tomas [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b2f42bb7a684e199190092e3a2e7520-TTORRES]; Opalski, Dan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b5ed6410d934bf699a008a252791a55-Opalski, Dan]; Nickerson, William

[/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=148f2c1c05b54f358e29c59b841664aa-Wnicker]; Orme-Zavaleta, Jennifer [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3c5a111dc377411595e5b24b5d96146b-Orme-Zavaleta, Jennifer]
Subject: RE: Announcing selection of the Deputy Director of the Office of Ground Water and Drinking Water

A wonderful selection! Her professionalism is world class and her substantive knowledge even better.
Jennifer has been and will only increase her presence as a critical player in OWs efforts to make the Nation's drinking water safe.

From: Grevatt, Peter
Sent: Monday, July 23, 2018 8:13 AM
To: OW-OGWDW-EVERYONE <OWOGWDWEVERYONE@epa.gov>
Cc: Ross, David P <ross.davidp@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>; Drinkard, Andrea <Drinkard.Andrea@epa.gov>; McDonough, Owen <mcdonough.owen@epa.gov>; Wildeman, Anna <wildeman.anna@epa.gov>; Dennis, Allison <Dennis.Allison@epa.gov>; Sawyers, Andrew <Sawyers.Andrew@epa.gov>; Goodin, John <Goodin.John@epa.gov>; Best-Wong, Benita <Best-Wong.Benita@epa.gov>; Nagle, Deborah <Nagle.Deborah@epa.gov>; tmehan@awwa.org; Diane VanDe Hei <dvandehei@amwa.net>; lthorp@cleanwater.org; Alan Roberson - AWWA (ARoberson@asdwa.org) <ARoberson@asdwa.org>; sam@nrwa.org; Sam Sankar <ssankar@ecos.org>; Nathan Ohle (nohle@rcap.org) <nohle@rcap.org>; Lousberg, Macara <Lousberg.Macara@epa.gov>; Campbell, Ann <Campbell.Ann@epa.gov>; Stevens, Robert <Stevens.Robert@epa.gov>; Torrez, Alfredo <Torrez.Alfredo@epa.gov>; Moraff, Kenneth <Moraff.Ken@epa.gov>; Laureano, Javier <laureano.javier@epa.gov>; Lueckenhoff, Dominique <Lueckenhoff.Dominique@epa.gov>; Gettle, Jeaneanne <Gettle.Jeaneanne@epa.gov>; Holst, Linda <holst.linda@epa.gov>; Garcia, David <Garcia.David@epa.gov>; Robichaud, Jeffery <Robichaud.Jeffery@epa.gov>; O'Connor, Darcy <oconnor.darcy@epa.gov>; Torres, Tomas <Torres.Tomas@epa.gov>; Opalski, Dan <Opalski.Dan@epa.gov>; Nickerson, William <Nickerson.William@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Subject: Announcing selection of the Deputy Director of the Office of Ground Water and Drinking Water

I am delighted to announce the selection of Dr. Jennifer McLain as the permanent Deputy Director of the Office of Ground Water and Drinking Water. Jennifer has demonstrated exceptional senior executive leadership capabilities through her outstanding performance in her roles as Acting Deputy Director in the Office of Ground Water and Drinking Water and Acting Division Director in the Office of Pesticide Programs over the past two and a half years. Jennifer is also a recent graduate of EPA's Senior Executive Service (SES) Candidate Development Program. Jennifer also brings exceptional programmatic leadership skills through her decades of experience leading complex environmental programs in both the Office of Water and the Office of Chemical Safety and Pollution Prevention.

Jennifer brings exceptional technical credentials, as demonstrated by the Ph.D. she earned in Chemistry in 1997 from Princeton University, along with a certificate in science, technology, and public policy. She also received a Bachelor of Science in Chemistry from the University of Notre Dame in 1991.

Please join me in welcoming Jennifer McLain to OGWDW!

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 12/8/2017 6:44:27 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: RE: AWWA statement on SDWA Health Advisories to NDWAC

Thanks Tracy!

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Friday, December 8, 2017 1:42 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: AWWA statement on SDWA Health Advisories to NDWAC

Lee,

FYI.

Tracy

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 12/8/2017 4:58:58 PM
To: Tracy Mehan [tmehan@awwa.org]
Subject: RE: Re WIFIA and SRF/WIN/WIFIA

Thanks

From: Tracy Mehan [mailto:tmehan@awwa.org]
Sent: Friday, December 8, 2017 10:54 AM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Re WIFIA and SRF/WIN/WIFIA

Lee,

We offered these comments with the Chief Counsel of SEPW pursuant to a recent meeting.

FYI.

GTM

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 10/27/2017 9:15:42 PM
To: Matthew Holmes [Matt@nrwa.org]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: NRWA Apprenticeship Program Signing Ceremony | November 14

Great!

From: Matthew Holmes [mailto:Matt@nrwa.org]
Sent: Friday, October 27, 2017 5:08 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>
Cc: Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: NRWA Apprenticeship Program Signing Ceremony | November 14

Thanks Lee. Sam and I will be coming in town by noon on the 13th, so if you can't make the event perhaps we can meet prior.

Matt

> **From:** Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
> **Sent:** Friday, October 27, 2017 4:06 PM
> **To:** Matthew Holmes <Matt@nrwa.org>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>
> **Cc:** Penman, Crystal <Penman.Crystal@epa.gov>
> **Subject:** RE: NRWA Apprenticeship Program Signing Ceremony | November 14
>
> Matt,
>
> Let me see if I can make it work. I have to leave on travel that day but might be able to make it before I leave.
>
> Lee
>
> > **From:** Matthew Holmes [mailto:Matt@nrwa.org]
> > **Sent:** Friday, October 27, 2017 4:19 PM
> > **To:** Forsgren, Lee <Forsgren.Lee@epa.gov>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>
> > **Subject:** NRWA Apprenticeship Program Signing Ceremony | November 14
> >
> > Good afternoon Lee and Sarah,
> >
> > There will be a ceremonial signing of the NRWA/DOL Apprenticeship Program for the water and wastewater industry at 101 Constitution Ave. NW on Tuesday, November 14th at 3:30 pm. Ten State Rural Water Associations have or in the process of registering their own programs under NRWA's National Guideline Standard, and Indiana is leading the charge by signing up the first four apprentices. We view this effort as a major step in the development of a future qualified workforce for rural and small systems.
> >
> > We would like to invite you to this ceremonial signing, designed to provide national exposure to the effort. We invite your participation if your schedule allows, and of course anyone from the agency is more than welcome. This event is occurring during National Apprenticeship Week. A list of supporting organizations is

below, as well as invited dignitaries. We are following up with House and Senate members now. Just let me know if you have any questions.

Thank you,

Matthew Holmes
Deputy CEO
National Rural Water Association
Ex. 6 | www.nrwa.org

R. Alexander Acosta, Secretary of Labor (Invited)
John V. Ladd, Administrator, Office of Apprenticeship & Training Administration
Jose Velasquez, Deputy Administrator, Office of Apprenticeship
Anne Hazlett, Assistant to the Secretary for Rural Development, USDA
Tom Halverson, CEO, CoBank – will announce a major funding contribution in support water/wastewater apprentices in rural America – a public-private partner
Jim Matheson, CEO, National Rural Electric Cooperative Association - partnering in support of critical infrastructure in the energy sector
Alan Roberson, CEO, Association of State Drinking Water Administrators - in recognition of the need to fill the shortage of certified operators

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 9/20/2017 2:12:45 AM
To: Matthew Holmes [Matt@nrwa.org]
Subject: Re: Will arrive about 7:30

Matt

Am checked in but need about 30 minutes to answer some emails. Does that work for you?

Lee

Sent from my iPhone

On Sep 19, 2017, at 6:52 PM, Matthew Holmes <Matt@nrwa.org> wrote:

> Sam and I would be happy to meet with you for dinner. Talk to you soon,
>
> Matt
>
> On Sep 19, 2017, at 6:31 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
>
> > Matt
> >
> > Just landed. Will call when I get to the hotel.
> >
> > Lee
> >
> > Sent from my iPhone
> >
> > On Sep 19, 2017, at 4:42 PM, Matthew Holmes <Matt@nrwa.org> wrote:
> >
> > > Hello Lee,
> > >
> > > Very good! Let's plan on touching base this evening. Just text or call me when you arrive Ex. 6 Looking forward to it.
> > >
> > > Matt
> > >
> > > Matthew Holmes
> > > Deputy CEO
> > > National Rural Water Association
> > > Ex. 6 | www.nrwa.org
> > >
> > > On Sep 19, 2017, at 4:14 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
> > >
> > > > Matt
> > > >
> > > > I will be arriving at the Grand Sierra Resort about

7:30 tonight. Where and when do you want me to meet you tonight or tomorrow morning? Also can I get your cell number? Mine is Ex. 6

Look forward to meeting you all tomorrow.

Regards,
Lee

Sent from my iPhone

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 9/15/2017 9:33:20 PM
To: Brent Fewell [brent.fewell@earthandwatergroup.com]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
CC: Michael Deane [Michael@nawc.com]
Subject: RE: Meeting with NAWC

Brent,

Unfortunately I have to do several public hearings in Alaska on Bristol Bay and will be out all that week. Crystal will try to find a time that works as soon as possible.

Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Brent Fewell [mailto:brent.fewell@earthandwatergroup.com]
Sent: Friday, September 15, 2017 5:28 PM
To: Penman, Crystal <Penman.Crystal@epa.gov>
Cc: Michael Deane <Michael@nawc.com>; Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Meeting with NAWC

Hi Crystal,

I wanted to circle back and see if Michael and I could reschedule a meeting with Lee to discuss issues of private sector ownership of POTWs. The week of Oct. 9 is fairly flexible for us. Many thanks for your assistance.

Have a great weekend.

Brent

Brent Fewell, Esq. | Earth & Water Group
1455 Pennsylvania Ave., NW, Suite 400, Washington, DC 20004
Ex. 6 (o) | Ex. 6 (c) | www.earthandwatergroup.com

Earth & Water Law LLC
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-----Original Appointment-----
From: Penman.Crystal@epa.gov [mailto:Penman.Crystal@epa.gov] **On Behalf Of** Forsgren, Lee
Sent: Friday, September 8, 2017 9:08 AM
To: Brent Fewell; Campbell, Ann
Cc: Michael Deane
Subject: Canceled: Meeting with Brent Fewell
When: Monday, September 11, 2017 10:00 AM-10:45 AM (UTC-05:00) Eastern Time (US & Canada).
Where: 1201 Constitution Ave NW, Washington DC 20004 WJCE 3219B Please call 202-564-5700 for escort
Importance: High

Brent Fewell
Michael Dean @ NAWC

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 9/22/2017 9:39:06 PM
To: cfinley@nacwa.org; arceneaux@amwa.net
Subject: Water Security and Resilience program outcomes
Attachments: Water Security 2017 Outcomes.docx

Michael and Cynthia,

Per our conversation today, Here are a few recent examples of how OW's security program has aided response to recent incidents, including the hurricanes. As you will see in the attached, there are many ways our staff have directly impacted the ability of communities across the Nation to prepare for and respond to disasters.

Please let us know if you have any question.

Regards,

Lee,

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
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Room 3219 WJCE
Washington, DC 20460
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EPA United States Environmental Protection Agency

Highlights: Outcomes of the Office of Water's Security and Resilience Program

Overall Training Metric: *On an annual basis, the Office of Water trains over 5,000 water utilities, state officials, and federal emergency responders to become more resilient to any natural or manmade incident that could endanger water and wastewater services.*

Florida Functional Exercise. On November 4 – 5, 2015, 110 representatives from Florida drinking water and wastewater utilities, hospitals and emergency response agencies participated in a two-day EPA-sponsored water sector workshop and Functional Exercise (FE) focused on emergency preparedness and response. The event included a half-day workshop discussing water sector-specific response protocols followed by a full-day facilitated FE utilizing a wide-area hurricane scenario. Objectives included testing water sector and response partner emergency response and coordination tools/services and assessing water sector local and interstate mutual aid capabilities. Notably, the exercise included development and processing of an interstate Emergency Management Assistance Compact (EMAC) request for water sector crews that mirrored an actual EMAC request from Florida that was successfully filled by Tennessee, North Carolina and South Carolina utilities following Hurricane Irma in September 2017. Below are exercise participant comments:

- "The event was a highly worthwhile exercise that further highlighted the strengths and weaknesses in the current EOC process."
- "It was a great experience for a brand new Emergency Manager (such as myself) to see how the whole system works and how it can be used during an event."
- "The event identified the need for more communications between the local emergency management agencies and the State."

Water/Wastewater Agency Response Networks or WARN. WARNs are a network of utilities organized within a state to facilitate the exchange of resources after an emergency. EPA has long worked with local and state government and water sector associations to support WARNs, including the initial development of WARNS that resulted in WARNs being established in 49 of the 50 states and the National Capital Region. EPA has continued to support WARNs by conducting tabletop and functional exercises, providing webinar training, sponsoring a yearly Chairs coordination meeting and developing tools and resources to keep WARNs response ready. In total, 45 out of the 50 WARNs have been activated in response to a local or state-wide emergency and have benefitted from the training available as shown by three WARN responses to the recent hurricanes:

- TXWARN – In August and September 2017, Hurricane Harvey dumped over 50 inches of rain in parts of southeast Texas. Thanks to the continuous training and exercises TXWARN participates in, TXWARN successfully coordinated all response activities with other TXWARN leaders, the Texas Emergency Operations Center, Texas Commission on Environmental Quality, Public Works Response Team, Texas Rural Water, U.S. EPA, DHS and national WARN through the extended response period. Between August 23 and September 6, 2017, TXWARN responded to, or coordinated response and recovery requests for resources, assessment teams and recovery teams for over 50 utilities affected by Hurricane Harvey.

- FLAWARN – In September 2017, Hurricane Irma affected over 90% of Florida drinking water and wastewater utilities. Even though only 10% of utilities were able to assist, those utilities quickly stepped in and provided valuable assistance to utilities in need.

    - A call center was developed by the Florida Department of Environmental Protection (DEP) to determine the operational status of utilities across the state. This was a coordinated effort between DEP, the U.S. Army Corps of Engineers, U.S. EPA, DHS, Florida Rural Water Association (FRWA), FlaWARN, DEP district offices and local county health departments to determine what local resources were available to meet needs. This successful coordination is a direct result of the training and tabletop exercises that have taken place between these groups.

    - FlaWARN received over 130 requests for assistance and deployed generators, operators, electricians, bypass pumps, pumper trucks and other equipment. FlaWARN is fortunate that the State of Florida Department of Emergency Management (DEM) purchased 16 generators, and a bypass pump for use at utilities. FRWA maintains these generators, as well as another 17 generators and a by-pass pump owned by their Association.

    - The following is a testimonial from impacted FlaWARN member, Beth Johnssen, Director, Collier County Public Utilities, Inground Services Division
      "The value of FlaWARN system is incalculable. The teams that were deployed hit the ground running without additional training and education needed and they knew how to operate equipment safely and efficiently. The FlaWARN system has long been recognized by Collier County Public Utilities as a valuable resource who is there to help in a time of need. Our entire community is indebted to FlaWARN, the Agencies that responded and to those individual professionals who came to assist. They played a valuable role in reducing further damage to our environment and community."

- GAWARN – In September 2017, Hurricane Irma caused widespread power outages and flooding throughout Georgia. GAWARN and Georgia Rural Water were able to successfully respond to all utility impacts within the state, and did not need to request federal assistance for the water sector.

Florida Flood Resiliency Project. In 2015, EPA sponsored a project to help water utilities in the Florida Panhandle assess their flood risks, identify vulnerable utility assets and identify and fund mitigation opportunities. The project also focused on integrating these mitigation projects into local hazard mitigation plans. Examples of recommended mitigation projects included elevating instrument panels, creating a wall around influent headworks, reinforcing an embankment, and relocating a lift station. Three Florida utilities developed projects for flood mitigation and incorporated those projects into local mitigation plans and utility capital plans for funding.

Preparing Florida for Hurricane Response. For the last few years, EPA has been preparing water and wastewater utilities in Florida and in nearby states for hurricanes and flooding. The effectiveness of these efforts in Florida is summarized by two key partners in reference to the September 2017 Hurricane Irma response:

- Gary Williams, Executive Director of Florida Rural Water Association: "Currently, my staff are helping the water sector in Florida to respond and recover from Hurricane Irma. I just wanted to express my support to EPA's Water Security Division (WSD) who over the years have undertaken valuable efforts in Florida to prepare the water and wastewater sector for hurricanes and flooding. Our staff in the Florida Rural Water Association are better able to respond to Hurricane Irma because of past EPA efforts that have included a water emergency response functional exercise in 2015/2016, a regional flood resilience project in 2015, two trainings on EPA's Flood Resilience Guide in 2014, and multiple workshops on EPA's Fed FUNDs federal funding tool in 2013. Particularly useful was the functional exercise which practiced the response capability now being used during Hurricane Irma. We improved our coordination with the Emergency Operations Center, resource tracking, situational awareness, and mutual aid requests through Water/Wastewater Alert Notification System (WARN) and through Emergency Management Assistance Compact (EMAC). In fact, an EPA Region 4 workshop specifically on EMAC ultimately helped us activate EMAC during Hurricane Irma to bring utility teams from Tennessee, North Carolina, and South Carolina to repair water and wastewater systems in the Florida Keys."

- Carol Hinton, FlaWARN Administrator: "FlaWARN was greatly aided in its response to Irma by the various training and presentations that the EPA funded including:
  - Interstate Mutual Aid and Assistance Training in Atlanta Georgia in 2015
  - Functional Exercise in Ft Lauderdale in 2015
  - Session at the Governor's Health Conference in Orlando in 2016

  I would like to see more of this support offered around the country. As much as we train, we still see new needs arise and plenty of lessons learned."

EPA Regional Interstate Mutual Aid and Assistance Workshop Series. Starting in 2013, EPA has conducted a series of Interstate Mutual Aid and Assistance (MAA) workshops for EPA Regions 1 (June 2013); 2 and 3 (September 2014); 4 (September 2015); 10 (November 2016) and 5 (August 2017). The goal of the workshops was to bring together representatives from water utilities, Water/Wastewater Agency Response Networks (WARNs), state regulatory agencies and emergency management agencies in order to strengthen relationships and improve interstate MAA capabilities through state-level Emergency Management Assistance Compacts (EMACs). Lessons learned from the EPA Region 4 workshop were instrumental in exercising water sector EMAC requests between Florida and the states of Tennessee, North Carolina and South Carolina in the wake of Hurricane Irma in September 2017. This EMAC deployment included about 8-10 out-of-state water utility teams sent to storm-ravaged Florida Keys utilities to help restore water and wastewater services.

EPA Water and Emergency Services Coordination Workshop Series. Between April 2016 and September 2017, EPA has conducted nine workshops throughout the country to increase coordination and communication between drinking water and wastewater utilities and local and state emergency management agencies before, during, and after disasters. Workshop locations include: Lincoln, RI (April 2016), Orlando, FL (May 2016), Bordentown, NJ (June 2016), Richmond, VA (August 2016), Denver, CO (January 2017), Portland, OR (February 2016), Robertsdale, AL (July 2017), Wichita, KS (August 2017), and Raleigh, NC (September 2017).

- Michael Sprayberry, the Director/Deputy Homeland Security Advisor for North Carolina Emergency Management wrote the following about EPA's Water and Emergency Services Coordination Workshop that occurred in the state Emergency Operations Center (EOC) the day it was activated to prepare for potential impacts from Hurricane Irma:

  The timing of the workshop, so near to *Hurricane Irma* landfall, gave the topics a real time sense of urgency for most of the attendees. Again, we appreciate you and the EPA team for all of the work you put in to bringing this valuable training and networking opportunity to North Carolina."

EPA Water and Healthcare/Public Health (PH) Interdependencies Workshop Series. Since August 2016, EPA has held five Water and Healthcare/Public Health workshops throughout the country to enhance coordination, communication and collaboration between water utilities and the healthcare and public health sectors prior to, and during an event which can impact water supply. The workshop locations include: Atlanta, GA (August 2016), Hartford, Connecticut (September 2016), Cincinnati, OH (April 2017), Morgantown, WV (August 2017), Boston, MA (September 2017); with upcoming workshops in: Norristown, PA (September 2017) and Albany, NY (October 2017). Lessons learned from the Atlanta, Georgia workshop assisted with the response efforts of Hurricane Irma. The Norristown, Pennsylvania workshop was rescheduled from early September to late September to allow speakers and attendees of the workshop to deploy to Texas for Hurricane Harvey relief efforts.

EPA Water and Power Resilience Guide and Workshops: Since August 2013, EPA held nine Water and Power Resilience Workshops throughout the country to increase coordination between water utilities and their electric providers and to increase water utilities' resilience to power outages. These workshops were held in: Lorton, VA (August 2013), Sayreville, NJ (November 2013), Bethpage, NY (November 2013), Lore City, OH (April 2014), Oklahoma City, OK (May 2014), Hadley, MA (November 2014), Anaheim, CA (July 2015), Arlington, TX (September 2017), and Tempe, AZ (September 2017). In March 2016, EPA published the Power Resilience Guide to share key workshop findings and best practices with a larger audience. Feedback on the guide and workshop series include:

- Power Resilience Workshop Series: Julie Hunt, Assistant Regional Manager, Trinity Water Authority provided the following feedback regarding a workshop held in Texas less than three weeks after Hurricane Harvey made landfall:

  "Thank you very much for EPA's leadership in developing the Water and Energy Coordination workshop. Your leadership in developing this workshop, the topics and a table top exercise was

valuable. You were able to plan and execute an informative workshop for the region. The workshop provided the utilities that attended with relevant knowledge pertaining to the electrical grid in Texas, EPA air regulations related to generators and ideas for microgrids and other backup electrical supplies. The workshop promoted awareness in preparing for outage events.

By having both water utilities and energy providers in the room together for the tabletop exercise, we were able to have a great dialogue about how each utility responds during an outage. The dialogue definitely strengthened the local relationships between energy and water utilities as well.

There is real value to utilities to have opportunities to take time to attend workshops like this one- it will help us be more resilient when the next power outage occurs. Thank you."

- Diane VanDe Hei, Executive Director, Association of Metropolitan Water Agencies provided the following feedback on coordinating with EPA on the September 2017 workshops in Texas and Arizona:

  "It was a pleasure working with you on the energy resilience workshops last week in Texas and Arizona. AMWA, WaterISAC and our local member utilities appreciate having had the opportunity to participate.

  Several water and wastewater system attendees told us they most appreciated learning about the resilience investments and planning by other utilities - both during presentations and through networking. In our experience, peer-to-peer learning is invaluable, so it's not surprising that the utility staff found the workshops extremely useful.

  Being prepared for short-term and long-term power outages is a big challenge for the water sector, so we hope to see more workshops like these, and we would be happy to collaborate with you again."

Colorado Water Emergency Services Workshop. EPA conducted a workshop in January 2017 in Denver to increase coordination between the water and emergency services sectors. Approximately 100 individuals from utilities and state and local government water and emergency management agencies participated. As a direct result of the workshop, Colorado's Division of Homeland Security and Emergency Management decided to form a statewide Water Distribution Task Force to develop a plan for emergency water. Colorado currently does not have a plan or procedures in place addressing this important topic. Per Jeremey Utter, Logistics Section Chief for the Division, the workshop highlighted this important need and brought together all of the key players. He invited workshop participants to contact him to be a part of the task force.

Georgia Tabletop Exercise and Hurricane Matthew. In July 2016, EPA conducted a State Emergency Response Tabletop Exercise (TTX) in Atlanta, Georgia. Participants included federal, state and local agencies and drinking water and wastewater utilities. Three months later, the participants implemented the lessons learned from the exercise during the response to Hurricane Matthew. Following the response, Amy Rammo Kuhs, of Georgia Environmental Protection Division said "I do believe that having our TTX in July did have a big impact on the positive response that was able to be made to help those communities that were impacted by Hurricane Matthew. One of the key points of success in any type of emergency is the effectiveness of communication and coordination with all partners and stakeholders at the local and state level. Keeping one of our exercise action items in mind, I tried to reach and start my pre-landfall communications 4 days out and continued to do so until the day of…Without a doubt in my mind, I believe that our ESF3 Water Sector Exercise that you helped facilitate was definitely a positive learning tool that greatly benefited all that attended."

Mitigation Funding for North Carolina Following Hurricane Matthew. In the aftermath of severe floods in North Carolina from Hurricane Matthew in October 2016, EPA worked with the North Carolina Department of Environment (NCDEP) to develop cost estimates for implementing mitigation measures to reduce future flooding impacts at water and wastewater utilities. As a result of this coordinated effort, NCDEP received $4 million from the state for mitigation projects at six water utilities.

Emporia, Kansas Water Main Break and Incident Command System Training. At approximately 4 a.m. Thursday, July 20, 2017, a 20-inch water main break in Emporia, Kansas left 25,000 people without water while in the midst of an intense heat wave gripping the Midwest that saw temperatures soaring to 107°F. That same day, the Kansas Department of Health and Environment (KDHE) issued a boil water advisory for the public water supply of the city of Emporia; the advisory was lifted the morning of Sunday, July 23, 2017. A week prior to the main break, EPA held a 4-day Incident Command System (ICS) training for 20 KDHE staff. These EPA-sponsored trainings are specifically designed to enable more effective response within the ICS structure to water-related incidents, and proved both timely and highly beneficial for KDHE staff during the response. Commenting on the training, Cathy Tucker-Vogel, Section Chief of the KDHE Public Water Supply Section said: "The EPA-sponsored ICS training was invaluable for our recent response to the Emporia water main break. During the activation of the KDHE departmental operations center, our staff trained in ICS were much better prepared to coordinate emergency response operations, including the monitoring of repairs and flushing and disinfection actions. The ICS training was some of the best training that my staff have taken and proved its worth during this event."

Village of Cobleskill, New York Water Supply Protection Project. In the fall of 2012, just prior to Superstorm Sandy, EPA staff conducted training in the Village of Cobleskill for small water and wastewater utilities on flood resilience and obtaining mitigation funding. This included providing an overview of flood mitigation measures in EPA's Flood Resilience Guide, and outlining FEMA mitigation programs and procedures described in EPA's Fed FUNDS online tool. In 2016, FEMA announced a federal mitigation grant for $2,769,000 (100% Federal cost share) to the State of New York for a Cobleskill Water Supply Protection Project. This project, which is associated with the flooding impacts from Superstorm Sandy, includes reconstruction of existing spillway structures on the Dow and Smith reservoirs and construction of additional spillways to eliminate the risk of loss of water service.