J. ALAN ROBERSON

The middle-aged Safe Drinking Water Act

Forty years and numerous amendments and regulations later, the Safe Drinking Water Act is a paragon of legislative success; it will remain a vital piece of legislation as long as its dictates and processes keep pace with current needs.

This is an important year for the drinking water community as it is the 40th anniversary of the Safe Drinking Water Act (SDWA). For some people, 40 is the start of middle age. Although I am many years past that birthday myself, I still consider myself middle-aged (some might want to debate that point). At 40, many people start looking back at their lives and taking stock; 2014 offers the opportunity for the drinking water community to take a look back at the SDWA and reflect on past successes and ponder future challenges.

The main players in the regulatory development process—which I consider to be the US Environmental Protection Agency (USEPA), the state primacy agencies, and the water systems—have all been very busy with the development and implementation of national regulations during the past 40 years that have resulted in increased public health protection. For the context of this article, I am not examining the changes to the initial regulatory development process resulting from the 1974 SDWA. Rather, I am going to focus on what has happened with the national drinking water regulations between 1974 and 2014.

Between 1975 and 2013, USEPA published 19 National Primary Drinking Water Regulations that addressed 91 contaminants (USEPA, 2001). Table 1 lists the 19 regulations finalized from 1975 to 2013 in chronological order. The number of regulated contaminants has increased from 22 in 1975 to 91 in 2000, and remains at 91 today, as shown in Figure 1. It should be noted that although no new contaminants have been regulated since 2000, several regulations have been revised, such as the Revised Total Coliform Rule (RTCR) in 2013 (78 FR 10269), and/or strengthened, such as the arsenic regulation in 2001 (66 FR 6975) and the Stage 2 Disinfection By-Products Rule (DBPR) in 2006 (71 FR 388).

THE THREE-ACT PLAY

I look at this time frame (1975–2014) in the regulatory development process as being similar to a three-act play that matches up with the SDWA reauthorizations in 1986 and 1996. The first act (1974–1986) started with the first set of National Interim Primary Drinking Water Regulations in 1975 that translated the 1962 US Public Health Service guidelines into national standards for 22 contaminants. Another article in this issue by Kimm et al details the challenges to USEPA in "spinning up" its regulatory development program after the 1974 SDWA.

To me, the focus of the second act (1986–1996) was on USEPA always being behind in its regulatory deadlines but still publishing several regulations that resulted in a large increase in the number of regulated contaminants from 23 to 83. The 1986 SDWA Amendments placed the USEPA on a regulatory treadmill with requirements to regulate a specific list of 83 contaminants in the first five years and then 25 new contaminants every three years thereafter. On the basis of these statutory requirements, the number of regulated contaminants would have exceeded 300 in 2014. By 1996, everyone recognized that this process for regulating new contaminants was absurd.

Two regulations in this time frame were primarily responsible for the large increase in the number of regulated contaminants and warrant some additional discussion. The Phase II Regulation in 2001 set national standards for 38 organic and inorganic chemicals and also established the standardized monitoring framework for quarterly sampling (generally) for chemical contaminants and monitoring waivers on 3-, 6-, or 9-year time frames. In the following year, the Phase V Regulation set standards for 23 organic and inorganic chemicals. From my point of view, these standards are relatively simple to follow. A water system takes quarterly samples (if that is the appropriate monitoring requirement), averages the concentration from all of the samples, and compares the average to the standard—a relatively simple comparison. This simple comparison will be contrasted to standards in the third act.

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I have worked in AWWA's D.C. office for the third act (1996–2014), and it's been a whirlwind from the regulatory development perspective. Although the number of regulated contaminants has increased by only eight (from 83 to 91), USEPA finalized 10 national regulations in the third act, as opposed to nine national regulations in the first two acts. So the third act has been very busy from the regulatory development perspective.

Additionally, the drinking water community has gone through three negotiated rulemakings/Federal Advisory Committee

(FACA) processes for the Microbial/Disinfection By-Product (M/DBP Cluster) as well as one FACA process for the Revised Total Coliform Rule (RTCR). If you have not participated in one of these negotiations, the number of hours spent in conference rooms by the negotiators, as well as in the Technical Working Group, is staggering. But time and resources are needed to debate the technical and policy issues for these complex regulations. My first article in JOURNAL AWWA summarized the technical and policy debates that went into the numbers for the Stage 1 DBP Rule (Roberson et al, 1995). Most important, each one of the negotiations has resulted in agreements that have served as the foundations for complex regulations that were supported by all parties. It's not likely that USEPA could have reached the same consensus from the various drinking water stakeholders through its typical proposal/take public comments/final regulatory development process. Collaborative efforts have been critical for the development of these complex regulations.

Working groups under the National Drinking Water Advisory Council (NDWAC) have provided another avenue for USEPA to solicit input on specific regulatory actions since the 1996 SDWA (USEPA, 2014). In the years following the 1996 SDWA, 18 NDWAC Working Groups provided input on a variety of topics ranging from Consumer Confidence Reports (CCRs) to operator certification to compliance of small systems. A more recent NDWAC Working Group effort focused on providing recommendations for water systems to become "climate ready" (USEPA, 2011).

A new NDWAC Working Group has been established to provide input on the Long-Term Revisions to the Lead and Copper Rule (LCR). The LCR is certainly one of the more complex regulations, and several complex issues such as lead service line replacement, sample site selection, and sampling protocols will need to be addressed. On March 25–26, 2014, the first meeting of the Lead and Copper Rule Working Group (LCRWG) focused on potential revisions associated with Optimized Corrosion Control Treatment (OCCT). LCRWG meetings are anticipated to continue through early 2015, and then USEPA will make its internal decisions on the proposed revisions.

From my point of view, many of the third-act regulations are more complex regulations. Contaminants such as arsenic and radium are "harder to treat" (i.e., more advanced treatment such as ion exchange, specialized adsorbents, or coagulation/microfiltration is needed to remove these contaminants). Advanced treatment is more capital-intensive and typically has higher operation and maintenance costs. A higher classification of operator is required for the advanced treatment. In

TABLE 1 National Primary Drinking Water Regulations

Year	Rule	Reference
1975	National Interim Primary Drinking Water Regulations	40 FR 59566
1979	Total Trihalomethanes (TTHM)	44 FR 68624
1986	Fluoride	51 FR 11396
1987	Phase I Volatile Organic Chemicals (VOCs)	52 FR 25690
1989	Surface Water Treatment Rule (SWTR)	54 FR 27486
1989	Total Coliform Rule (TCR)	54 FR 27544
1991	Phase II Synthetic Organic Chemicals (SOCs) and Inorganic Chemicals (IOCs)	56 FR 3526
1991	Lead and Copper Rule (LCR)	56 FR 26460
1992	Phase V SOCs and IOCs	57 FR 31776
1998	Stage 1 Disinfection By-Products Rule (DBPR)	63 FR 69389
1998	Interim Enhanced Surface Water Treatment Rule (IESWTR)	63 FR 69477
2000	Radionuclides	65 FR 76707
2001	Arsenic	66 FR 6975
2001	Filter Backwash Recycling Rule (FBRR)	66 FR 31085
2002	Long-Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR)	67 FR 1844
2006	Stage 2 Disinfection By-Products Rule (DBPR)	71 FR 387
2006	Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)	71 FR 653
2006	Groundwater Rule (GWR)	71 FR 65573
2013	Revised Total Coliform Rule (RTCR)	78 FR 10269

some cases, the residuals from these treatment processes present some disposal challenges. These regulations also have more complex treatment techniques, such as individual filter turbidimeters, filter ripening requirements, and additional treatment requirements (i.e., the treatment "bins" for *Cryptosporidium*).

BIG SUCCESSES IN THE PAST

The first 40 years of the SDWA have resulted in big successes from the regulatory perspective. Protection from microbial contaminants has been increased from many perspectives. In 1989, the Surface Water Treatment Rule (SWTR) established removal and inactivation requirements for *Giardia lamblia*, and inactivation requirements for viruses (54 FR 27486). Disinfectant residual requirements were also set in the SWTR, at the same time compliance samples are taken for the Total Coliform Rule (TCR). The TCR provided for microbial protection in the distribution system and established a microbial monitoring framework based on system size (54 FR 27544). Filtration has been installed in several hundred systems that were previously unfiltered (noting that several systems are still unfiltered for system-specific reasons). Groundwaters that need disinfection are now required to disinfect under the Groundwater Rule (GWR, 71 FR 65573).

The TCR has been revised twice. The first revision in 1989 shifted from a density compliance determination to presence/absence (54 FR 27544). The second revision in 2013 eliminated the total coliform maximum contaminant level and shifted to a treatment technique with a find-and-fix approach for potential problems in the distribution system (78 FR 10269).

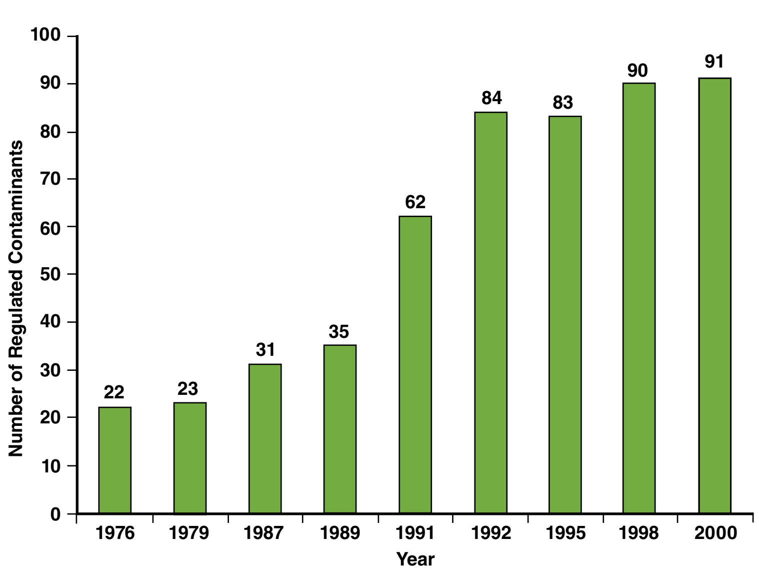
Protection from chemical contaminants has also increased. In 2001, the arsenic regulation was decreased by a factor of five, from 50 to 10 µg/L (66 FR 6975). Standards have been set for commonly used herbicides such as atrazine and glyphosate, as well as for nitrate and nitrite from agricultural activities. Standards have been set for a whole host of industrial chemicals such as trichloroethylene and tetrachloroethylene, as well as several volatile organic compounds (VOCs) such as vinyl chloride. Corrosion control has been optimized through the LCR to reduce consumers' exposure to lead from drinking water.

From my own point of view, the pairing of M/DBP cluster of regulations—i.e., publishing a DBP control regulation at the same time as a microbial control regulation—has provided significant increases in public health protection (because most water systems produce DBPs) while maintaining microbial protection. The benchmarking and profiling provisions of these regulations maintained microbial protection, whereas water systems made the treatment adjustments necessary to comply with the DBP regulations. Under a risk-based regulatory framework, systems with high levels of *Cryptosporidium* are now required to install additional treatment or use one of the other tools in the compliance toolbox in the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR, 71 FR 653).

Exposure to DBPs has been significantly reduced, and that's a big success since most water systems disinfect, and therefore, produce DBPs. Going back before the Total Trihalomethane (TTHM) Rule, data from finished drinking water samples collected between 1975 and 1976 had a mean national TTHM level of 68 µg/L and a 90th percentile value of 150 µg/L (McGuire et al, 2002). Approximately 20 years later, during the 1997–1998 Information Collection Rule (ICR, 61 FR 24354), those values had dropped to a mean of 28 µg/L and a 90th percentile of 60 µg/L, a reduction of approximately 60%.

These reductions were prior to the Stage 1 DBPR (63 FR 69389), which further reduced DBP concentrations. Concentrations for TTHMs and five of the haloacetic acids (HAA5) decreased from pre-Stage 1 to post-Stage 1 for both surface water and groundwater (USEPA, 2005). For surface water plants, average TTHM values decreased from 42.3 to 35.0 µg/L (approximately 17%) and average HAA5 values decreased from 29.1 to 22.5 µg/L (approximately 23%). It should be noted that these TTHM values are different from the ICR TTHM values discussed previously, as the ICR applied only to systems serving more than 100,000 people whereas the Stage 1 DBPR applied to all systems that provided disinfection. For groundwater plants, the decrease in DBP values was less substantial because of a lower percentage of plants changing their treatment technology. Still, average TTHM concentrations decreased from 15.4 to 13.2 µg/L (approximately 14%) and HAA5 decreased from 8.5 to 7.0 µg/L (approximately 18%). The Stage 2 DBPR (71 FR 387) provided for equity across the distribution system through the locational running annual average (LRAA) for compliance.

FIGURE 1 Number of regulated contaminants



25 VERSUS 40

Back in the day when I was 25, I was full of vim and vigor. For the SDWA, the 25th anniversary was in 1999, three years after the 1996 SDWA, and the drinking water community was full of vim and vigor. USEPA and the drinking water community were extremely busy between 1996 and 1999, and several important regulatory actions were completed in this time frame to meet new mandates from the 1996 SDWA.

For USEPA and the state primacy agencies, the drinking water state revolving loan fund was established to provide additional funding. USEPA developed requirements for the states' operator certification programs as well as for state primacy "capacity development" programs. States developed source water assessment programs, and the initial assessments were conducted by either the states or the water systems.

For providing drinking water information to the public, USEPA developed the regulation for consumer confidence reports in 1998 (63 FR 44512). Water systems got used to the requirements for developing and sending these annual reports to their customers. For identifying new contaminants for potential regulation, USEPA released the first Contaminant Candidate List (CCL1) in 1998 with 60 contaminants (63 FR 10274).To close out 1998, USEPA also published the first pair of regulations from the M/DBP Cluster: the Stage 1 DBPR (63 FR 69389) and the Interim Enhanced Surface Water Treatment Rule (63 FR 69477).

At 40, one slows down, maybe loses a step, possibly becomes crankier, and potentially starts down the road of turning into a full curmudgeon. And that is happening somewhat with the SDWA. While the current regulatory development process is full of lots of regulatory actions in the pipeline, in reality, no new contaminants have been regulated under the contaminant identification process mandated by the 1996 SDWA. One could argue that perchlorate is going to be regulated in the future, as an off-cycle positive regulatory determination was made for perchlorate in February 2011. However, from my point of view, perchlorate has been on the regulatory radar screen for at least a decade. It should be also noted that USEPA missed its proposal deadline of February 2013. A proposed perchlorate rule continues to be delayed for the necessary health effects modeling, and the cost–benefit analysis for a perchlorate regulation continues to be debated. The fact that occurrence of perchlorate is not widespread in the United States has contributed to the lack of urgency. The perchlorate regulation is presently in a bit of quagmire.

The current regulatory output from USEPA reminds me of how I look when I try to run around a track (and it's not a pretty picture anymore). While I am not a proponent of developing regulations for the sake of regulation, but the current regulatory development process needs to be optimized so that we can identify contaminants with adverse health effects that we can all believe and that occur in public water systems near the level of health concern, and where regulating at a national level can make a real difference. If anyone reading that last sentence recognizes the words, I am paraphrasing Section 1412(b)(1)(A) of the SDWA for identification of contaminants, noting that the decision that a national regulation provides a "meaningful opportunity for risk reduction" is the sole judgment of the USEPA Administrator. We have the appropriate words in the law—we just need to make it happen in a way that works for all of the stakeholders in the drinking water community.

FUTURE SUCCESSES WILL BE CHALLENGING

Anyone in the drinking water community can feel pretty good about the first 40 years of the SDWA given all of the successes previously discussed. However, as the SDWA enters middle age, maintaining the same level of success in the future will be challenging. From my point of view, we need to carefully think about five issues for the future:

- Funding
- The regulatory development process
- Distribution systems and premise plumbing
- Data
- Preparedness

Funding. Just about everyone in the drinking water community has limited resources:

- USEPA—for research and program implementation
- State primacy agencies—for program implementation
- Water systems—for compliance with the regulations and for everything that needs to be done to produce and deliver safe drinking water 24/7/365

> It's not likely that USEPA could have reached the same consensus from the various drinking water stakeholders through its typical proposal/take public comments/final regulatory development process.

Money in the drinking water community follows the national economy, and the last few years have not been pretty. USEPA has seen continued budget cuts, and many states have faced budget cuts, pay cuts, and/or furloughs. Water systems have had to contend with decreased revenues from lower tap fees and water sales, both from the recent recession and from decreasing per capita demand. The economy is doing slightly better now, but from a revenue perspective, we are not going to see the go-go days of the past in the foreseeable future.

At the same time, because of the economic conditions, many water systems had their rates frozen or were able to pass only minimal rate increases. Some water systems have been able to pass consistent rate increases, but what is going to be the long-term consumer acceptance of higher rates? In most systems, the wastewater charges also appear on the water bill, and for many systems, the increases in wastewater rates has been higher than for water because of new nutrient regulations and other wastewater regulations. But from the customers' perspective, it's all the same bill.

Finally, water system managers and their governing boards are going to have to develop a more complete understanding of the treatment costs for compliance versus the need for increased infrastructure spending. Previous research estimated the total compliance costs from all of the drinking water regulations to be approximately $4.5 billion per year in 2008 dollars (Reiling et al, 2009). This is a little more than 11% of AWWA's estimated national infrastructure replacement needs of approximately $40 billion per year (WUC, 2012). It should be noted that these are national aggregate numbers and do not necessarily reflect the challenges at the local level such as a groundwater system having to install arsenic treatment at multiple wells. However, difficult decisions will have to be made in the future to address these competing priorities for system managers and for boards and elected officials.

The regulatory development process. Finding the appropriate contaminants to regulate and meet the SDWA requirements is becoming more difficult. The low-hanging fruit from the regulatory perspective has already been regulated in the first three acts of the SDWA. Since the 1996 SDWA Amendments, USEPA has finalized three Contaminant Candidate Lists (CCLs) as the starting point in the process for identifying new contaminants for potential regulation. USEPA has completed two cycles of regulatory determinations from CCLs, and has decided to not regulate 20 contaminants because a national regulation would not have provided "a meaningful opportunity for risk reduction" as required by the SDWA (68 FR 42897, 73 FR 44251). Several of these contaminants were found to have zero or minimal occurrence in the Unregulated Contaminant Monitoring Rules (UCMRs; Roberson & Eaton, 2014).

A negative regulatory determination is as much of a success as a positive. At one point these contaminants were of potential concern, so they were listed on the CCL. If occurrence data were needed, then those contaminants were listed on the UCMRs. Then, based on zero or minimal UCMR occurrence, or for other reasons, USEPA decided that regulating these contaminants did not meet the SDWA criteria.

Clearly the regulatory development process needs some optimization. I am not exactly sure how to accomplish that, but we need a better process. The end result might be future CCLs with a smaller number of contaminants than the 116 listed on the Third Contaminant Candidate List (CCL3, 74 FR 51850). Future UCMRs might be more targeted so that we don't end up with lots of nondetects or an increased percentage of detections through lower reporting limits that are nowhere near the same range of potential health concern. The drinking water community needs to become more involved in the details of the regulatory development process, from identifying contaminants for future CCLs and UCMRs to developing a better understanding of what should be regulated and what should not be regulated, recognizing that that final decision rests with the USEPA Administrator. At some point in the future, I would be thrilled if the drinking water community could go to USEPA and say, "Contaminant *x* should be regulated, and here's why."

On the back end of the regulatory process, national compliance has to improve. For many years, national compliance has varied between 92 and 94%, and I think that's a shame. Would you accept a car that did not start one time out of 20 (95% of the time)? Why is this percentage acceptable for the drinking water community? Many systems need all types of assistance (technical, financial, and managerial), and the drinking water community needs to pull together to provide the assistance that is needed to bring water systems back into compliance. One day we might have a national goal of 99% or 99.99% compliance with all of the drinking water regulations.

Distribution systems and premise plumbing. The drinking water community has invested a whole lot of time and money on the regulatory development process for regulations that are primarily focused on the entry point to the distribution system. So, do we need a distribution-system rule in the future? Maybe, but maybe not—it's difficult to evaluate the regulatory need and any potential risk reduction from such a regulation at this time. More research is definitely needed to determine what the remaining risks are and what regulatory actions might be taken for the distribution system that might provide "a meaningful opportunity for risk reduction" as required by the SDWA.

Two distribution systems on the current regulatory radar are storage tanks and disinfectant residuals. Should water systems be required to have a storage tank operation and maintenance plan that has system-specific time frames? USEPA is starting an informal stakeholder dialogue on storage tanks, but more work is needed to determine an appropriate regulatory or nonregulatory approach that would result in risk reduction without creating an undue burden to water systems and/or state primacy agencies.

Should disinfectant residual requirements be a specific number as opposed to the current detectable residual? The State of Louisiana Department of Health and Hospitals recently enacted an emergency rule to require a disinfectant residual of 0.5 mg/L to address *Naegleria fowleri* (Department of Health and Hospitals, 2013). Other states are considering similar revisions (possibly to a different number) to their own disinfectant residual requirements. Maybe it's time for a retrospective analysis of disinfectant residual requirements (the current requirements date back to 1989) to consider if any revisions are necessary to continue to provide public health protection in the distribution system.

Finally, premise plumbing is an issue that is growing in importance, primarily because of illnesses and deaths from *Legionella*. The Centers for Disease Control and Prevention found that during 2000–2009, the 50 states and the District of Columbia reported 22,418 cases of legionellosis through the National Notifiable Disease Surveillance System (CDC, 2011). Because this system is a passive reporting system, the national incidence is likely higher. The number of cases is high enough that the drinking water community needs to do something—but what?

Technically and legally, premise plumbing is the responsibility of the building owner, not the water system. Typically the water system's responsibility ends at the meter or the curb stop. But given the sobering statistics, water systems need to work with the building owners to ensure that they know how to maintain water quality from the meter to the tap. Building owners also need to understand the regulatory implications such as monitoring and operator certification when adding a secondary disinfection system within their building. This is an important public health issue that needs to be addressed by the drinking water community, including the building owners.

For the SDWA, the 25th anniversary was in 1999, three years after the 1996 SDWA, and the drinking water community was full of vim and vigor.

Data. The drinking water community needs better data from several perspectives, including health effects data. Right now the drinking water community seems to be chasing smaller and smaller risks in drinking water. Are we at the margins of science for future regulations providing a "meaningful opportunity for risk reduction" as required by the SDWA (noting that that decision is the sole judgment of the USEPA Administrator)? This uncertainty makes it more challenging to explain rate increases to customers when additional treatment is needed for compliance with regulations when the underlying science is debatable at best.

Hexavalent chromium, at least in California, is one example of a contaminant about which the health effects debate continues while the California standard is being implemented and many California water systems are installing treatment. At the California proposed final regulation of 10 µg/L, the estimated annual compliance cost in California ranges from 0.3 to $0.5 billion per year (Seidel et al, 2013). At the same standard nationally, the estimated compliance cost is 0.6–$5.1 billion per year. It should be noted that the high end of this range is larger than the combined cost of all of the 19 drinking water regulations previously discussed. A legitimate debate on the health effects data is ongoing, and more health effects research is needed before a national hexavalent chromium rule is developed (AWWA, 2014).

The data needs are not just for potential adverse health effects. Optimizing the collection of occurrence data is needed to optimize the regulatory development process. The Unregulated Contaminant Monitoring Rule (UCMR) provides a regulatory mechanism for collecting robust national occurrence data, but at a significant national cost compared with the large number of nondetects (Roberson & Eaton, 2014). Targeted surveys might provide the relevant regulatory information at a much lower cost than listing a contaminant on future UCMRs. Additionally, the collection of more general water quality and treatment data such as pH and alkalinity at the same time as the UCMR sample collection would provide some critical information for the regulatory development process.

Preparedness. In the drinking water community, preparedness is typically considered from the security and disaster preparedness perspective. Even with the completion of the regulatory requirements for vulnerability assessments almost a decade ago, water systems need to continue to be vigilant with their physical security and cybersecurity.

But the recent incidents in Charleston, W. Va., and Lynchburg, Va., are just two examples of the variety of threats and hazards that water systems need to continually consider. These two threats were quite different—a leaking above-ground storage tank and a train derailment. Additional threats such as accidents on pipelines and highways can also affect a water system's source water. And this is not even considering potential impacts from weather events such as hurricanes, tornadoes, flooding, and ice storms. Add other events such as wildfires, human error, and mechanical failures, and the potential impacts from climate change, and the list of threat and hazards is a long one.

The preparedness perspective is also part of long-term water supply planning and demand forecasting. Decreasing per capita demand has been affecting water systems since the passage of the Energy Policy Act of 1992 (PL 102-486) and the increased penetration of low-flow plumbing fixtures into the marketplace. From a water supply perspective, water systems are considering a wide variety of new strategies ranging from Loudoun Water (Va.) using old quarries for water storage to Wichita Falls (Texas) using direct potable reuse for a portion of its supply (Loudoun Water, 2014; *Star-Telegram,* 2014). Southern Nevada Water Authority (SNWA) is moving toward building more than 200 miles of

How do we bridge the gap between increasingly complex water-related challenges and innovative, reliable solutions? It starts with knowledge of regulations, research, technologies, tools, and trends in the water industry. Over the last century, Journal AWWA has been a cornerstone of the peer-reviewed knowledge base so vital to that first step, thereby helping water professionals across the globe ensure the next generation of water supply. Cheers to the Journal for 100 years of critical service to the industry!
—Jess Brown, R&D Practice Director, Carollo Engineers

transmission mains to bring groundwater from central and eastern Nevada to southern Nevada (SNWA, 2014). Clearly the highest quality sources that were closest to the water systems are already being used, and water systems are now considering more distant water sources and lower-quality sources in their long-term water supply planning.

Water systems need to consider a variety of threats and hazards, and develop plans to mitigate impacts to the system and/or mitigate the consequences. Understanding how a water system should appropriately address potentially multiple low-probability, high-consequence events is not simple. Drinking water systems need a systematic approach to identify the threats and hazards that are applicable for their own system, and to plan how to mitigate them. Preparedness should be considered as part of a water system's overall risk management for numerous risks, including the more traditional financial risks.

Collaborations. Collaborations are the key for solving the challenges facing the drinking water community as the SDWA approaches middle age in order to maintain or increase public health protection. The challenges in determining the appropriate contaminants to regulate or in developing nonregulatory solutions in an economic- and resources-limited environment warrant collaborative solutions. Collaborations have worked in the past with the complex regulations in the M/DBP Cluster and the RTCR and can work again the future. The drinking water community needs to pull together for an active and happy middle-aged SDWA.

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