

Celebrating the Safe Drinking Water Act's 40th Anniversary and Recognition of the Challenges Ahead

Originally enacted into law in 1974 by President Gerald Ford, the US EPA's *Safe Drinking Water*

Act (SDWA) recently hit the 40th anniversary mark. The *SDWA* was promulgated only four years after President Richard Nixon formed the US EPA and initiated the *Water Quality Improvement Act*, focused primarily on water pollution restrictions and oil discharge. Prompted by numerous media reports of foul odor, disease-causing microbes and cancer-causing chemicals in drinking water supplies, the *SDWA* added regulatory context, order and accountability to the treatment of municipal water.

Triumphs and trials

Since the early 1900s, the water treatment industry has celebrated many successes. The addition of chlorination in Chicago, IL and Jersey City, NJ waterworks in 1908 dramatically reduced the incidence of cholera, dysentery, typhoid and other epidemic waterborne diseases and is considered one of the 10 greatest public health achievements of the 20th century.¹ In the decades that followed, the need for a multi-barrier approach to drinking water treatment was recognized. Beyond chlorination and other water treatment practices, protection of drinking water sources and secure delivery to consumers were additional critical control points for ensuring water quality.

In addition to the triumphs in water quality, there have also been numerous challenges. Emerging hazards (i.e., endocrine disruptors) continue to challenge the most advanced treatment works as do resistant pathogens (chlorine-resistant *Cryptosporidium* and UV-resistant adenovirus). Effective treatment may be complicated by the creation of potentially harmful DBPs and trihalomethanes. Increased population vulnerability (elderly, young, chronically ill, terror threats, etc.) and changing ecosystems (extreme precipitation events, drought) increase the unpredictability of waterborne outbreaks and lead to supply deficiencies.

SDWA timeline

Throughout the 70s, 80s and 90s, the *SDWA* achieved several major milestones. In 1986, President Ronald Reagan signed an amendment to the *SDWA* into law. In general, this amendment called for increased regulation of more than a hundred drinking water contaminants and increased US EPA's authority to enforce the law with civil and criminal penalties for violators. Needs for surface water filtration, groundwater disinfection, lead prohibition and increased contaminant monitoring were also highlighted. In 1996, additional amendments were signed into law by President Bill Clinton and focused on reducing DBPs, protecting source water, training operators and updating infrastructure.

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In 1998, the *Stage 1 DBP Rule* mandated the use of coagulants in water treatment to reduce natural organic matter that reacts

with chlorine disinfectants to produce DBPs. Soon after, the *Stage 2 DBP Rule* was promulgated, focused on reduction of DBPs in the water distribution system. In addition, efforts to improve surface water treatment to reduce the risk of protozoan pathogens were also advanced on the heels of the largest US waterborne outbreak ever recorded, in Milwaukee, WI. Eventually, regulation of contaminants such as radionuclides, arsenic and fluoride followed, increasing consumer confidence in the quality of the municipal drinking water supply.

Improved communication, training and support

Along with *SDWA* amendments in the 90s evolved a new level of community involvement and transparency about water quality and treatment challenges. Water quality data would now be publically available on the Internet and also sent in the form of *Consumer Confidence Reports* directly to homes as addendums to water utility bills.

Source water protection was again in the forefront.² The *SDWA* required that all states track available source waters, identify major sources of contamination and assess potential population risks. (These assessments are available in public databases so that all stakeholders can engage in source-water protection and help to prioritize collective action.)

In 1999, mandate of an operator certification program establishing minimum standards for certifying, or recertifying, operators of public water systems was issued. Although these programs are implemented through individual states, consistency to the standard guidelines was provided by US EPA and published in the *Federal Register*. Utilities were given two years for implementation before noncompliance penalties ensued.³

With over 160,000 municipal water utilities in the US, serving an estimated 297 million customers, building new or replacing old facility infrastructure is better supported. The 1996 amendments established funding resources for infrastructure improvements, known as the *Drinking Water State Revolving Fund (DWSRF)*. This program was especially useful for smaller public utilities where budgets for quality improvements could not be easily absorbed.

Constant resolve

One of the major accomplishments of the *SDWA* to celebrate is the initiative to never be complacent about the possibility of water contamination and risks. In an effort to continuously assess current and emerging drinking water threats, the *Contaminant Candidate List (CCL)* identifies unregulated priority contaminants for regulatory consideration. Currently, US EPA regulates more than 90 contaminants. As directed by the *SDWA*, a *CCL* is

published approximately every five years, beginning with *CCL1* in 1998, which listed 60 priority contaminants for consideration; *CCL2*, listed 51 contaminants in 2005; and *CCL3*, published in 2009, included 116 contaminants.⁴ Inclusion on the *CCL* does not guarantee regulation but rather assists in prioritizing contaminants of interest.

Under the *SDWA*, at least five *CCL* contaminants must be considered for regulatory consideration. While not all considered contaminants result in an actionable standard, advances in information collection or research of the contaminants are beneficial. From *CCL1* and *CCL2*, nine and 11 contaminants were considered but no regulatory action was determined appropriate or necessary. In 2011, however, US EPA made a positive regulatory determination on perchlorate, a naturally occurring and anthropogenic chemical used in rocket fuel and explosives manufacturing that is suspected of disrupting human growth hormone production.

Recently, the draft *CCL4* was available online for public review and comment. Building on the final *CCL3*, two additional contaminants were added (manganese and nonylphenol); four were removed due to their absence or infrequent occurrence in water and previous determinations not to regulate (1,3-dinitrobenzene, dimethoate, terbufos and terbufos sulfone). Only one contaminant (strontium) was determined to occur frequently in drinking water and possibly pose a health effect in humans, particularly children and those deficient in calcium.⁵ Therefore, strontium, a naturally occurring and industrial waste chemical, is moving toward a positive regulatory determination.

Challenges ahead

Challenges to provide safe water supply in the developed and developing world remain. Although the *SDWA* targets hundreds of potential water hazards, tens of thousands of manufactured chemicals have uncertain risk profiles. Billions of people worldwide lack access to safe drinking water and hundreds of thousands die each year from exposure to drinking

water hazards.⁶ Vigilance in proactively identifying new hazards and developing cost-effective, innovative solutions is imperative in our next 40 years. Education and cooperative engagement among consumers, municipalities and the POU industry is essential as we face new, emerging challenges and acknowledge that not one solution solves every problem.

References

1. CDC, "A Century of U.S. Water Chlorination and Treatment: One of the Ten Greatest Public Health Achievements of the 20th Century," *Morbidity and Mortality Weekly Report*, vol. 48, no. 29, pp. 621-629, 1999.
2. US EPA, *Water: Safe Drinking Water Act*, 13 September 2013. [Online]. Available: <http://water.epa.gov/lawsregs/guidance/sdwa/basicinformation.cfm>. [Accessed 16 February 2015].
3. US EPA, "Final guidelines for the certification and recertification of the operators of community and nontransient noncommunity public water systems," *Federal Register*, vol. 64, no. 24, pp. 5916-5921, February 5, 1999.
4. US EPA, *Fact Sheet: Preliminary Regulatory Determinations for the Third Drinking Water Contaminant Candidate List (CCL3)*. October 2014. [Online]. Available: www2.epa.gov/sites/production/files/2014-10/documents/epa815f14001.pdf. [Accessed 13 February 2015].
5. US EPA, "Fact Sheet: Drinking Water Contaminant Candidate List 4- Draft," *EPA 815-F-15-001*, January 2015. [Online]. Available: www2.epa.gov/sites/production/files/2015-02/documents/epa815f15001.pdf. [Accessed 13 February 2015].
6. WHO, *Water Fact Sheet #391*, July 2014. [Online]. Available: www.who.int/mediacentre/factsheets/fs391/en/. [Accessed 16 February 2015].

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