CLEAN DRINKING WATER: A STREAM OF SUCCESS AND OPPORTUNITY FOR REFORM

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I. INTRODUCTION

Forty-five years ago, Congress passed the first version of the Safe Drinking Water Act[1] (SDWA or Act). In passing the Act, Congress provided a set of comprehensive rules to govern the quality of the drinking water being provided by public water systems (PWSs) across the nation. As originally enacted, the SDWA defined a "public water system" as a system that provided drinking water to at least twenty-five people or fifteen service connections for a minimum of sixty days per year.[2] Previous regulations had been limited to water supplied to and on interstate carriers, vastly restricting the scope of regulated waters.[3]

In order to achieve safe drinking water, the principle mechanism adopted was defining enforceable standards for acceptable water quality.[4] The U.S. Environmental Protection Agency (EPA) was designated the authority to set those standards, called maximum contaminant levels (MCLs).[5] The primary federal responsibility was to establish the MCLs and other guidelines to serve as baseline measures for both state governments and the water suppliers.[6]

The Act continues to regulate numerous systems today, helping to ensure that communities have clean drinking water. According to a Congressional Research Report released in March 2017, the SDWA applies to about 152,700 water systems.[7]

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[1] Safe Drinking Water Act, 42 U.S.C. §§ 300f–j-9 (Suppl. IV 1974) (current version at 42 U.S.C. §§ 300f–j-27 (2018)).

[2] U.S. ENVTL. PROT. AGENCY, 25 YEARS OF THE SAFE DRINKING WATER ACT: HISTORY AND TRENDS 3 (1999) [hereinafter SDWA HISTORY & TRENDS], https://nepis.epa.gov [https://perma.cc/2GQD-392A] (search "866R99007").

[3] *See* William E. Cox, *Evolution of the Safe Drinking Water Act: A Search for Effective Quality Assurance Strategies and Workable Concepts of Federalism*, 21 WM. & MARY ENVTL. L. & POL'Y REV. 69, 70 (1997).

[4] 42 U.S.C. § 300g-1 (Supp. IV 1974). For purposes of the SDWA, the EPA was defined as the "Administrator" in 42 U.S.C. § 300f(7) (Supp. IV 1974).

[5] *Id.* § 300g-1(b).

[6] *See* Cox, *supra* note 3, at 70.

[7] MARY TIEMANN, CONGRESSIONAL RESEARCH SERV., SAFE DRINKING WATER ACT (SDWA): A SUMMARY OF THE ACT AND ITS MAJOR REQUIREMENTS 3 (2017), https://fas.org/sgp/crs/misc/RL31243.pdf [https://perma.cc/FB7Z-BMAM] [hereinafter SDWA SUMMARY].

Approximately 51,000 of these are community water systems that benefit the same residences all year.[8] These PWSs provide water to close to 300 million people, and all federal regulations are applicable.[9] Over 18,000 PWSs are non-transient, non-community water systems, generally serving the same people for more than six months out of the year, but not year-round.[10] The majority of federal regulations apply to these water systems.[11] Lastly, nearly 83,200 other PWSs are transient, non-community water systems, providing their own water to transitory customers, such as rest stops, gas stations, and campgrounds.[12] The only applicable regulations are for those pollutants that pose immediate health risks.[13]

While the Act has come a long way since its inception, through regulating more contaminants and providing additional mechanisms to ensure proper water quality, it is still flawed. This Note will first examine the history of the SDWA, from the first enactment in 1974 to the current version of the statute, highlighting the major amendments of 1986, 1996, and 2016. Part III will examine some of the key successes that have come from the Act and its amendments. Part IV will examine two instances where the Act still falls short, focusing on the water crisis in Flint, Michigan and the exemption for oil and gas well operations. Finally, this Note will offer some suggestions on how to address the shortcomings—specifically, the Act should (i) mandate updates for failing infrastructure and require more rigorous monitoring to ensure compliance; (ii) be applied again to regulate the oil and gas industry; and (iii) regulate more hazardous chemicals.

II. HISTORY

A. Municipal Water Before the SDWA

Water has always been recognized as a fundamental requirement for human life. Ancient civilizations were either built near water resources,[14] or were developed in some way to harness water from a more distant source. While populations accepted the importance of water quantity to sustain life, water quality was not

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[8] *Id.*

[9] *See id.* ("These water systems provide water to more than 299 million people. All federal regulations apply to these systems.").

[10] *See id.* (noting that 18,718 public water systems are non-transient non-community water systems, such as schools or factories).

[11] *Id.*

[12] *Id.*

[13] *Id.* at n.3 ("The EPA's longstanding policy is to exclude transient systems from drinking water regulations except for those contaminants, such as nitrate, that the EPA believes have the potential to cause immediate adverse human health effects resulting from short-term exposure.") (citing National Primary Drinking Water Regulation on Lead and Copper, 65 Fed. Reg. 1950 (Jan. 12, 2000)).

[14] SDWA HISTORY & TRENDS, *supra* note 2, at 1.

always so readily understood.[15] As populations continued to grow and communities became denser, problems with sanitation and pollution arose.[16]

It was not until the 19th century that scientists began to comprehend the link between disease and contaminated water.[17] In the 1850s, Dr. John Snow proved his theory that transmission of disease could occur by drinking contaminated water.[18] A couple of decades later, French chemist and microbiologist Louis Pasteur showed that food spoiled due to contamination by microbes in the air.[19] He went on to develop the "germ theory" of disease,[20] arguing that these microbes could transmit disease through the water supply.[21] This theory helped to prove the relationship between contaminated water and localized disease outbreaks.[22]

In the early 20th century, scientists' and engineers' primary focus concerning water quality was the removal of pathogens from the public water supply.[23] The federal government began regulating water quality in 1914, when the U.S. Public Health Service (PHS) set standards for bacteria content in water systems providing drinking water to interstate carriers.[24] While it was not federally mandated, each of the states individually adopted the same standards to use as guidelines for local PWSs.[25]

Congress addressed water pollution across the nation in 1948 by passing the Federal Water Pollution Control Act.[26] The original statute "authorized the Surgeon General of the Public Health Service, in cooperation with other Federal, state and local entities, to prepare comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries and improving the sanitary condition of surface and underground waters."[27] It also gave authorization to the Federal Works

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[15] *Id.*

[16] *See id.* at 2 (discussing the "germ theory" of disease, which explained how microorganisms could transit diseases through mediums such as water); *see also* Linda Poppenheimer, *Clean Water Laws — Prior to Safe Drinking Water Act of 1974*, GREEN GROUNDSWELL BLOG (June 24, 2013), http://greengroundswell.com/clean-water-laws-prior-to-safe-drinking-water-act-of-1974/2013/06/24/ [https://perma.cc/NPK5-PT7F] (discussing the various connections made between contaminated water and disease in the 19th century).

[17] Poppenheimer, *supra* note 16.

[18] *Dr. John Snow*, JOHN SNOW INC., http://www.jsi.com/JSIInternet/About/snow.cfm [https://perma.cc/CC4Z-E26J].

[19] *Louis Pasteur: The Man Who Led the Fight Against Germs*, BBC, http://www.bbc.co.uk/timelines/z9kj2hv [https://perma.cc/J7DD-CY8V].

[20] *Id.*

[21] *See* SDWA HISTORY & TRENDS, *supra* note 2, at 2.

[22] *Id.*

[23] *See id.*

[24] *Id.*

[25] *See id.*

[26] *See* U.S. FISH & WILDLIFE SERV., DIGEST OF FEDERAL RESOURCE LAWS OF INTEREST TO THE U.S. FISH AND WILDLIFE SERVICE: FEDERAL WATER POLLUTION CONTROL ACT (CLEAN WATER ACT), https://www.fws.gov/laws/lawsdigest/fwatrpo.html [https://perma.cc/6CSA-3LN8].

[27] *Id.*

Administrator to assist municipalities, states, and interstate agencies to construct treatment plants to treat sewage before discharging it into interstate waters and tributaries.[28]

The statute was amended numerous times, most notably in 1972, transforming the law into the Clean Water Act (CWA).[29] These amendments highlight the objectives of Congress to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[30] One of the most distinguished updates included the establishment of the National Pollutant Discharge Elimination System (NPDES),[31] regulating the discharge of pollutants through point sources into a "water of the United States" through a permit system.[32] These permits establish discharge limits, monitoring requirements, and further provisions to protect water quality and public health.[33] Additionally, the 1972 amendments gave the EPA the authority to implement pollution control programs, provided funding to construct sewage treatment plants, and preserved the requirements to establish water quality standards for surface waters.[34]

While general water quality regulations increased, there was a growing apprehension regarding the management of drinking water supplies. The inadequacies of drinking water regulations came to light in a 1970 PHS study concerning PWSs.[35] The study surveyed 969 PWSs located in nine areas across the United States, including both large and small systems.[36] It found that "[36%] of . . . individual tap water samples contained one or more bacteriological or chemical constituents exceeding the limits in the Public Health Service Drinking Water Standards."[37] Additionally, 56% of the service facilities exhibited physical deficiencies including inadequate protection of groundwater sources and faulty disinfection techniques.[38]

These shortcomings, along with the rising concern of pesticides and other industrial chemicals reaching drinking water supplies, prompted Congress to pass the Safe Drinking Water Act of 1974.

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[28] *Id.*

[29] *See History of the Clean Water Act*, EPA, https://www.epa.gov/laws-regulations/history-clean-water-act [https://perma.cc/C4DH-SHNV]; *see also* U.S. FISH & WILDLIFE SERVICE, *supra* note 26.

[30] 33 U.S.C. § 1251(a) (Supp. II 1972).

[31] *See id.* § 1342.

[32] *See National Pollutant Discharge Elimination System (NPDES)*, EPA, https://www.epa.gov/npdes/npdes-permit-basics [https://perma.cc/BDF9-XZNW].

[33] *See id.*

[34] *See History of the Clean Water Act, supra* note 29.

[35] *See* U.S. ENVTL. PROT. AGENCY, COMMUNITY WATER SUPPLY STUDY: SIGNIFICANCE OF NATIONAL FINDINGS 1 (1999), https://nepis.epa.gov/Exe/ZyNET.EXE?ZyActionL=Register&User=anonymous&Password=anonymous&Client=EPA&Init=1 [https://perma.cc/9ADV-ZCA3] [hereinafter COMMUNITY WATER SUPPLY STUDY].

[36] *Id.* at 5.

[37] *Id.* at 10.

[38] *Id.*

B. The Original SDWA

The primary purpose of passing the SDWA was to study contaminants in drinking water sources and design maximum level goals for each contaminant in order to protect consumers.[39] The determination of fixed limits for each contaminant mirrored prior programs, but the sweeping difference was that the limits now applied to all PWSs above a certain size.[40] The Act gave the Administrator of the EPA (Administrator) the power of oversight and enforcement of the applicable standards.[41]

The new standards were divided into two categories, the first of which were the national primary drinking water regulations (NPDWRs),[42] covering substances that may have an adverse effect on human health. The second category contains national secondary drinking water regulations (NSDWRs),[43] which include substances that may adversely affect human welfare, including the odor or appearance of the water. NSDWRs are not enforceable under federal law.[44]

For each of the NPDWRs, the EPA is required to establish a health goal, defined as "the level of contaminant in drinking water below which there is no known or expected risk to health."[45] This standard is the "recommended maximum contaminant level" (RMCL).[46] While the RMCL standard itself is not legally enforceable, it guides the EPA in establishing the "maximum contaminant level" (MCL).[47] MCLs are legally enforceable and are as close to the RMCL as possible, taking into consideration both cost and technological feasibility.[48]

The 1974 SDWA required the EPA to regulate drinking water in two steps, the first of which was to create interim NPDWRs, largely based on the twenty-eight PHS standards.[49] In addition to establishing MCLs, there were requirements for the monitoring and analysis of regulated contaminants, record keeping, and a provision to notify the public if a water system fails to meet the federal standards.[50] The second step was to revise these standards after the National Academy of Sciences reviewed them in light of the health risks to consumers.[51] The first eighteen interim standards

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[39] *See* 42 U.S.C. § 300g-1(b) (Supp. IV 1974); SDWA HISTORY & TRENDS, *supra* note 2, at 2.

[40] *See* Cox, *supra* note 3, at 77.

[41] 42 U.S.C. § 300g-2 (Supp. IV 1974).

[42] *Id.* § 300f(1).

[43] *Id.* § 300f(2).

[44] *Id.*

[45] SDWA HISTORY & TRENDS, *supra* note 2, at 4.

[46] Cox, *supra* note 3, at 78.

[47] *Id.*

[48] *See id.*; *see also* SDWA HISTORY & TRENDS, *supra* note 2, at 4.

[49] SDWA HISTORY & TRENDS, *supra* note 2, at 6.

[50] *Id.*

[51] *Id.*

of 1975 included "six synthetic organic chemicals, ten inorganic chemicals, turbidity, and total coliform bacteria."[52]

The SDWA included additional provisions to ensure the safety of drinking water. One example is the underground injection control (UIC) program,[53] implemented as a response to the lack of federal regulation of groundwater pollution.[54] However, this applied only to the operation of injection wells, and thereby excluded many potential sources of groundwater contamination.[55] A second example is the sole-source aquifer protection program.[56] Aquifers that had received a special designation due to their important relationship to public health were provided protection to ensure that federally-funded activities caused them no harm.[57]

While recognizing that not all provisions were necessarily feasible, the Act provided for variances[58] and exemptions.[59] Variances provide exceptions for MCLs where raw water quality prevents a PWS from complying with the standard, despite the use of the best available technology.[60] A state with primary enforcement responsibility for PWSs may also grant exceptions to NPDWR provisions requiring the use of a specific treatment, if that treatment is unnecessary to protect public health.[61] Exemptions provide exceptions to compliance with MCLs or the treatment requirements if a PWS is unable to comply due to "compelling factors," including economic burdens.[62] If an exemption is granted, control measures and a compliance schedule for meeting the NPDWR are required.[63] However, neither variances nor exemptions may be granted if there is an unreasonable risk to human health.[64]

In administering the Act, the EPA was given the authority to delegate the primary responsibility for enforcement, or "primacy," to states, territories, or tribes, so long as they met specific requirements.[65] The EPA provided grants to the states and assisted in administering their programs.[66] "With EPA's oversight, states with primacy adopt, implement, and enforce the standards established by the federal drinking water program to ensure that the public water systems in their jurisdictions provide consumers with safe water."[67] States require PWSs to collect water samples

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[52] *Id.*

[53] *See* 42 U.S.C. § 300h-3 (Supp. IV 1974).

[54] *See* Cox, *supra* note 3, at 79.

[55] *See id.*

[56] *See* 42 U.S.C. § 300h-3(e) (Supp. IV 1974).

[57] *Id.* § 300h-(3)(a)(1).

[58] *Id.* § 300g-4; *see also id.* § 300g-2 (a)(4).

[59] *Id.* § 300g-5.

[60] *Id.* § 300g-4(a)(1)(A).

[61] *Id.* § 300g-4(a)(1)(B).

[62] *Id.* § 300g-5(a)(1).

[63] *Id.* § 300g-5(b).

[64] *Id.* § 300g-5(a)(3).

[65] *See* SDWA HISTORY & TRENDS, *supra* note 2, at 4 (discussing the roles of states that have primacy; at the time this report was published, all states but Wyoming had assumed primacy and received grants from the EPA).

[66] *Id.*

[67] *Id.*

and have them tested in state-approved laboratories.[68] After receiving the results, states must then determine whether the PWS is in compliance or violation of the federally mandated standards.[69] If it is in violation, the public must be notified.[70]

In passing the SDWA, there was an assumption that new regulations would be easily adopted. But in actuality, the next twelve years showed only slow progress, finally spurring Congress to adopt the 1986 amendments.

C. Amendments of 1986

Between 1975 and 1985, the EPA had only developed regulations for twenty-three additional contaminants.[71] Aside from wanting to speed up that pace, Congress also wished to address deficiencies in the implementation of established programs.[72] One such deficiency was the increased concern regarding synthetic chemicals from agriculture and manufacturing, both of which were being detected in water sources at alarming rates.[73]

First, the 1986 amendments changed some of the terminology from the original Act. The approach of having both "interim" and "revised" standards was abandoned and all existing interim NPDWRs were now designated simply as NPDWRs.[74] Additionally, RMCLs were now referred to as MCLGs or "maximum contaminant level goals."[75]

Second, the 1986 amendments required the EPA to set MCLGs and MCLs for eighty-three specified contaminants.[76] Within twelve months, NPDWRs were required for at least nine of those listed.[77] At least forty additional contaminants were required to have NPDWRs within twenty-four months and the rest had a deadline of thirty-six months.[78] The legislation also required the EPA to establish further regulations beyond the listed eighty-three contaminants within set timeframes, to establish additional programs to protect groundwater, and to specify the "best available technology" for treating each contaminant with a designated MCL.[79]

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[68] *Id.*

[69] *Id.* at 4–5. There are three main types of violations: (1) MCL violation, when the level of a contaminant in treated water exceeds the EPA or state's legal limit, (2) treatment technique violation, when a PWS fails to treat drinking water in the manner designated by the EPA, and (3) monitoring and reporting violation, when a system fails to test its waters, or if it fails to report test results in a timely manner. *Id.*

[70] *Id.* at 5.

[71] *See* SDWA HISTORY & TRENDS, *supra* note 2, at 7.

[72] *Id.*

[73] *Id.* Another concern was the lack of sufficient control over disease-causing microbial contaminants. *Id.*

[74] *See* Cox, *supra* note 3, at 81.

[75] *See, e.g.*, 42 U.S.C. § 300g-1(a) (Supp. IV 1986).

[76] *See* SDWA HISTORY & TRENDS, *supra* note 2, at 7.

[77] 42 U.S.C. § 300g-1(b)(1)(A) (Supp. IV 1986).

[78] *Id.* § 300g-1(b)(1)(B), (C).

[79] *See* SDWA HISTORY & TRENDS, *supra* note 2, at 7.

Finally, one of the most important revisions was the requirement that lead-free materials be used to repair or install new PWSs or plumbing systems that provided water for human consumption.[80] Additionally, PWSs were required to notify people potentially affected by lead contamination from the water, either from lead being within the water supply or if the water was corrosive enough as to cause the leaching of lead from the pipes.[81] This spurred the passing of the Lead and Copper Rule (LCR) in 1991,[82] requiring PWSs to treat water to prevent the corrosion of lead pipes.[83] Under the SDWA, the LCR determines the action level—the point at which additional prevention or removal steps are required—for lead of 15 parts per billion (ppb), even though there is no safe level of lead.[84] Specifically, the LCR states that "[if] lead concentrations exceed an action level of 15 [ppb] . . . in more than 10% of customer taps sampled, the public water system must undertake a number of additional actions to control corrosion."[85]

D. Amendments of 1996

The 1996 amendments continued to broaden regulations for drinking water in some regards but also slowed the pace for other regulatory procedures. There was a general belief that the 1986 amendments had created a "regulatory treadmill" in the forced establishment of MCLGs and NPDWRs and there was a large demand to slow that process.[86] The practice of maintaining a list of unregulated contaminants as candidates for regulation and continuing to select some of those candidates remained the same, but the pace of publishing regulations substantially decreased.[87]

One of the big regulatory overhauls shifted focus to a more in-depth scientific study on setting regulations "based on data about the adverse health effects of the contaminant, the occurrence of the contaminant in public water systems, and the estimated reduction in health risk that would result from regulation."[88] The EPA was required to conduct a cost-benefit analysis for each proposed regulation, comparing the costs charged to water suppliers with the health benefits conferred to the public.[89]

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[80] *See* 42 U.S.C. § 300g-6(a)(1) (Supp. IV 1986).

[81] *See id.*

[82] *See* 40 C.F.R. § 141 (1991); *see also* U.S. ENVTL. PROT. AGENCY, NO. 570/9-91-400, LEAD AND COPPER RULE FACT SHEET (1995).

[83] *See id.* §141-80(b).

[84] ERIK OLSON & KRISTI PULLEN FEDINICK, NAT'L RES. DEF. COUNCIL, WHAT'S IN YOUR WATER? FLINT AND BEYOND 3 (2016), https://www.nrdc.org/sites/default/files/whats-in-your-water-flint-beyond-report.pdf [https://perma.cc/6G7L-LSW6].

[85] 40 C.F.R. § 141.80(c)(1).

[86] *See* Cox, *supra* note 3, at 91.

[87] *Compare* 42 U.S.C. § 300g-1(b)(1)(B) (Supp. II 1996), *with* 42 U.S.C. § 300g-1(b) (Supp. IV 1986) (showing the similarity of the 1986 amendments with the 1996 amendments).

[88] *See* SDWA HISTORY & TRENDS, *supra* note 2, at 10.

[89] *Id.* ("Public health protection remains the primary basis for deciding the levels at which drinking water standards are set.").

The 1996 amendments also sought to improve public relations by means of providing accessible information and supporting public participation.[90] Starting in 1999, all community water systems were required to prepare an annual water quality report that included information about the source of the water being provided, levels of regulated contaminants found in the water, and the known health effects of contaminants detected above the safety limit.[91] If a PWS violated a federal drinking water standard at any point, it was required to notify its customers of the breach.[92] By 2003, states with primacy were required to conduct assessments of water sources in order to identify threats of contamination and how likely it was for a given water source to be contaminated.[93] The public could assist in these assessments, and the results had to be made available to the communities.[94]

There was also a push from the federal government to help the states maintain compliance. A new federal grant program, titled the Drinking Water State Revolving Fund (DWSRF),[95] was established to give money to the states who, in turn, would loan it to PWSs to update their facilities and ensure standards were being met.[96] Each state was required to develop a plan for intended use of the grant money and was required to seek public input.[97] Federal grant contributions were also conditioned by provisions that encouraged compliance with recommended non-mandatory provisions of the SDWA, including the "development of technical, managerial, and financial capacity of public systems."[98] In order to receive the full amount of funding, each state had to ensure new systems had adequate capacity to sustain their customers and develop procedures for spotting and repairing capacity deficiencies.[99]

While the 1996 Amendments reeled back the pace of implementing new regulations, many changes were still made to the benefit of consumers. The increase of public awareness and involvement was a significant milestone, both simply by being equitable in informing consumers, and by helping to promote accountability of the persons or companies maintaining the water systems.

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[90] *See id.* at 11 (detailing several reports, assessments, databases, and programs that the 1996 Amendments created in order to improve public access and increase public participation).

[91] *Id.*

[92] *Id.*

[93] *Id.*; *see also* Cox, *supra* note 3, at 91.

[94] SDWA HISTORY & TRENDS, *supra* note 2, at 11.

[95] *Id.*

[96] *Id.* ("This federal grant program provides money for states . . . [to] provide loans to water systems to upgrade their facilities . . . . A portion of each state's federal grant money can be set aside for several specific purposes, including acquiring land to buffer drinking water sources from contamination and funding other local protection activities.").

[97] *Id.*

[98] *See* Cox, *supra* note 3, at 92; 42 U.S.C. § 300j-12(a)(3)(A)(i) (Supp. III 2016).

[99] *See id.* § 300j-12(a)(1)(G)(i), § 300g-9(a), § 300g-9(c).

E. Amendments of 2016

In December 2016, Congress passed the Water Infrastructure Improvements Act (WIIN Act).[100] Congress' intent was "to provide for improvements to the rivers and harbors of the United States [and] to provide for the conservation and development of water and related resources."[101] While the WIIN Act was broadly applicable, it resulted in numerous revisions to the SDWA.[102]

The WIIN Act authorized new grant programs in an effort to help communities, particularly those in economic distress, to pursue better quality drinking water while maintaining both their economic and environmental vitality.[103] Specifically, the grant programs do the following: "(1) help public water systems serving small or disadvantaged communities meet SDWA requirements; (2) support lead reduction projects, including lead service line replacement; and (3) establish a voluntary program for testing for lead in drinking water at schools and child care programs."[104] The WIIN Act also authorized $100 million in DWSRFs for communities[105] under the Stafford Act.[106]

III. ACCOMPLISHMENTS UNDER THE SDWA

The single most important aspect of the SDWA is that it has provided a uniform set of regulations for drinking water systems nationally. It is no longer up to the individual states to determine what chemicals should be regulated and how, or to manage the financing to update and implement new water systems. The Act is arguably one of the most important pieces of legislation regarding day-to-day usage of a generalized commodity, something typically taken for granted.

The list of NPDWRs monitored by the EPA today includes a wide variety of contaminants.[107] Sources of these contaminants vary from erosion of natural deposits, to intentional discharge by various industries, to simply being a byproduct of drinking water disinfection.[108] The sheer number of sources for water pollution is proof that there needs to be a uniform system in place to monitor drinking water

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[100] Water Infrastructure Improvements for the Nation Act, Pub. L. No. 114-322, 130 Stat. 1628 (2016).

[101] *Id.*

[102] SDWA SUMMARY, *supra* note 7, at 3.

[103] *See* Sarah M. Beason et al., *A WIIN for Water Infrastructure*, LEXOLOGY (Dec. 27, 2016), https://www.lexology.com/library/detail.aspx?g=15d2beb6-c301-4182-bd8b-07c578dea69c [https://perma.cc/D4DW-9CJY].

[104] SDWA SUMMARY, *supra* note 7, at 3.

[105] Beason et al., *supra* note 103, at 3.

[106] 42 U.S.C. §§ 5121–5123 (Supp. III 2016).

[107] *See National Primary Drinking Water Regulations*, EPA, https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations [https://perma.cc/5Z6E-47XU].

[108] *See id.* Additional sources include runoff, decay of cement in water lines and corrosion of household pipes.

supplies to ensure its overall quality. Without a systematic approach to comprehensively address the multitudes of contaminants and their sources, there would no doubt be some states left with poor standards.

Another achievement under the SDWA is the availability of federal funding, largely as a result of the 1996 amendments. The DWSRF program is a powerful funding tool between the federal government and the states, with Congress in charge of appropriating the funds.[109] The EPA provides grants to the states and Puerto Rico in order to capitalize their loan program, where the states provide an additional 20% match in funds.[110] Direct grant funding is also provided for the District of Columbia and some U.S. territories.[111] "The 51 DWSRF programs function like infrastructure banks by providing low interest loans to eligible recipients for drinking water infrastructure projects."[112] Since inception, the state DWSRFs have provided more than $32.5 billion to water systems, building on a federal investment of $19.1 billion.[113] Without this federal assistance, states may not have the funds for the necessary infrastructure updates.

More recently, the WIIN Act was passed to provide additional financial assistance to struggling communities. The WIIN Act authorized funding for water infrastructure improvements, research, as well as reauthorizing various watershed conservation and restoration programs. In response to the Flint crisis, the EPA awarded a $100 million grant to the Michigan Department of Environmental Quality to fund infrastructure updates, which was funded by the WIIN Act.[114] The funding was provided to help enable Flint to accelerate and expand its efforts to upgrade infrastructure after their water catastrophe. Combined with the $250 million in state funds already allocated to Flint, this additional funding will go a long way in helping make the essential upgrades, especially in regard to replacing or treating corroded lead pipes.

While the SDWA has made significant improvements in how drinking water is regulated, there are still present-day concerns that need to be addressed in order to continue providing clean water. Scientific and technological advances continue to discover new sources of contamination, as well as new contaminants in our water systems. In light of this information, the SDWA needs to be amended further.

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[109] *How the Drinking Water State Revolving Fund Works*, EPA, https://www.epa.gov/drinkingwatersrf/how-drinking-water-state-revolving-fund-works#tab-1 [https://perma.cc/8UYQ-4GBC].

[110] *Id.*

[111] *Id.*

[112] *Id.*

[113] *See id.* Assistance was provided through over 13,000 agreements for improving drinking water treatment, fixing old pipes, improving source of water supplies, replacing or constructing finished water storage tanks, and additional infrastructure projects required to protect public health.

[114] News Release, EPA, EPA Awards $100 Million to Michigan for Flint Water Infrastructure Upgrades (Mar. 17, 2017), https://www.epa.gov/newsreleases/epa-awards-100-million-michigan-flint-water-infrastructure-upgrades [https://perma.cc/BH9C-8CJS].

IV. WHERE THE SDWA IS STILL FLAWED

A. The Water Crisis in Flint

The city of Flint is located along the Flint River, approximately sixty miles northwest of Detroit, Michigan.[115] Being on the river, Flint was home to a number of industries in the 1800s, including fur trading, lumber, and the manufacture of carriages.[116] Once the automobile industry took off, Flint again found itself an industrial hub, with Buick Motor Company founded there in 1903, and General Motors in 1908.[117] Unfortunately, this industrial vibrancy did not last. In 1960, the population of Flint had peaked over 200,000, and by 2014, it had dropped below 100,000.[118] Poverty has since swept through Flint, "with [41.6%] of the population living below federal poverty thresholds—2.8 times the national poverty rate."[119]

The first water system of Flint was established in the late 1800s under private ownership, and the city later bought it in 1903.[120] The Flint River provided an easy source for water and was treated at a water plant before dispersal to residents.[121] To ensure a reliable water supply, Flint agreed to a long-term water contract with the Detroit Water and Sewerage Department (DWSD) in 1967, with water being supplied from Lake Huron and treated for corrosion control.[122]

The clean water being supplied from DWSD did not last. Flint took a hard hit from the 2008 financial crisis, driving Michigan Governor Rick Snyder to declare a state of financial emergency in Flint.[123] In an effort to save money, Flint planned on purchasing their water from a soon-to-be-built pipeline from Karegnondi Water Authority, who would still supply the water from Lake Huron.[124] In the meantime, as a temporary solution, the city began to use water from the Flint River.[125] While there is still a question as to who exactly authorized this transition, Howard Croft, the former director of public works for Flint, asserts that the decision came directly

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[115] Jim Shelson, *Lead in the Water—The Flint Water Crisis*, 83 DEF. COUNSEL J. 520, 520 (2016).

[116] *See* ERIC SCORSONE & NICOLETTE BATESON, LONG-TERM CRISIS AND SYSTEMIC FAILURE: TAKING THE FISCAL STRESS OF AMERICA'S OLDER CITIES SERIOUSLY 1 (2011).

[117] *See id.*

[118] FLINT WATER ADVISORY TASK FORCE, FINAL REPORT 15 (2016).

[119] *Id.*

[120] *Id.*

[121] *See id.*

[122] *Id.* at 16.

[123] Brie D. Sherwin, *Pride and Prejudice and Administrative Zombies: How Economic Woes, Outdated Environmental Regulations, and State Exceptionalism Failed Flint, Michigan*, 88 U. COLO. L. REV. 653, 660 (2017).

[124] *Id.* at 661.

[125] *Id.*

from the Governor's administration.[126] Regardless of who gave the authorization, this decision had catastrophic effects.

According to a verified class action complaint filed in 2016, Flint government officials authorized a study of the Flint River in 2011 to determine if it could safely be used as a primary source of drinking water.[127] The results overwhelmingly indicated that the river water was unsafe without anti-corrosive agents to prevent the leaching of lead, copper, and other heavy metals from the pipes into the water.[128] In 2014, the city emergency manager at the time, Darnell Earley, ordered Flint to begin pulling their water from the Flint River.[129] At the time the order was given, Mr. Earley had knowledge "that the water was highly corrosive and dangerous to people and property when distributed without proper anti-corrosive treatment," a treatment that had an estimated cost of $60 per day.[130]

Within days of the switch, water users began to complain that their water was foul in appearance, taste, and color.[131] Flint citizens expressed their concerns over the following eight months.[132] Soon after the Flint River became the primary source of municipal water, the Michigan Department of Environmental Quality (MDEQ) and Flint officials gained knowledge that the water contained elevated levels of Trihalomethanes (TTHM).[133] Flint water users finally received a notice of the contaminant breach in January 2015.[134] Allegedly, Mr. Earley refused demands for responsive action, and rejected Detroit's offer to waive the $4 million reconnection fee that would allow for reconnection to the Lake Huron water supply.[135]

The problems with the Flint River only continued to multiply. That summer, scientists from Virginia Tech tested nearly 300 drinking water samples in Flint.[136] Approximately thirty of the samples indicated lead levels of 25 ppb, substantially exceeding the federally-mandated action level of 15 ppb, and overall, the water from

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[126] Curt Guyette, *Exclusive: Gov. Rick Snyder's Men Originally Rejected Using Flint's Toxic River*, DAILY BEAST (Jan. 24, 2016), https://www.thedailybeast.com/exclusive-gov-rick-snyders-men-originally-rejected-using-flints-toxic-river [https://perma.cc/KUB2-RN4A].

[127] Amanda Callihan, *The Drinking Water Supply Crisis in Flint, Michigan: What It Exposes About Enforcement of Water Supply Law and Public Health in the United States*, 29 TUL. ENVTL. L.J. 303, 306–07 (2017) (citing Verified Class Action Complaint for Declaratory Relief, Injunctive Relief, Equitable Relief & Damages at 14, Mays v. Snyder, No. 16-000017-MM (Mich. Ct. Cl. Jan. 21, 2016)).

[128] *See* Callihan, *supra* note 127, at 307.

[129] *Id.*

[130] Complaint at 17, Mays v. Snyder, No. 5:15-cv-14002 (E.D. Mich. Nov. 13, 2015) [hereinafter Mays Complaint].

[131] *Id.* at 5.

[132] *Id.* ("Flint water users expressed their concerns about water quality in a multiple of ways including letters, emails and telephone calls to Flint and MDEQ officials, the media and through well publicized demonstrations.").

[133] *See id.* at 18.

[134] *Id.*

[135] *Id.* at 18–19.

[136] *See* Mays Complaint, *supra* note 130, at 20.

the river was nineteen times more corrosive than the Lake Huron waters.[137] Additionally, Dr. Mona Hanna-Attisha, a local pediatrician, began studying the lead levels in children.[138] What she found was startling—the percentage of children in Flint suffering from elevated lead blood levels had doubled since the water supply had been switched to the Flint River.[139] "[S]tudies of lead exposure in children, particularly those under the age of 6, indicate an increased risk for damage to cognition, behavior and employment prospects, also lower I.Q.s, poor impulse control and decreased lifetime earnings."[140] More than 8,000 vulnerable children drank the contaminated water.[141]

Faced with this astounding evidence that the water was unsafe, Genesee County Health Officials issued a public health emergency in October of 2015, and advised Flint residents not to drink their tap water.[142] Additionally, Governor Snyder ordered the Flint water supply be reconnected to Detroit.[143] The Governor also appointed an independent task force—the Flint Water Advisory Task Force—to conduct a review to determine what happened, why it happened, and what was necessary to prevent another water disaster.[144] The report concluded:

> The Flint water crisis is a story of government failure, intransigence, unpreparedness, delay, inaction, and environmental injustice. The [MDEQ] failed in its fundamental responsibility to effectively enforce drinking water regulations. The Michigan Department of Health and Human Services failed to adequately and promptly act to protect public health. Both agencies, but principally the MDEQ, stubbornly worked to discredit and dismiss others' attempts to bring the issues of unsafe water, lead contamination, and increased cases of [Legionnaires' disease] to light. With the City of Flint under emergency management, the Flint Water Department rushed unprepared into full-time operation of the Flint Water Treatment Plant, drawing water from a highly corrosive source without the use of corrosion control. Though MDEQ was delegated primacy . . . the [EPA] delayed enforcement of the [SDWA] and Lead and Copper Rule, thereby prolonging the calamity. Neither the Governor nor the Governor's

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[137] *See id.*

[138] *See* OLSON & FEDINICK, *supra* note 84, at 10.

[139] *Id.*

[140] Mona Hanna-Attisha, Opinion, *The Future for Flint's Children*, N.Y. TIMES (Mar. 26, 2016), https://www.nytimes.com/2016/03/27/opinion/sunday/the-future-for-flints-children.html?_r=0 [https://perma.cc/7WVM-VX9G].

[141] *Id.*

[142] *See* Mays Complaint, *supra* note 130, at 22.

[143] *Id.*

[144] *See* FLINT WATER ADVISORY TASK FORCE, *supra* note 118, at 2.

> office took steps to reverse poor decisions by MDEQ and state-appointed emergency managers until October 2015 . . . . The significant consequences of these failures for Flint will be long-lasting. They have deeply affected Flint's public health, its economic future, and residents' trust in government.[145]

Ultimately, it was not the acts of one individual or agency that caused the disaster in Flint, but a compounding series of failures.

The Flint water crisis has resulted in a great deal of litigation, which continues to burden the courts today. The number of persons who have been exposed to Flint water is in the tens of thousands.[146] Perhaps the most troubling fact is that the current legislation in place should have prevented this from happening—specifically, the LCR mandates the use of an anti-corrosive agent for suspect waters like those from the Flint River, regular monitoring of that water system, and immediate public notification if excess levels of pollutants are found during water sampling. A comprehensive study of these events in Flint should provide a platform for education and allow for the expansion of legislation to fill regulatory gaps.

B. The Exception for Oil and Gas Operations

The process known as hydraulic fracturing (fracking) began in the early 1940s to continue stimulating production from oil reservoirs.[147] With technological advances, including the use of horizontal drilling, fracking is being used to extract oil and gas in low-permeability formations including coal beds, tight gas sands, and unconventional shale formations.[148] The process of fracking has allowed for the development of domestic tight oil resources, reducing dependence on international resources.[149] There are nearly 1.3 million oil and gas facilities[150] in operation within the U.S. today. While this method of oil and gas extraction has vastly expanded domestic production, it also presents an array of concerns, including trespass on private lands, the triggering of localized earthquakes, and environmental

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[145] *Id.* at 1.

[146] Brianna Provenzano, *The State of the Flint Water Crisis, By the Numbers*, BUS. INSIDER (Mar. 32, 2017), https://www.businessinsider.com/flint-water-crisis-facts-numbers-2017-3 [https://perma.cc/J82R-P47T].

[147] MARY TIEMANN & ADAM VANN, CONGRESSIONAL RESEARCH SERV., HYDRAULIC FRACTURING AND SAFE DRINKING WATER ACT REGULATORY ISSUES 1 (2015), https://fas.org/sgp/crs/misc/R41760.pdf [https://perma.cc/PU4J-DSM2]. Hydraulic fracturing is also used for other purposes including the development of geothermal production wells, but for the purposes of this Note, it will only relate to oil and gas production.

[148] *See id.*

[149] *Id.*

[150] *National Threat Map*, OIL & GAS THREAT MAP 2.0, http://oilandgasthreatmap.com/threat-map/ [https://perma.cc/XZK2-E8KH] (showing 1,292,669 wells, compressors & processors nationally).

contamination. In particular, there is growing apprehension regarding the contamination of groundwater by fracking.

Because of the low permeable nature of the formations being targeted, the basic idea of fracking is to create fractures within the formation, providing space through which the natural gas or oil can easily flow to the surface.[151] The process starts by drilling a well and inserting a steel pipe casing into the well bore.[152] The casing is perforated along the targeted zones, allowing the fracturing fluid to flow into the target zones when injected.[153] Once the formation is saturated and cannot absorb any more, the pressure resulting from the fluids still being injected will cause the formation to fracture.[154] Fracking fluids will include some sort of proppant, a "solid material . . . used to hold open the cracks made in the reservoir rock after the high pressure of the fracturing fluids is reduced [including] sand, ceramic beads, or miniature pellets."[155] Proppants remain within the formation to keep the fractures open.[156]

In addition to the proppants, fracking fluids include a large volume of water and chemical additives.[157] Additives will often consist of gels that carry the proppant into the fractures, biocides to limit bacterial growth, inhibitors against pipe corrosion, and sometimes acid in order to dissolve rock material to enable easier gas and fluid flows.[158] The exact mixtures of fracking fluids vary widely, depending on the well. Some percentage of the fracking fluid will return to the surface, called flowback,[159] while some may remain underground. Studies have shown that in some cases, over 90% of the fluids remain underground.[160]

These fluids pose a significant risk to drinking water supply. Underground contaminants, namely methane, can reach drinking water through the fractured rock, as well as via abandoned wells.[161] Contaminants can also reach water supplies

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[151] *Hydraulic Fracturing 101*, EARTHWORKS, https://earthworks.org/issues/hydraulic_fracturing_101/ [https://perma.cc/9QZA-QZ4W].

[152] *Id.*

[153] *See id.*

[154] *See id.*

[155] *GSA Critical Issue: Hydraulic Fracturing*, GEOLOGICAL SOC'Y AM., https://www.geosociety.org/GSA/Science_Policy/Critical_Issues/hf/GSA/Policy/issues/hf/waterQuality.aspx [https://perma.cc/9E2D-42AF].

[156] *See id.*

[157] *See id.*

[158] *See id.*

[159] *See Hydraulic Fracturing 101*, *supra* note 151.

[160] *See id.*

[161] Rebecca Harrington, *Oil From Fracking Can Reach Drinking Water—But There's a Simple Way to Prevent It*, BUS. INSIDER (Feb. 23, 2016), http://www.businessinsider.com/few-fracking-wells-contaminate-drinking-water-2016-2 [https://perma.cc/GD8R-GX7N]; *see also GSA Critical Issue: Hydraulic Fracturing*, *supra* note 155 ("Because the fracking fluids are injected into the subsurface under high pressure, and because some of the fluids remain underground, there is concern that this mixture could move through the well bores or fractures created in the reservoir rock by hydraulic pressure, and ultimately migrate up and enter shallow formations that are sources of freshwater. There is also concern that geologic

through poorly cemented or completely un-cemented fracking wells.[162] The EPA analyzed a representative sample of oil and gas wells throughout the U.S., discovering that 66% of wells had one or more un-cemented regions and that "3% of wells had un-cemented regions within the depth where well operators reported there was groundwater—putting them at high risk of contaminating drinking water."[163]

Groundwater can also be contaminated by chemicals being directly injected into underground sources of drinking water (USDWs).[164] In 2004, the EPA released a final study evaluating the impacts to USDWs by fracking in coalbed methane reservoirs.[165] The report found that approximately 90% of coalbed methane basins in the country are at least partially located in USDWs.[166] There are also reported cases in which fracking fluids are injected directly into USDWs during normal operations.[167] A handful of fracking chemicals, including benzene and methanol, may be injected into or close to USDWs in concentrations that threaten human health.[168] The concentration of these chemicals can be anywhere from four to nearly thirteen thousand times the acceptable concentration in drinking water.[169] Furthermore, the exact mixture of the chemicals is generally unknown. Public records contain information about the most likely chemicals to be used, but beyond that it is only speculation unless a state's statute specifically requires that the exact mixture be released to the public.[170]

The contamination of drinking water can be extremely hazardous. Health problems to humans include increased fatigue, nausea, joint pain, and irritation of the eyes, nose, throat, and skin.[171] The overall quality of the water can decrease as well. Increased levels of methane can cause frothing and bubbles in the water.[172] In some communities near fracking wells, residents can light their tap water on fire due

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faults, previously existing fractures, and poorly plugged, abandoned wells could provide conduits for fluids to migrate into aquifers.").

[162] *See* Harrington, *supra* note 161.

[163] *Id.*

[164] *See Hydraulic Fracturing 101*, *supra* note 151.

[165] *Id.*

[166] *Id.*

[167] *See supra* text accompanying note 164.

[168] *Id.*

[169] *Id.*

[170] JAMES T. O'REILLY, THE LAW OF FRACKING § 10:1 (2017).

[171] Nadia Steinzor, Wilma Subra & Lisa Sumi, *Investigating Links Between Shale Gas Development and Health Impacts Through a Community Survey Project in Pennsylvania*, 23 NEW SOLUTIONS 55, 62 (2013), http://journals.sagepub.com.ezproxy.lib.utah.edu/doi/pdf/10.2190/NS.23.1.e. [https://perma.cc/G52V-ZRRM].

[172] *See* U.S. ENVTL. PROT. AGENCY, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS 6–9 (2004), https://fracfocus.org/sites/default/files/publications/evaluation_of_impacts_to_underground_sources_of_drinking_water_by_hydraulic_fracturing_of_coalbed_methane_reservoirs.pdf [https://perma.cc/27CN-K9C4] [hereinafter EVALUATION].

to the increased levels of methane.[173] Residents in the Black Warrior Basin of Alabama claimed that their tap water had a milky white substance and strong odors after fracking, while other residents found globs of black jelly-like grease that had a petroleum smell.[174] In the San Juan Basin located in Colorado and New Mexico, a county employee found "explosive levels of methane" and "toxic levels of hydrogen sulfide" in residents' homes.[175] Fracking fluids have also been correlated with the death of plant and animal life.[176]

In light of these concerns with the contamination of drinking water supplies, it would seem appropriate that fracking and the fluids therefrom be regulated under the SDWA. However, that is not the case. The legal battle began when the Legal Environmental Assistance Foundation, Inc. (LEAF) filed a petition with the EPA in 1997, asking for the rescission of the EPA's approval of an Alabama UIC program, which had been involved with unregulated methane gas fracking activities on eight separate occasions.[177] LEAF alleged that the regulation of state UIC programs under the SDWA applied in this case, requiring Alabama to first obtain an authorized permit before approving the operations.[178] The EPA denied the petition, claiming that fracking didn't fall within the regulatory definition of "underground injection" because the principal function of the fracking wells was not underground fluid displacement.[179] In response, LEAF contended that the narrow interpretation was inconsistent with the SDWA regulations, and that fracking clearly had to be regulated under state UIC programs due to the statutory definition of "underground injections."[180] The court agreed with LEAF, finding that Congress had dictated that all underground injection programs be regulated[181] in order to achieve the purpose of "prevent[ting] underground injection which endangers drinking water sources."[182]

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[173] *See Tap Water Catches on Fire in Debby and Jason Kline's Ohio Home Due to Methane Levels*, HUFFINGTON POST (Jan. 12, 2013) https://www.huffingtonpost.com/2013/01/12/tap-water-catches-fire-methane-debby-jason-kline_n_2462981.html [https://perma.cc/9TU5-TH5M]; *see also* Zoe Schlanger, *Fracking Wells Tainting Drinking Water in Texas and Pennsylvania, Study Finds*, NEWSWEEK (Sept. 15, 2014), http://www.newsweek.com/fracking-wells-tainting-drinking-water-texas-and-pennsylvania-study-finds-270735 [https://perma.cc/3PR9-M2TT].

[174] EVALUATION, *supra* note 172, at 6–10.

[175] *Id.* at 6–13. Additionally, evidence shows that the composition of the methane gas found in residential drinking water wells originated in nearby coalbeds that were the target of fracking, rather than from sewage-derived methane contamination. *Id.* at 6–7.

[176] *Id.* at 6–10.

[177] Legal Environmental Assistance Foundation (*LEAF I*) v. EPA, 118 F.3d 1467, 1471 (11th Cir. 1997).

[178] *Id.*; *see also* 42 U.S.C. § 300h(b)(1)(B) (2000) (noting that prior to obtaining a permit, a state must prove that the operation will not endanger underground drinking water sources).

[179] *LEAF 1*, 118 F.3d at 1471.

[180] *See id.* at 1471–72.

[181] *See id.* at 1474.

[182] 42 U.S.C. § 300h(b)(1) (2000).

Before the court could act to enforce its holding, Alabama revised its UIC program.[183] This gave the EPA the ability to approve the revised program under the less restrictive § 1425 of the SDWA[184] and effectively classify fracking activities as separate from UIC regulation. LEAF challenged the EPA's actions again, and the Eleventh Circuit again ruled in favor of LEAF, holding that the "EPA must classify hydraulic fracturing into one of the five specific SDWA categories for the clear purpose of underground injection regulation."[185] This success was short-lived, as the EPA and the oil and gas industry continued to search for ways around fracking regulation.

In 2003, the EPA entered an agreement with three major oil and gas companies that controlled 95% of the fracking industry, asking them to remove diesel fuel and "other toxic substances" from the fluids being injected underground.[186] The Memorandum of Agreement (MOA) established a voluntary arrangement between the EPA and three major oil companies, wherein all agreeing companies had thirty days from signing to terminate their use of diesel fuel in fracking processes.[187]

The MOA did not have the kind of regulatory authority as was originally hoped for, and Congress officially exempted fracking from the SDWA two years later.[188] The Energy Policy Act of 2005 amended §1421(d) of the SDWA, formally excluding fracking from the statutory definition of underground injection.[189] While the EPA has established minimum standards that the state UIC programs must meet, the risks that fracking poses to drinking water supplies are significant enough that the fracking process should be regulated under federal law.

V. ROOM FOR IMPROVEMENTS

A. Infrastructure and Regulation Updates

The passing of the WIIN Act was a critical step in addressing the infrastructure deficiencies of the nation, by providing grants to help update and replace aging systems. However, the need for reform is much larger than replacing aged infrastructure in a mere handful of impoverished communities. According to the American Water Works Association, "an estimated $1 trillion is necessary to

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[183] Legal Environmental Assistance Foundation (*LEAF II*) v. EPA, 276 F.3d 1253, 1256 (11th Cir. 2001).

[184] *Id.* at 1257.

[185] Angela C. Cupas, *The Not-So-Safe Drinking Water Act: Why We Must Regulate Hydraulic Fracturing at the Federal Level*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 605, 619 (2009).

[186] *Id.* at 620.

[187] *Id.* at 620–21.

[188] Energy Policy Act of 2005, Pub. L. No. 109-58, § 1(a), 119 Stat. 594 (2005).

[189] *Id.* ("The term 'underground injection' means the subsurface emplacement of fluids by well injection; and excludes . . . the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations relating to oil, gas, or geothermal activities.").

maintain and expand service to meet [drinking water] demands over the next 25 years."[190]

There is a total of one million miles of pipes across the country that deliver drinking water, many of which were installed before the middle of the 20th century with an approximate lifespan of 75–100 years.[191] At the current rate that utilities are replacing water pipes, it will take an estimated 200 years to replace the entire system.[192] As the pipes continue to age, there is an increased risk of corrosion, rusting, and breaking.

One of the most concerning realities of aging pipes is the risk of water contamination. Flint is certainly not the only U.S. city to experience contaminated drinking water due to aged pipes. In 2015, an estimated eighteen million people were served by PWSs that were in violation of the LCR.[193] Offenses included failures to report contamination to state officials and the public as well as failures to test the water for lead or conditions that would result in lead contamination.[194] In a study of approximately 1,100 community water systems serving 3.9 million people, at least 10% of the homes tested showed lead levels over 15 ppb.[195]

Despite the hard evidence that demonstrates the widespread contamination risks to drinking water, the EPA's record for taking formal enforcement action against violators has been scarce. According to their own data analyzing the reported violations in 2015, the EPA only took formal action against 11.2% of infractions.[196] This lack of accountability sends a message to service providers that compliance is more of a suggestion rather than mandatory action. In order to prevent another disaster like Flint, it is essential that the EPA and state agencies take action against violators.

The enforcement of present regulation is fundamental to ensuring widespread access to clean drinking water, as is updating the regulation that must be enforced. In light of the Flint crisis, the EPA recognized that there was a compelling need to revise the LCR in order to "strengthen its public health protections and to clarify its implementation requirements to make it more effective and more readily enforceable."[197] To be able to meet these objectives, the EPA is currently evaluating recommendations from the National Drinking Water Advisory Council (NDWAC) and other stakeholders on possible revisions to the LCR.[198] Some of the principal

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[190] AM. SOC'Y OF CIVIL ENGINEERS, 2017 INFRASTRUCTURE REPORT CARD: DRINKING WATER (2017), https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf [https://perma.cc/SFE7-QW8Q].

[191] *Id.*

[192] *Id.*

[193] *See* OLSON & FEDINICK, *supra* note 84, at 5.

[194] *Id.*

[195] *Id.*

[196] *See id.* at 6.

[197] U.S. ENVTL. PROT. AGENCY, LEAD AND COPPER RULE REVISIONS WHITE PAPER 3 (2016), https://www.epa.gov/sites/production/files/2016-10/documents/508_lcr_revisions_white_paper_final_10.26.16.pdf [https://perma.cc/88BT-X2PB].

[198] *Id.* at 4.

recommendations that should be adopted to protect human health include the implementation of a national lead service line replacement program, updated corrosion control treatment requirements, and increasing transparency and information shared with the public.[199]

The SDWA and the subsequent LCR have made significant progress in monitoring and reducing the presence of lead and copper in drinking water supplies, and in mandating the shift in materials used for new infrastructure and repairs. The EPA should seriously take into consideration the NDWAC's recommendations and continue to revise these regulations in order to reduce exposure to hazardous substances through outdated infrastructure.

B. Uniform Regulation for Oil & Gas Industry

Because fracking injects contaminants underground, sometimes directly into groundwater sources, it should not be exempt from regulation under the SDWA. While some states have individually implemented their own regulations regarding fracking and its byproducts,[200] they offer varying levels of protection without uniformity. Underground water is not stagnant and the migration across state borders is difficult to predict. Furthermore, fracking fluids left in a formation or contaminates underground drinking water may remain there for decades, posing risks for future generations.

The very purpose of the SDWA was to establish uniform standards for drinking water in order to ensure the health of the nation.[201] In particular, the UIC program was created to protect underground sources of drinking water.[202] Underground injection is defined as "the subsurface emplacement of fluids by well injection," excluding the underground storage of natural gas, and since the amendment in 2005, fracking fluids.[203] In further explaining the purpose of the UIC program mandate, the SDWA specifically states that "[u]nderground injection endangers drinking water sources if such injection may result in the presence in underground water

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[199] *Id.* at 7.

[200] Three states—New York, Vermont, and Maryland—have issued an outright ban on fracking activities, while others have implemented temporary moratoriums. Some states require certain disclosures of fracking chemicals to the public, but others have no requirements for disclosure. *See* John Hurdle, *With Governor's Signature, Maryland Becomes Third State to Ban Fracking*, STATEIMPACT PA. (Apr. 4, 2017), https://stateimpact.npr.org/pennsylvania/2017/04/04/with-governors-signature-maryland-becomes-third-state-to-ban-fracking/ [https://perma.cc/Y96T-XTSQ]; Brad Plumer, *How States Are Regulating Fracking (In Maps)*, WASH. POST (July 16, 2012), https://www.washingtonpost.com/news/wonk/wp/2012/07/16/how-states-are-regulating-fracking-in-maps/?utm_term=.e315c35584a0 [https://perma.cc/9ES3-HDDB].

[201] *See* 42 U.S.C. § 300g-1(b) (Supp. IV 1974); SDWA HISTORY & TRENDS, *supra* note 2, at 2.

[202] *See* 42 U.S.C. § 300h(b) (2000).

[203] *See id.* § 300h(d)(1).

which supplies or can reasonably be expected to supply any public water system of any contaminant . . . [that] may otherwise adversely affect the health of persons."[204]

The exemption of fracking fluids from regulation under the UIC program is erroneous. The fracking process falls neatly within the definition of 'underground injection,' as one of the key steps to the process is the injection of the fluids underground.[205] Further, while the exact composition of the fracking fluid mixture is generally unknown, the studies that have been conducted show that the fracking fluids adversely affect human health.[206] Exempting fracking from regulation under the UIC program of the SDWA provides no benefit to the public—rather, the only benefit provided is to the oil and gas operators who are left with one less federal regulation to comply with during the course of their operations. The SDWA was enacted to provide safe drinking water at the tap. Providing a benefit to industry by exempting fracking from regulation does not fall neatly within the purpose of the SDWA, and accordingly, the exemption should be repealed.

Additionally, elements of fracking fluids that pose a serious risk to public health should be reconsidered. The SDWA still regulates diesel fuel in underground injection processes, but diesel fuel is only one of many potentially hazardous ingredients used. The risk of groundwater contamination from fracking fluids is significant enough that the EPA needs to either strictly regulate their use or implement an outright ban.

C. Increase the Number of Regulated Chemicals

Since the 1990s, the EPA has come close to successfully regulating only one new contaminant.[207] In 2011, the EPA announced its intention to set a federal standard for perchlorate, a chemical found in rocket fuel and road flares known to disrupt thyroid functions in humans.[208] But since then, no federal action has actually been taken. It is imperative that more regulations be established, especially considering that tens of thousands of new chemicals have come into use since the SDWA's first inception.[209]

The slowing of the pace in regulating new chemicals is, in part, due to the standards established in 1996. In refining the 'regulatory treadmill,' the new guidelines resulted in the EPA having to move more deliberately in passing new

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[204] *See id.* § 300h(d)(2).

[205] *See Hydraulic Fracturing 101*, *supra* note 151.

[206] *See supra* notes 171–175 and accompanying text.

[207] Brady Dennis, *In U.S. Drinking Water, Many Chemicals Are Regulated—But Many Aren't*, WASH. POST (June 10, 2016), https://www.washingtonpost.com/national/health-science/in-us-drinking-water-many-chemicals-are-regulated--but-many-arent/2016/06/09/e48683bc-21b9-11e6-aa84-42391ba52c91_story.html?utm_term=.6f444bd73b9e [https://perma.cc/SLA3-KPMT].

[208] *See id.*

[209] Annie Snider, *What Broke the Safe Drinking Water Act?*, POLITICO (May 10, 2017), http://www.politico.com/agenda/story/2017/05/10/safe-drinking-water-perchlorate-000434 [https://perma.cc/H2DR-9REE].

regulations by having to "prove that there is a meaningful opportunity to improve public health."[210] While there are obvious benefits to this approach of ensuring sound science, those benefits are practically obsolete if no new regulations are being enacted. The whole idea behind the SDWA was that it would be updated regularly as more information came to light regarding contaminants.

Despite the challenge of having to navigate through these administrative hoops, it is still no excuse for why some contaminants have not yet been listed. For a chemical like perchlorate, there is ample evidence proving that it should be regulated under the SDWA. Even trace amounts can be dangerous to human health, as it prevents the thyroid from absorbing iodine, required to produce hormones critical for brain development.[211] California took action to regulate perchlorate in their drinking water by setting a limit of 6 ppb, a concentration approximately equating to mixing three teaspoons into an Olympic-sized swimming pool.[212] Massachusetts has set an even stricter standard of 2 ppb.[213] However, the EPA has still not taken action at a national level, despite having found the chemical in the drinking water of forty-five states, as well as in the bodies of every single American who has been tested for it.[214] After the National Resources Defense Council filed a lawsuit in 2016 demanding results, the EPA signed a consent decree agreeing to finalize regulation for perchlorate by the end of 2019.[215] Until that regulation is adopted, perchlorate remains unregulated at the federal level.

In order to address this major failure of the SDWA, it is essential to revisit the procedural requirements currently in place. House Democrats have introduced a bill that would do just that. The bill proposes to remove some of the procedural requirements and mandates that the EPA set standards for a minimum of ten new contaminants every three years, along with another measure to increase federal funding.[216] While the listing of new contaminants should continue to be based on sound science, there must be a streamlined process to enable regulators to update the list of contaminants accordingly. With updates to industrial and technological processes nationwide, threats to the public health do not remain static year after year. Accordingly, the regulations implemented to protect public health should not remain static either. Furthermore, previous amendments to the SDWA mandated that the list of regulated chemicals be routinely updated on a rolling basis, supporting the idea that Congress intended these regulations to be systematically revised. The mandate to periodically revisit the list of regulated chemicals should again be implemented to ensure the safety of the nation's drinking waters.

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[210] Dennis, *supra* note 207.

[211] Snider, *supra* note 209.

[212] *Id.*

[213] *Id.*

[214] *See id.*

[215] *Id.*

[216] Safe Drinking Water Act Amendments of 2017, H.R. 1068, 115th Cong. (1st Sess. 2017).

VI. CONCLUSION

The SDWA was a major regulatory step in protecting the nation's drinking water and the public's health. Creating a uniform set of regulations for levels of viruses, bacteria, and chemicals ensured cleaner water for all citizens and ultimately has allowed the United States to provide some of the cleanest water worldwide. The revisions made in 1986, 1996, and 2016 have continued to expand the SDWA by listing more contaminants for regulation as well as providing more federal funding to assist water providers in meeting these objectives.

While there is no doubt that the SDWA has a host of successes, there is still room to improve. The recent water crisis in Flint brought light to this fact, uncovering a pattern of intransigence, unpreparedness, environmental injustice, and ultimately, the government's own unwillingness to take immediate action. There is a need for more regulation to reduce lead levels in drinking water, including both infrastructure updates and stricter enforcement against systems who are in breach. Because of our aging infrastructure nationwide, it is necessary to acquire additional funding to support these updates.

Furthermore, hydraulic fracturing needs to be regulated at a national level. The threats that fracking poses both in the certainty that it can affect underground sources of drinking water and the adverse effects to public health make it critical that fracking be regulated under the SDWA. Fracking should be maintained once again under the UIC provisions, and fracking fluid chemicals posing a serious risk to human health need to be monitored, and in some cases, entirely banned. Additionally, the SDWA needs to be consistently updated with more contaminants that pose a health risk.

While the SDWA has transformed over the course of forty-five years into a crucial regulatory tool for the nation's drinking water supplies, it is essential that it continue to be revised in order to meet the goal of providing clean and safe drinking water to consumers.

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