The Safe Drinking Water Act Just Turned 50. What Does That Mean for Drinking Water?

AUDIO TRANSCRIPT

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CHRIS OWEN: I'm Chris Owen, Hazen's director of water and reuse innovation, and this is an audio story for Horizons, our online magazine.

CHRIS: What do you remember yourself doing in 1991? I'm assuming that you were even alive then. I was. I was in my 30s, and back then, I listened to a lot of Prince, called my friends using a landline—the kind with a big curly cord—and I supervised water quality for the City of Tampa's Water Department.

1991 was the year someone handed me a copy of the Federal Register. It contained the new Lead and Copper Rule that had just been published as part of the Safe Drinking Water Act. And they said, "What does it mean for us?"

I didn't know. So, I got a big whiteboard, and as I went through the rule, I started mapping out what seemed to be most important. There were all these little action pathways in the language that you had to follow. If this happens, then you have to do x, if that happens, you have to do y, if you get a different result, you might have to do z.

Decoding a convoluted drinking water law probably sounds like some people's definition of torture. In fact, it wasn't even what I had planned. I had earned my doctorate studying evolutionary biology with a focus on marine life: fish, seals, sea otters. And then I worked as a diver for the Fish and Wildlife Service for a while. That water quality job for the City of Tampa was a total plot twist for me.

But the even bigger plot twist was that I loved it. Turning on my own faucet now took on a whole new meaning. I was learning about everything that had to happen to water before I could drink it, and starting to see how it all tied back to the Safe Drinking Water Act. And behind all of that legalese language in the Federal Register, this law was really just a roadmap for how to get to safe, drinkable water.

In December, the Safe Drinking Water Act turned 50. I can't decide whether that's a long time or not much time at all. I wanted some help reflecting on how this law started, how it's evolved over the decades, and how we should think about it moving forward. So, I called some friends.

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CHRIS: I started with someone who could take us back through some of the history of this hugely important water law. Alan Roberson directs the Association for State Drinking Water Administrators, which supports states in their efforts to provide safe drinking water. Before that, he spent 25 years leading federal regulations advocacy work for the American Water Works Association, also known as AWWA.

Back in 1974—when the Safe Drinking Water Act became law—Alan was a college freshman, wearing bell bottoms in his civil engineering classes at Georgia Tech.

CHRIS: So tell us what drinking water treatment in the United States looked like before the SDWA.

ALAN ROBERSON: Well, it was a mix. You know, we had pioneers like Abel Wolman and George Fuller, some of the people that started AWWA or were the pioneers back in the 1900s and on that. And, you know, that's where we figured out how to do filtration, disinfection, some of the real fundamentals of conventional treatment. And the Public Health Service set guidelines, and there were several iterations of these in the 20s, 30s, 40s, 50s.

And the states could use them as they see fit. So some of them used all the guidelines as standards. Some used some of them. Some had a blend of standards and recommendations. But it was kind of a mixed bag. And so, consequently, that led to a mixed bag of safety.

And really, what the driver[s] were of the act were really two things. One, the—the general environmental movement of the 70s. Clean air, clean water, establishment of EPA, books like Silent Spring by Rachel Carson. All those converge with some studies done by EPA and researchers, some researchers at the EPA lab in Cincinnati and then over in Netherlands found trihalomethanes and found some very high numbers.

CHRIS: Trihalomethanes: They're a group of chemicals that belong to a larger group of chemicals called disinfection byproducts. More on that one later.

ALAN: And those two were probably the biggest drivers of the Safe Drinking Water Act, the kind of environmental movement, the realization by public and Congress that we needed to have enforceable standards rather than this patchwork of guidelines.

CHRIS: So in December 1974, President Gerald Ford signed the Safe Drinking Water Act into law. If you didn't already know that, we forgive you. Nixon's resignation, which happened months earlier, is much more likely to come up in trivia. But still—this new drinking water law was a really big deal. It set minimum standards for water quality in public drinking water systems, and it laid out the requirements for how to establish any new drinking water standards.

ALAN: Yeah, I think right away, the '74 Act set the floor—the floor for compliance, the floor for drinking water safety. It set the floor. And then over time, that floor has just continually been increased.

CHRIS: He means the bar has been raised higher and higher. The list of regulated contaminants, which started at 22, is now more than 100. (How much more than 100 depends on how you count some of the groups on that list.)

The SDWA has also been through two major revisions that added all sorts of rules and details. For example, it now has criteria for adding any new contaminant limits in drinking water. And it set up something called the Drinking Water State Revolving Fund, or SRF. That's a federal funding program to help utilities pay for upgrades they need to stay in compliance.

ALAN: They've done 14, 15,000 project assistance agreements. That's a big number. About half of those agreements have gone to disadvantaged communities. And I think that was sort of the point of the program is that, how do you help people that struggle to secure traditional financing.

CHRIS: Alan has seen and participated in a lot of those evolutions, first at AWWA and now through ASDWA. He said a huge amount of effort has gone into both shaping all these rules and complying with them. For example, just monitoring for individual contaminants takes a lot of work, and that work never stops for a utility.

ALAN: There are different monitoring schedules depending on what you found in the water, how often you have to do it. And so, you know, just to stay in compliance for a large system is a challenge.

CHRIS: I asked him what he wishes more people understood about the history of our drinking water.

ALAN: I think it's that drinking water is safer now than it's ever been. You know, again, we have all these enforceable standards over a wide range, and yet there's still a lot of challenges ahead.

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CHRIS: Erik Rosenfeldt, Hazen's drinking water practice lead, said that one of the biggest ways the Safe Drinking Water Act has evolved over the decades relates to the kinds of contaminants it regulates, and the kinds of treatment technologies needed to remove them.

ERIK ROSENFELDT: The general ideas for what we were concerned about in drinking water, besides the fact that people don't want to drink water that's cloudy or highly turbid, was found around the late 1800s, early 1900s with the idea of germ theory and things that, you know, pathogenic organisms that make people sick. That was really the biggest concern for people in safe drinking water is, you know, how do you avoid getting that water contaminated with microorganisms that are going to make people sick? And like I said, that stuff was understood before, long before the Safe Drinking Water Act, you know, a century before, 75 years before.

CHRIS: But that started to change in the 1980s and 90s. Remember those trihalomethane studies that Alan Roberson mentioned? Trihalomethanes, or THMs, are chemicals that were discovered in the 60s and 70s. They turned out to be a large class of chemicals called disinfection byproducts.

ERIK: So the idea that we told everybody they needed to chlorinate their water, but we didn't tell them how much, right, led to people just saying, well, I'm going to make my water extra safe and I'm going to add a ton of chlorine.

And then along the way you find out that, well, if you're adding a bunch of chlorine to water that has naturally occurring organics in it, there will be reactions. And some of those reactions will cause things like disinfection byproducts, chlorinated organic chemicals, which are notorious for being cancer-causing chemicals. So we started evolving our thinking away from just keeping it safe from pathogenic organisms to thinking about other things that might also be in the water, other chemical things.

So there were things like the THM rule, which started thinking about drinking water as a place where carcinogenic chemicals could be formed. And then that morphed into the Disinfection Byproducts Rule. And then those kind of got combined in these amendments where the EPA came up with this concept of, we need to ensure a minimum safe level of disinfection, and we need to make sure that we're not overdoing it and creating these harmful byproducts.

And so the amendments have been ways for them to step through that. And along the way, every one of those amendments causes a shift in the technology.

When you can think about the ways that you need to do disinfection—to ensure disinfection without overdoing it, all of a sudden chlorine isn't the only answer. You have to think about other technologies to get much of your disinfection, because chlorine has these byproducts, right? So that's when things like ozone and UV became more integral into drinking water treatment plants.

CHRIS: In early 2024, the EPA finalized new drinking water limits for six chemicals called per- and polyfluoroalkyl substances, or PFAS. Erik said those rules have kicked off another pivotal moment for drinking water technology, because a huge number of utilities will likely be affected. And it takes really advanced technology—equipment that most utilities don't currently have—to remove PFAS from water.

ERIK: And PFAS is a set of organic chemicals that's extremely resistant to oxidation and really only treatable by removing out of the water. And so these six PFAS compounds that just had the final rule promulgated ... is leading towards potentially mass adoption of things like GAC or ion exchange technology or membrane technology. That's the best available techniques for removing these six chemicals. And so we're kind of at the precipice of a potential shift, one of these sort of monumental shifts within the water industry.

What they're also doing is driving a lot of research into new technologies that could potentially destroy these PFAS compounds. And that would be the ideal case, because right now, our solution to get these things out of drinking water is essentially to just pull them out of drinking water. But we haven't done anything to the actual contaminant itself. So we're just sort of shifting the media of concern from drinking water to whatever we stuck that material onto.

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CHRIS: Cynthia Lane said it doesn't help that PFAS removal technology is very expensive. Cynthia designed drinking water systems for a private sector firm before spending almost a decade doing regulatory and technical work at AWWA. She's now the general manager of two utilities (called districts) that operate just south of Denver: the Platte Canyon Water and Sanitation District and the Southwest Metropolitan Water and Sanitation District. Her team also distributes water for three smaller utilities.

CYNTHIA LANE: So when you factor in all of those other districts, we actually serve a population of about 85,000 people.

CHRIS: Cynthia spends a lot of time explaining the cost of water to customers—and trying to find ways to make it more affordable. One way is through her work on AWWA's Water Utility Council, which oversees AWWA's government affairs work to make sure it's focusing on the right things.

CYNTHIA: Our policy efforts have been very squarely focused on making sure that as we're seeing regulatory efforts come through on PFAS, on lead and copper, and I know we've got some microbial work teed up in the next couple of years, that all of that is backed up by funding. Or, frankly, when it comes to PFAS, we have a whole different conversation we're having about the polluter pay principle—

CHRIS: Ah, the polluter pay principle. It's this idea that whoever did the polluting in the first place should be the one who foots the bill for cleanup. Some utilities are pursuing that avenue by suing major PFAS manufacturers like 3M.

The Water Utility Council is calling for the permanent creation of a Low-Income Household Water Assistance Program—a continuation of a program that Congress temporarily set up during the pandemic. It protects financially stressed customers from losing their water service if they can't pay the bills. That's because the government recognizes that when you lose access to clean water, it gets a lot harder to stay hydrated, to cook, to clean. It's a health and safety issue.

CYNTHIA: That was very successful during COVID, and we'd love to see it stood up as a more permanent program as we start to talk about the Lead and Copper Rule, PFAS rule, microbial rules, everything else that's coming and we're putting this financial burden on our customers.

CHRIS: Cynthia said we're now in an era of the Safe Drinking Water Act where we're constantly talking about risk. We've addressed the most immediate health risks in water: the stuff that causes diseases like typhoid and cholera. Things like PFAS represent a very real risk that we need to consider, but the risks are more complex and much more expensive to fix.

CYNTHIA: So, when we think about risk reduction, no risk is the best risk. But no risk is not a reality. So then it comes to, what is the risk we can accept?

CHRIS: Much of that dialogue is happening with customers. When the SDWA went through its second major revision in 1996, the EPA began requiring utilities to communicate with their customers through things like the Consumer Confidence Reports. Those are annual water quality reports that have to include specific information like where the water comes from, what contaminants have been detected in it, and what possible health effects those contaminants could have.

They're very important transparency tools. But Cynthia said that more recently, especially after the Flint water crisis, utilities have been wrestling with the fact that sometimes meeting those legal communication requirements just isn't enough. Especially if you're communicating with a community that's historically been marginalized and may not trust outsiders.

Take Denver Water's lead service line replacement program. Cynthia sits on an advisory committee for it, since the utilities she manages receive their water from Denver Water. She said they want to get residents on board with two things: letting Denver Water replace aging service lines on their private properties and using water filters distributed by the utility while they wait for those replacements to happen.

CYNTHIA: They have actually engaged local on the ground community service, well, community organizations to deliver that messaging directly to those residents. So whether those community organizations speak a different language, so, whether it's Spanish or one of the other languages that's spoken here in the area, they're actually having those community groups deliver that messaging instead of Denver Water, so it comes from a group that they trust.

Just those two basic items, which seem very basic, are a big deal to some residents to have that type of trust that they will allow those things to happen. But as a group, as a community, we've been—are becoming more successful at gaining that trust as we're moving through that program.

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CHRIS: Stephanie Ishii, Hazen's director of integrated resource technology, also thinks a lot about risk communication, especially as it relates to source waters—the bodies of water that supply drinking water. The Safe Drinking Water Act requires states to establish source water protection programs. But Stephanie says our whole concept of source water is changing right now.

STEPHANIE ISHII: I think that as our communities are becoming denser and denser, as our analytical capabilities are becoming stronger and stronger, and as—as you well know—chemicals that are hard to break down are being tracked throughout our systems, we are all realizing that there is no such thing as wastewater and stormwater and source waters living in their own cups or buckets—that, as expected as it might sound, it is all one water.

And so, because of that, I think our definition of source water is expanding to say, in fact, all waters—that one water—is a potential source water. And so we need to treat and manage source water, wastewater, these things that we used to think of having lower value, just as we would a spring water, a groundwater or anything else.

CHRIS: One of the biggest challenges Stephanie sees today around source water protection relates to the trend of industrial onshoring: bringing manufacturing processes that have been historically done overseas back to the U.S.

STEPHANIE: That industrial onshoring absolutely has benefits with respect to job creation and supply chain certainty and addressing geopolitical challenges and many other things that I probably know very, very little about. But it also means that we're bringing new water users and new wastewater generators to our communities that are producing—that are using water at a rate that many communities maybe have not seen in the past, because they haven't had industries within their service area. But they're also producing waste streams that are potentially very different than the waste streams that that utility or that community has seen in the past.

CHRIS: She's talking about waste from things like battery and computer chip manufacturing. In some cases, water and wastewater utilities might not even have the right equipment to remove that kind of stuff from water.

STEPHANIE: And so I feel like more than anything, the thing that's required is information sharing and just kind of this recognition on both parts of, you know, you've got your primary objectives as an industry, we have our primary objectives as a municipality, and they could at first flush seem really

conflicting with each other. But if we talk and we talk about our objectives, our constraints, our flexibilities, we can get to a place where we can both say yes.

CHRIS: So, if you could identify one or two strategic improvements in the SDWA, what would they be?

STEPHANIE: The first thing that comes to mind is—and I think it's something that probably comes to the minds of many because of all the conversations about PFAS—is, when you consider just the number of chemicals that are created every day, the number of chemicals that are brought to market every single day, and just the ubiquitous nature of those chemicals in everything that we use and everything that we eat and everything that we touch, everything that we dispose of, it'd be interesting and I think hopeful and fruitful to think about one of the strategic changes to the Act being—not necessarily, you know, lessening our focus on targeted analyses and the limiting of these specific individual constituents within the Act, but to really think about what the role of non-targeted analyses or indicator compounds or effect-based testing or bioassays is within that Act, so that we can be regulating, at the same time, those concentrations of individual constituents, but also recognizing that we probably can't keep up with the manufacturing of every single individual constituent that's being brought to market and might have a health impact.

CHRIS: I don't have time to explain all of the technical terms that Stephanie just mentioned. And by that, I mean I don't want to put you to sleep. What's important to understand is that she's talking about new ways to measure and understand the health effects of mixes of chemicals in water. And this is a really key point.

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Historically, the Safe Drinking Water Act has looked at pollutants individually. You measure and treat drinking water for a specific contaminant because research has shown that above a certain concentration, that one contaminant can cause health issues. But we humans are rarely exposed to just one pollutant at a time. It's usually a mix.

Remember how I mentioned that the SDWA now regulates 100 or more contaminants? Just within the group of chemicals known as PFAS, there are tens of thousands of individual chemicals. More come on the market every year. Stephanie's saying that instead of trying to keep up with every possible substance, chemical or otherwise, in drinking water, we should explore analytical methods like non-targeted analyses and bioassays—techniques that could potentially allow us to measure and study the health effects of groups of chemicals.

Stephanie also said she'd like to see the Safe Drinking Water Act give utilities more authority to protect their drinking water sources. And that would include requirements for establishing communication pathways within your watershed.

That could be useful not just for the industrial onshoring trend, but also for climate change and the risk that climate change is opening up for drinking water.

STEPHANIE: Climate impacts way more than just temperature and precipitation. So the things that also need to be brought into consideration over these long-term planning horizons are, you know, how does climate change impact the way that we use water?

So, for example, agricultural communities that are in the Midwest might do zero irrigation right now. They rely on precipitation and that supports the development that they need of their crops or their livestock. Ohio just went through a major drought. And this conversation about the role of irrigation within the agricultural community is becoming more and more prevalent. And so, what does that mean? It means it's going to entirely change our predicted water use patterns, because when we were looking into the future based on what's happened in the past, we assumed that this agricultural entity was not going to be pulling on groundwater supplies or not going to be pulling on surface water supplies because their needs were satisfied by precipitation.

So I feel like one of the biggest things about climate change is that it's going to make so much more obvious the connections between our water resources and between our users of those water resources, whether that be the environment, the agricultural community, the industrial community, or municipal communities, and the need for information transfer across all of those different entities.

CHRIS: Alan Roberson said that the drinking water field also needs to think through how to prepare for more acute climate-related events like floods, algal blooms, and wildfires, all of which pose safety risks to drinking water systems. When I spoke with him in October, a number of communities in the Southeast were still working to repair their drinking water systems, which were taken offline by the devastating floods from Hurricane Helene.

ALAN: And so how do we adjust things to that? I don't have an easy answer for it, other than I think we really need to think carefully about the concept of buying insurance. How much do we invest in designing and building plants differently to provide more resilience?

CHRIS: Erik Rosenfeldt agreed that climate change is already bringing huge challenges that could make it even harder to comply with the Safe Drinking Water Act. But he echoed what Alan said earlier about our drinking water being safer than it’s ever been.

ERIK: The whole cycle is just set up to make sure that Americans and customers of these water utilities can confidently turn on their tap, get a great, cool glass of water, drink it, be safe, and oh, by the way, not pay exorbitantly for it. The amount of money that that glass of water costs compared to compared to a bottle of water, is 50 to 100 times less, right? It's cheap, it's safe, it's always on when you turn on that tap. It’s consistent everywhere.

And that truly is the legacy of the Safe Drinking Water Act. It is no different whether you're drinking New York City water or whether you're drinking middle-of-nowhere Missouri public water. It is held to the same standards.

CHRIS: Cynthia Lane wishes more people understood what I first started to learn with my whiteboard back in 1991: that is, everything the Safe Drinking Water Act is already doing for us, day in and day out.

CYNTHIA: We prioritize our water main replacements to focus on water mains that have repeated breaks and repeated failures because if I don't replace them and I have a water main break and I have to do a boil water notice, you know, I'm back in the regulation. So even just something as simple as prioritizing our 20-year capital plan, it's really all tied to making sure that we're complying

with the basics of the [regulations]. Everything that we do ties back to the Safe Drinking Water Act. Every decision we make about funding, every decision we make about operations when, you know, my guys are out there turning valves or they're out there, you know, maintaining a fire hydrant.

It all comes back—everything that we could do as a utility—ties back to the Safe Drinking Water Act.

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CHRIS: That's what we hope you take away from these conversations: how safe our drinking water is here in the U.S., how much work goes into making it safe, and how our very idea of what "safe" means is always evolving. And how the Safe Drinking Water Act is the backbone of that work.

I'm Chris Owen for Horizons, Hazen's online magazine. Thanks for listening.