

Early Implementation of the Safe Drinking Water Act of 1974*

Chapter 1: The Major Elements of the Legislation and their Historical Context

ARDEN CALVERT: Hello, my name is Arden Calvert, and I will be serving as moderator for this oral history of the early implementation by EPA of the Safe Drinking Water Act of 1974.

Let me begin with a brief biography. I retired from EPA in 2001 after 31 years in several EPA programs, including working in the resource management unit of the Drinking Water Program during the 1980s. Since retirement I've been teaching a course on the relationship between science and environmental policy at several colleges. I hold a bachelor's degree in Government from Hamilton College and a master's degree in Political Science from the University of Toronto.

This oral history of the early implementation of the Safe Drinking Water Act has brought together a number of senior professional managers who played major roles in these activities between 1975 and 1985. Collectively, these individuals have provided more than 200 years of experience in managing environmental protection and public health programs.

Our goals in this video are fourfold: First, to set the historical context in which the program was launched and outline the major elements of this historic legislation. Second, describe the scientific, technical, and political challenges we've faced. Third, recount how we undertook to implement the new program. And with the benefit of hindsight, fourth, identify the factors that we believe contributed to our successes in implementing the Federal Drinking Water Program. It is our hope that some of the lessons learned through our experiences may be of interest to historians and useful to future managers of environmental programs.

Before we begin with the details, let me introduce Vic Kimm and ask him an opening question. Vic led the Drinking Water Program from its initiation in 1975 through 1985. He was a longtime career manager at EPA and subsequently served another 10 years as a senior career official in the Office of Pesticides and Toxic Substances, which controlled the use of industrial chemicals and the licensing of pesticides. He is an environmental engineer by training, having received bachelor's and master's degrees from Manhattan College and New York University, and also studied Economics and Policy Development at Princeton University. So, Vic, what were you thinking when you were faced with the daunting task of leading the creation of a brand new agency still trying to find its footing?

VIC KIMM: Good morning, Arden. I'm very pleased to join the panel and talk about the early days of the Drinking Water Program. I was very pleased to be offered an opportunity to lead this new program just as it was getting underway. I had joined the agency at its inception in 1970, where I served as the Deputy in the Policy Shop. In that position I got to know virtually all of the senior managers at the agency, but more importantly, recognized the new agency culture, which was very open to innovation. And for that reason it was a fun place to work and a fun place to think about developing a new program.

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In addition, when I looked at the legislation, which had a strong proclivity for the state management, I was very sympathetic with that as an approach. That was based on my belief that lasting changes are only likely to be sustained if you can impact the local institutions. This belief was a result of two separate but extensive experiences I had in the '60s. I served in the early '60s for a number of years in Latin America as a volunteer -- an "ask not" generation volunteer, if you will -- doing community development work. And in the latter part of the decade I served as an official in the anti-poverty programs, doing Civil Rights work in the South. And in both of these sets of circumstances, I came to a strong conviction that lasting change could only come through institution building, and that was really the name of the game. And so it was with real enthusiasm that I accepted the appointment. I began the job thinking that this would be a great adventure into the future. But, in fact, I had very little real knowledge of the kinds of challenges we would face as we implemented the new program. Back to you, Arden.

ARDEN CALVERT: Thank you, Vic. Before discussing the program itself, we would like to provide some historical context. What is the link between drinking water quality and public health? To do this we have asked Doctor Joseph Cotruvo to speak. Joe served as the director of the Standards Division for its first 12 years of the program and has had and has extensive worldwide experience with risk assessment, public health standards, and water treatment technology. Joe holds an undergraduate Chemistry degree from Cleveland University and a PhD in Chemistry from Ohio State. Joe?

JOE COTRUVO: Thank you. Well, there is a longstanding historical concern about drinking water quality. It goes way back, well before the Romans, even, but the Romans were particularly adept at managing drinking water. We know they built aqueducts shipping water for miles from the hills, even though most of their settlements were on rivers. So, they understood that it wasn't always a good idea to drink the water that was readily at hand.

The actual concerns about public health in drinking water actually took a lot longer time to evolve because that linkage was not obvious. In the middle 1800s, John Snow famously did perhaps the first real epidemiology study and he applied it to drinking water: the famous Broad Street pump incident, where there was an outbreak of cholera in London at the time. And after a lot of work and a lot of legwork on his part, he convinced the authorities to take the pump panel off, basically. Now, a lot of people used that water from that pump. And it's not that they were all in agreement -- there was a tremendous amount of disagreement -- but eventually it happened and eventually the disease outbreak ended. And that's the history of the beginning of the understanding of a linkage between drinking water and health.

But at that point there was not an understanding of microbial disease. Bacteria were not understood. It wasn't until about 30 years later that Louis Pasteur and Robert Cook identified bacteria, actually identified some of them in drinking water, and verified, essentially, what Snow had discovered. But

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even with that water treatment didn't get instituted quickly. Again, toward the ends of the 1800s, the engineers who were processing water began to introduce filtration. And it wasn't until 1908, actually, in the United States in New Jersey, where chloride was first applied to drinking water treatment as a disinfectant, and even that was met with a lot of skepticism, and in fact, lawsuits trying to prevent it.

But ultimately, once a number of water systems were upgraded to the point of having filtration and disinfection, the incidence of waterborne disease and sanitation-related diseases began to drop pretty rapidly, and by the 1920s or so really bottom lined consistently. But the background to all of this is that there were very significant risks from people consuming surface drinking water in those days in the early 1900s and 1800s and before. In the United States, if you lived in a major city on a major river, in the East, particularly, chances are your child wouldn't make it. There was about one in five deaths that occurred in young children during that time period and, of course, that's been very, very significantly reduced. So, many people have said that the introduction of chlorine is perhaps the greatest public health breakthrough of the 20th century.

ARDEN CALVERT: Thank you. Thank you, Joe. Can you talk a little bit about the historic federal role in drinking water?

JOE COTRUVO: It is interesting, by the way, that the Safe Drinking Water Act didn't pass until 1974, about 200 years after the formation of the country. Up until that time drinking water was managed at the state level. States determined appropriate specifications sometimes, and provided some oversight. But it wasn't given a great amount of priority, especially as we approached the middle of the 20th century. However, in 1914 there was an understanding of the need to approve the quality of drinking water so that interstate commerce could be protected. And so what are called major watering points, major transportation centers, were covered by standards produced by the United States Public Health Service. Ultimately, those standards, in fact, were adopted for national drinking water standards after the passage of the Safe Drinking Water Act.

ARDEN CALVERT: So, Vic, how did the federal role in drinking water quality change?

VIC KIMM: The new legislation significantly changed and elevated the federal responsibilities dealing with drinking water quality.

But first let me say a little bit about where the institutions were in the '70s [with respect] to the time frame at which the legislation was actually enacted. For their part, the state health departments had led the reform of water works practices in the early decades of the 20th century, [and] they felt that they had a significant success. They had virtually eliminated the classical waterborne diseases like cholera and typhoid. And as they went along, they shifted their priorities to other needs they saw and reduced the amount of resources devoted to oversight of the public water systems. What that meant

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in practice was that there was a lower level of supervision, and that got picked up in some of the later studies.

For the water works managers, they had pretty much the same perception—that is, they saw or believed that the major, real threats were behind them. They focused on contemporary problems, and so their priorities really related to providing consistent and effective service through aging infrastructure. There was a significant effort to maintaining the bacteriological quality of the drinking water they were supplying and with minimizing costs and being perceived as effective managers.

Within the water works professionals, however, there were a number of other more serious concerns that weren't being addressed or being discussed. And these related largely to a Public Health Service community water survey of 1969, which looked at more than a thousand systems across the country and concluded, (1) that the state supervision programs were very uneven and often lax, and (2) they expressed concerns about the bacteriological quality of the water, particularly among small systems that appeared to be not doing the routine monitoring that the then in-place regs required.

In addition to that, the environmental community came forth with—not only did they have the general concerns about public health protection, but they raised the specter of a potential link between organic contaminants in drinking water and cancer rates. And just as the Congress was about to address the new legislation, EDF [Environmental Defense Fund] published a statistical study that did, in fact, seem to support that proposition, that there was a link between organic contaminants and cancer rates in the City of New Orleans. The study received a tremendous amount of media attention, and I'm sure contributed to the enactment of the bill.

And then, finally, at that point in time I think most Americans believed that their water was safe. And so that created for us, as we began the program, a bit of a communication problem, and we wanted to address specific problems without undermining the general belief that drinking water in the United States was among the safest in the world. And then, finally, I think we need to look at what was going on in Congress during these years. That is, the '70s saw the Congress elevate federal roles in a variety of pollution control programs dealing with air pollution and water pollution. And so I think no one really should have been surprised that as the Drinking Water Program came to their attention, that they would enact similar legislation. Back to you, Arden.

ARDEN CALVERT: So, what were the major provisions of the Safe Drinking Water Act?

VIC KIMM: The Safe Drinking Water Act did a very clear job of defining roles and responsibilities. It stated that EPA would be responsible for generating scientifically based standards that would be applicable to all water supplies that served 25 or more customers. It set a process for setting new standards that would include interim standards based on the most recent Public Health Service standards of '63, I believe. And secondly, that we would contract with the National Academy of Sciences for a major study of contaminants in drinking water that might have health significance. And

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third, that we would issue revised regulations, once the NAS was at hand, that would significantly expand the number of contaminants for which standards would be generated.

The law indicated quite clearly that the utilities were the people expected to do the monitoring and to comply with the new standards. Similarly, it expressed a very strong preference that the states reassume or rebuild their capacities to fulfill the oversight function. And to that end, they included a large, new federal grant program for the states. I believe it was \$20 million in the first year, but this was the wherewithal to take those programs, hire new professionals, expand the laboratories, and do all of the things necessary to complete the oversight function. The law also made it quite explicit that EPA would only take on the oversight role where the states were either absolutely unwilling or unable to take on that responsibility—again, showing us a strong preference.

And, finally, among other provisions, the statute included a requirement for public notice. And this was the first step in what generally became known as “community right-to-know” legislation, which was picked up in subsequent legislation in a number of areas. But as it related to the Drinking Water Program, it meant that the utilities had an absolute responsibility to notify the customers if they exceeded standards. Now, in fact, that provision led to one of the few lighter moments that we had in the first year of the program. And that was when I received a letter from the warden of a state penitentiary, who indicated he had read the law, and that if public notice was ever required in his facility, he hoped that I would join him in the yard and explain to the inmates that the drinking water was not safe to drink. This was received with a good deal of humor by my friends and staff, and fortunately never really happened. Anyway, back to you, Arden.

ARDEN CALVERT: Thank you, Vic. So, what were the challenges that you faced during this initial implementation period?

VIC KIMM: Well, as we began the program we made a number of discoveries that significantly impacted our priorities for the first few years. To begin with, we looked at the basis for the old Public Health Service standards, and they were really the product of a different era. They included an expert panel coming together and issuing the standards without any scientific justification or background documents, and with no provisions for due process and public participation. What this meant in practice was that for whatever regulatory activities we were going to take on, we were going to have to begin with an empty slate, and we were going to have to require the exhaustive technical justifications and the extensive due process provisions that applied to all new regulations at that time.

A second challenge that we recognized was as we began to deal with the states, it was clear that they did not have inventories of all of the public water systems covered by the new law. This meant that we had to sit down with the 50 states and work out a new national inventory, and fortunately we were able to use automated data-processing systems that were becoming available at the time, but it was a large task. But it was absolutely necessary to define who, in fact, were the regulated community.

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Another area was our effort to say, "Well, what data is there to show us what contaminants that are present in drinking water that aren't presently regulated?" And here our activities were really caught up in the technological change, which is a quite common phenomenon. In the early '70s there was an analytical breakthrough that enabled chemists to identify contaminants in water at levels that were previously undetected. But these were essentially advanced technologies that were applied in research in research laboratories, but they had not been applied to drinking water at the utility level, in large measure because most of the utilities did not yet have the sophisticated analytical tools that it took to undertake this work. And here, again, it set for us a national priority, that we had to come up with national surveys that were statistically significant using the new technology to get a better handle on what contaminants were actually occurring in drinking water.

About this time it became clear to us that the resources we had available to us were not adequate to the tasks that were in front of us, and so we began an effort to try to increase our resources. We began the program with enough resources to cover about 50 work years in headquarters, 20 positions in a lab in Cincinnati, and about three dozen Public Health Service Officers in EPA's regions, and most of those folks had been associated with the Public Health Service Interstate Carrier Program. At any rate, the business of attracting more resources meant that we had to devote significant time to briefing other people in the Agency, to dealing with the Office of Management and Budget, and then finally dealing with the Congressional committees. While it took some time and effort, those efforts were quite successful. I think we'll talk a little bit more about that later in the day.

And then, finally, the work with the inventories in the states got us to focus on what we termed, "the small system problem." And here the facts of life were the vast majority of Americans were served by a relatively small number of large systems that were professionally managed. But the vast majority of systems were small, and many of them did not include any professional water works managers. An example of that would be something like a trailer park. And so for these systems we had a unique challenge. That is, we couldn't just assume that they would add treatment because that was probably not feasible for these smaller systems. We developed a strategy indicating compliance was feasible through a number of other relatively straightforward mechanisms—drilling a new well, hooking onto a nearby system—that did have a better quality water, et cetera.

But once we had a strategy, it was clear to us we needed to communicate with that portion of the regulated universe. And so in the first few years of the agency a number of our staff found themselves going to meetings of trailer park managers to explain to them, (1) they were public water systems under the law; (2) that they had requirements to conduct monitoring, particularly the bacteriological monitoring; and (3) the good news was that in most places the states would analyze those samples for free, so it wouldn't be a big cost item for the trailer parks to begin to come into compliance.

At any rate, despite all of these problems, we were able to maintain an extraordinary level of enthusiasm among the staff. I think they saw themselves as professionals pursuing significant public

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health goals, and I think this attitude among our staff across the board helped us gain a lot of public support as we began implementation activities.

ARDEN CALVERT: Faced with all of this, did you have some sort of strategy for implementation in mind?

VIC KIMM: Right, well, let me try to briefly describe the major elements of our implementation strategy. We began by publishing a strategy called, "One Step at a Time," in which we said, in view of the challenges, implementation would have to be incremental. We would begin with what we saw as the largest public health issues first. Second, we would use transparent processes so that people could have input into our deliberations. And third, we would take cost and feasibility into account in setting any new requirements. This, in fact, was required by the statute.

We also began with a focus on communication strategies. That is, we identified a number of critical stakeholder groups, and then for each group we developed a strategy about how would we communicate with them, how would we try to draw them into our deliberative processes. Among the critical stakeholders, obviously, were the regions and states, because if they didn't share in developing the requirements, since they shared implementation responsibilities, we would not be able to get the program up and running as quickly as we would have liked.

Secondly, we focused on the utility managers. If these are the folks who have to comply with the regulations, to the degree that they understood the requirements, et cetera, we thought that would enhance our ability to get the high levels of compliance that we were after. Third, we obviously had a responsibility to deal with the public, and here we relied principally on major media speeches, that kind of thing, to begin to get our word out about what we were all about.

And then another element of our communication strategy and it may not have been apparent, but at that time the committees that authorized legislation assigned staff to monitor implementation, and so we had an absolute requirement to go and talk to Congressional staffs as we began the program, as we found problems, and as we implemented solutions.

And then finally we made a decision to invest heavily in the National Drinking Water Advisory Council. Lots of statutes call for independent advisory councils, as the Drinking Water Program did, but for they were for the most part, in my experience, ceremonial. We decided, no, that we would try to make them substantial and substantive and invest in them heavily in the beginning of the program.

The Council was composed of 15 members. They came from nominations from the National Academy of Sciences, and they included a wide range of expertise. We committed to having them meet often, every few months. We had the meetings, not only in Washington, but we had them around the country. And we devoted significant resources to having our senior managers present to the Council,

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"Here are the problems that we're dealing with. Here are the solutions we're developing," or, "Here are the actions that we plan to take."

And again, we discovered that this was very effective in meeting a number of our communication needs. First, the regional meetings guaranteed that the local media would focus on the proceedings and begin asking questions about local drinking water issues, which was helpful.

Secondly, the Council meetings became a very effective way of reaching what we called "the trade media." At that point there were a number of private newsletters that circulated among public health officials, among drinking water practitioners, that purported to track what the government was doing in their fields of interest. And again, this turned out to be another effective way of getting anyone who was concerned with the program to understand the evolving nature of what we were undertaking. Back to you, Arden.

ARDEN CALVERT: Thank you, Vic. So, what were the regional concerns about headquarters as the program began? For this question we turn to Jack Hoffbuhr, a Public Health Officer and the head of EPA's regional Drinking Water Program in Denver, Colorado. Jack was a leader among regional supply staffs, and in his post-retirement went on to become the executive director of the water supply professional association, the American Water Works Association. In that position, which he held for 14 years, he led a major transformation of the group's interest in modern management practices. Among his many accomplishments, he was part of the first class of Peace Corps volunteers, working in the mountains of Peru. Jack holds a Bachelor of Science and a Masters of Science in Chemical Engineering from Oregon State University and an MPA from the University of Colorado.

JACK HOFFBUHR: Thank you, Arden. As Vic mentioned, before the creation of the Drinking Water Program, the Interstate Carrier Program was being implemented by a group of commissioned officers of the US Public Health Service, both in the regions and in headquarters.

We were a very close-knit group for a couple of reasons. Number one, there weren't very many of us. And number two, we strongly believed in our common mission of safe drinking water. We had forged very, very strong working relationships with utilities and with the states during implementation of the program, and we had all worked together on the community water supply survey that Vic mentioned. We really did have to work together and in a very cooperative fashion because we didn't have very much legislative authority, and so to get any improvements made we had to work closely with the states and the affected utilities.

So, when this new group showed up to form the Drinking Water Program we didn't know who they were. And they were saying the right things about involvement of the regions, involvement of the states, working together to get a good implementation process underway. However, we were pretty

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skeptical because of our previous experience with both the Water Pollution Control Program and the Air Pollution Control Program, which were both tightly controlled by headquarters. So, you can imagine our pleasant surprise when these folks actually walking their talk and forming work groups with both states and some utilities and the regions fully involved. And they were really doing what they said they would do regarding cooperation. So, we felt that we could work this out.

So, obviously we didn't agree on everything, and everything wasn't wine and roses, but just based on our initial working relationship we felt that as time went on we could work the kinks out and proceed with effective implementation. This was very critical, since the state drinking water programs were severely understaffed and severely underfunded. And there was no way they were going to be able to proceed with implementing this program on their own without some very major hand-holding. And headquarters, for their part, had really done the job of getting us some badly needed resources that we really needed in order to do that major hand-holding.

During the same time, the water utilities actually were more interested in the standards-setting process rather than who was actually going to enforce these regulations. But eventually they came around and supported primary enforcement responsibility for the states, primarily because they realized they would rather deal with somebody they knew and had been working with for sometime rather than some distant regional office. Now, the environmental groups during this time were pretty much a mixed bag. They also were primarily interested in the actual standards-setting process, and in some cases, particularly in our region, they actually opposed primary enforcement responsibility because they simply didn't trust the states to implement the program properly. But all in all, because of the strong headquarters and regional commitment to communication and involvement, we eventually turned the tide in all but one state. So, Arden, what started out as skepticism turned into a strong working relationship that I think was highly successful.

ARDEN CALVERT: Thank you, Jack. Now let us turn to John Wise for additional comments from a regional perspective on early implementation activities. John joined the EPA San Francisco office at its implementation in 1970 and served as the drinking water program branch chief from 1975 to 1984. He subsequently served as Deputy Regional Administrator from 1984 until his retirement in 2001. He was very active during the formative years of the Drinking Water Program and was a major contributor to many of our innovative initiatives. His education includes a BS, Bachelor of Science in Sanitary Engineering and Business Finance from the University of Colorado, and a Masters of Science in Engineering and Economic Planning from Stanford University. John?

JOHN WISE: Well, thank you, Arden. As Jack has just noted, in 1974 very few states had the capability to implement the new Safe Drinking Water model. The regional offices, working very closely with headquarters, had to develop and customize a drinking water program for each state. This began the classic triangulation -- headquarters, regions, and states -- that enabled new drinking water programs to be built from scratch that could meet federal requirements. The program grants that EPA offered to the states in the very early years were instrumental in helping the states build the needed capacity and

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the capability to be certified for primary enforcement authority. And so over time we had ten regions working with 50 different states that forged one consistent national program. This was an extraordinarily successful model of implementing a national law through the states, our partners.

ARDEN CALVERT: This concludes the first segment of the session. Segment two will be about standard setting.

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Chapter 2: The Scientific, Technical, and Political Challenges

ARDEN CALVERT: This is the second installment of the oral history of the Drinking Water Program at EPA. We'll have a discussion on the first task the new Safe Drinking Water Act set for the Office of Drinking Water—namely, setting enforceable public system standards. Joe Cotruvo, could you tell us more about that?

JOE COTRUVO: Yes, the law passed in 1974 and required publication of interim standards very shortly thereafter, and there were interim standards published in 1975, proposed and ultimately promulgated. They were derived directly from the 1962 Public Health Service standards. They included ten inorganic chemicals, six pesticides, several microbial risk-related items like coliform and turbidity. And later on, a year or so later, comprehensive standards for radionuclides were produced. So, these were familiar to the industry, generally, and so there actually wasn't too much of a concern expressed with the release of those standards.

However, the Congress also built in a process for moving toward revised standards, ultimately, the national drinking water regulations. They required that the agency contract with the National Academy of Sciences to do a thorough review of, essentially, all that they could learn about drinking water quality, and to provide that report to the agency. And the agency, EPA, was required by the law to, within a hundred days of release of the report, propose new standards.

Well, the National Academy report didn't quite have the kind of information that Congress expected. For one thing, there really wasn't a lot of information available on drinking water quality. They did their best to produce a comprehensive report. Perhaps the most important part of the report was that it described some methodologies for doing risk assessments for chemicals that were carcinogens. And so, we used that information and the current methodology from established standards, but the agency had to go back and actually develop all of the basic information to produce the revised regulations. So, that meant going back and doing comprehensive national monitoring surveys, which we did in concert with the research and development people in Cincinnati, and our drinking water lab, also in Cincinnati.

The first major part of that involved the recently identified trihalomethanes, chloroform and related chemicals, which just a year or two before had been identified in drinking water, initially by a brewery chemist in the Netherlands, but ultimately followed up on by our research people in the Cincinnati laboratories. And methods were developed to do the analyses, a comprehensive national survey was conducted, and we learned that every water supply that was chlorinated had at least some trihalomethanes (THM), and some had quite a lot.

Simultaneously, there was a release of the bioassay study conducted by the National Toxicology Program on chloroform where they dosed the animals at very high doses, as they normally do, and determined that there were cancers found in rats and mice in that study from long-term exposure at high doses.

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So, with those two pieces of information, essentially the occurrence of the trihalomethanes and the fact that at least one of them was carcinogenic under the NTP bioassay screening test, we used that to construct the trial method and trihalomethane regulations.

Those were proposed in 1978. They included a methodology that was very different from what was followed with the interim standards. The agency had the responsibility to produce all of the supporting information, and in quite considerable detail, and use that information -- be it toxicology, analytical chemistry, occurrence, treatment technology, costs, economic impact -- to craft a regulation for the trihalomethanes. So that was really the first new drinking water regulation. And the particular complexity of that resulted from the fact that it came from disinfection, from the use of chlorine, which was really a very significant public health measure. So, it was really important that that regulation be crafted in such a way that it would not inadvertently cause people to reduce the technology, the treatment that they were using for disinfection to reduce microbial risk, and at the same time reduce the risks of these byproduct chemicals that were being generated at the same time. So, that regulation was prepared and proposed.

ARDEN CALVERT: Before we go into that, let me just ask you. If the NAS report couldn't provide what it was charged to provide, that seemed to leave you and the program a bit in the lurch, and you were really sort of required to invent out of whole cloth the process of integrating the toxicology, the analytical methods, even the technology to make judgments on what the standards were. Is that a fair summary?

JOE COTRUVO: Yes, that's right. We had to develop the information from all of those aspects, but we also had to develop the methodology to apply it into a regulation. And, of course, when [we were producing] a regulation that has to withstand judicial review, so that required a lot of complexity and a lot of detail that was never done in the case of the interim regulations.

JOE COTRUVO: Okay, well, simultaneously, with the THM regulation, we also were working in the direction of trying to see if it was possible to deal with the aggregation of industrial chemicals that were being released into surface waters, particularly, and which were discussed to some degree in the NAS report. And keep in mind, at that time this was relatively shortly after the major Clean Water Act provisions, before pre-treatment requirements, before effluent guideline requirements, so there really was a greater concern about industrial chemical discharges into surface waters.

We knew from some of our work with our colleagues in Europe that granular carbon was a possible way of dealing with them. And it was determined to create a proposal that would involve the use of granular carbon in at least those, what you might call, vulnerable public water supplies on industrial rivers to try to reduce the variety of synthetic organic chemicals that could be found in a number of those rivers. And the idea was that in the United States there was a little bit of experience with

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granular carbon being put into sand filters. Virtually all surface water supplies had sand filters, but in some cases the sand was taken out and granular carbon was put in.

With that limited experience with granular carbon use in the United States in filter beds for taste and odor control, it was decided to attempt to produce a regulation that would involve installation of more of those kinds of facilities on these vulnerable surface water supplies. In other words, replacing the sand in existing filters with granular carbon. But it's certainly not an ideal technology from a practical operational perspective because in those cases the carbon was added in and might have stayed there for five years or more. But in the case of synthetic organic chemical removal, it very likely is going to be necessary to replace or reactivate that carbon much more frequently. The logistics of doing that in a sand filter would be very difficult, including some other problems.

The industry, of course, the water industry, was very concerned about that, very incensed about it. And in a tremendous public comment period, thousands of comments, literally thousands of comments came in, essentially all negative to the effect that it wasn't feasible, it was expensive, it wasn't a proven technology. And ultimately, we rethought the issue, looked at some of the practical problems as well as some unknown issues about the use of granular carbon and accumulation and uneven release of chemicals.

So, the agency ultimately decided to go ahead and promulgate the trihalomethane regulation but withdraw the proposed granular carbon regulation. And in retrospect, I think that was exactly the right decision because, indeed, that was not a very practical way of trying to treat organic chemicals in water supplies. I think the good news is that, since that time, with the institution of much greater waste water technology, at least secondary treatment in all of those waste water treatment plants upstream, certainly pre-treatment requirements on industries, effluent guideline requirements of various industrial sectors, the actual amounts of organic chemicals in consumers' waters is much less than it was in the past.

ARDEN CALVERT: So, Joe, would it be fair to say that, basically, with the dropping of the GAC approach, you now were forced to deal with a whole host of different organic compounds in a different way?

JOE COTRUVO: Exactly. And rather than that across-the-board kind of technological approach, we then determined that the best approach probably was to identify the chemicals concerned in water and produce individual maximum contaminant levels for those. And that, of course, opened up the process of essentially duplicating what was done with the trihalomethane regulations, which was to determine the occurrence, determine the treatment technology, determine the toxicology and health risks, and analytical chemistry and economics, and ultimately write a number of individual drinking water regulations. Now, that doesn't mean that we were abandoning the idea of group regulations, because the best approach, of course, is a combination—where it makes sense—regulate in groups. Disinfection, by the way, is a group regulation. And where it made sense, regulate individual

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substances that were considered to be of potential risk to health from drinking water and reasonably, widely distributed.

ARDEN CALVERT: Okay, thank you, Joe. So, before we leave the topic of standards, of the first new standards, can you comment on the significance of the whole approach that we had to evolve with respect to the entire agency?

JOE COTRUVO: Yes, the major novelty, you might say, is the introduction of significant risk assessment and of a process, where once one identified the chemicals of interest and the concentrations and the exposures and their toxicology, then it was a question of determining what is the appropriate way to regulate to protect public health? And there are really two kinds of chemicals that one would be thinking about, two large groupings. One of them, what we would call threshold chemicals, chemicals where the toxicity is unlikely to exist below a certain dose. And others that are called non-threshold chemicals, and that's where, at least theoretically, there is some finite risk from exposure at any dose. And those non-threshold substances are genotoxic types of chemicals, chemicals that react with DNA and could damage DNA and then result in, possibly, some conversion of a normal cell into a cancerous cell. And so, the methodologies that were described in the National Academy report actually came in very handy at that point, because they dealt with non-threshold chemicals and risk assessment methodologies. And what they did, actually, was begin with this methodology that had been applied in the past to radionuclides, which are indeed genotoxic, and modify it and apply it to organic chemicals. It's not an exact linkage, but there are sufficient relationships that it's worth pursuing in that direction. So that's something big, and we also created a methodology for differentiating chemicals based on the type of toxicity that could occur, a classification system that we used in the drinking water standards.

But it was clear pretty quickly that the process of producing standards using all of those methodologies was just not fast enough to deal with the detections that were being reported and recorded. For example, about this time things like trichloroethylene, tetrachloroethylene were being found in all kinds of waters, groundwater, and the problem with them was they were very large volume solvents. They were being spilled, they were being highly discharged into waterways, and they're not biodegradable. So if they got into the water, chances are if you looked, you would find them.

And so, that created tremendous concerns, and so as a result of that, getting together with Vic and the crew, we came up with the idea of drinking water health advisories. And the drinking water health advisories are simply that. They are assessments based on the health risk, the toxicology of chemicals, without much reference to technology and analytics. And they were not regulatory; they were advisory. They were guidelines, but they did go through a review process. And so they actually provided definitive benchmark information when one of these extraneous chemicals was being found and was not regulated. So, that really helped water suppliers, state regulators, to make judgments about the significance of some of these detections that were occurring. About 200 health advisories have been produced, drinking water health advisories. And then even more recently, just this year, the pesticide program produced 350 pesticide drinking water health advisories. So, it's a good idea. It

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provides a lot of information. It helps decision makers and regulators make decisions quickly. Other regulatory programs in the agency back then, in fact, also were able to make use of them—Superfund, solid waste programs who were finding contaminants in groundwater, it provided benchmarks for them to use as to the kinds of concerns and the kinds of cleanup actions that would be appropriate for those sites.

ARDEN CALVERT: Thanks, Joe. Just to clarify a couple of points. When you talk about differentiating the universe of chemicals that we would have to do deal with, the definition was based on the toxic endpoint suspected or associated with the chemical, not some sort of chemical class. Is that correct?

JOE COTRUVO: Yes, the threshold type of toxins and non-threshold type of toxins. Yes.

ARDEN CALVERT: And just to clarify, when you say that the health advisories provided definitive data, you meant definitive data that was available? It basically couldn't make the ultimate call, otherwise it would be the rule, right?

JOE COTRUVO: The health advisories were the best available information based on the data that was available, and so what we had was the Federal Government, EPA, EPA's drinking water office evaluating that information, making judgments, and providing the authoritative sources that some of these local and state people could then use easily.

ARDEN CALVERT: Thank you, Joe. And now let us hear from Jack and John about how the decision not to go forward with the GAC rule was received in the regions and states. Jack?

JACK HOFFBUHR: Arden, the decision to not proceed with the GAC rule was received with a huge collective sigh of relief by utilities, states, and regions alike for three basic reasons. First, the water utilities were really struggling with how to deal with the other new standards, and the improvements that they were going to have to undertake to meet those standards. Secondly, the utilities were in the midst of coping with really outmoded treatment techniques, conveyance facilities, and ancient distribution systems. We still had slow sand filters, we had wood stave pipes, and we had uncovered, finished water reservoirs throughout our entire region. And believe me, installing granular activated carbon filters was nowhere on the radar for these utilities. And finally, the utility personnel were pretty leery of the cost-benefit ratio for GAC. Many had used powdered activated carbon for many years for taste and odor control due to algae blooms, but they really had not considered activated carbon for anything else. So, Arden, those were the key reasons that everybody felt really good about the headquarters decision not to proceed with the GAC rule.

ARDEN CALVERT: Thank you, Jack. John?

JOHN WISE: Well, all of us, headquarters and regions, put a lot of time into developing the granulated activated carbon rule, so-called GAC rule. The GAC rule could have led to improved treatment

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technology for a wider range of generic, organic chemicals over the longer term, rather than the specific chemical-by-chemical regulations. But at the time, in Region 9, as all across the country, the water supply industry, including the largest water utilities in California, were in no position to implement such a technically sophisticated new treatment rule. And they did not have the financial resources, particularly given the backlog of needed capital investments for basic treatment infrastructure, which was profoundly lacking across the country. And let's remember that the drinking water state revolving loan funds were not available to help utilities with their investment needs until after 1996. And so we had a situation where the utilities simply were not ready and could not implement the rule, despite the obvious advantages of doing so.

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Chapter 3: Implementation of the Public Water Supply System Program

ARDEN CALVERT: We'll pick up the discussion of how the Office of Drinking Water pursued the development of actual drinking water programs to oversee and enforce the implementation of regulatory standards.

To discuss this, we'll ask Alan Levin, the Director of our state program division from 1976 to 1982. Alan joined EPA at its inception in 1970 from the prior Water Pollution Control Administration. Among other assignments, Alan was detailed to be the Deputy Director for Environmental Programs for the state of Ohio between 1973 and 1975. This experience proved especially helpful with his role in the Drinking Water Program. He later became EPA's Deputy Regional Administrator in Chicago and after retirement from EPA, played a major role in launching the AWWA Research Foundation discussed later in this program. Alan holds a degree in Physical Science and Public Policy from Temple University. Alan?

ALAN LEVIN: Thank you very much, Arden. I'm happy to be here today. The centerpiece of our implementation strategy was to promote state delegations. That seems like a pretty obvious statement because we discovered early in the game that there was no way that EPA could implement the program in that many number of states faced with lack of resources. So, what we had to do was develop a close working relationship with the EPA regional staffs.

Jack Hoffbuhr previously had mentioned that they really didn't know us, and that's true. We had a couple of, maybe two or three, Public Health Service officers, very dedicated folks, but as far the senior staff was concerned, they didn't know me, they didn't know Vic, they didn't know Joe. They had resumes, but as you well know, a resume isn't always enough. So, what we did was we began our implementation activities in 1975 with a series of bimonthly meetings around the country with the leaders of the regional drinking water programs. In other words, face to face.

Our early meetings focused primarily on how best to use the available grants to promote state enforcement responsibility, or as we called it, primacy, and how we should respond to numerous implementation questions that we were getting during the first few years of the program. So, this dialogue led to us to generate a series of program guidance memos which improved the consistencies of our activities across the regions.

Now, let me just say, when we talk about developing program guidance, we didn't just sit down at a desk and crank them out. We formed small work groups, and we made sure that there was a regional rep within each work group. And in many cases we were also able to bring a state fellow or lady in on these guidance memos, and that really improved the consistency. Over time, the lack of the travel funds forced us to reduce the frequency of such meetings to twice a year, but the frequent face-to-face meetings were critical in launching the program.

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Let's talk a little bit about resources. The technical capacities of our regional staff were enhanced in '76 and '77 when the Office of Management and Budget, OMB, added a hundred work years to our budget to help the regions cope with their new program responsibilities. And this not only helped them cope with new responsibilities, but it enabled the regional staff to attain branch-level status, and so they became more visible units within the regional structures.

These hires also enabled us to significantly strengthen the capabilities of the regional offices. Now, there was a former Deputy Administrator at EPA who had kind of a neat saying, which was, "Even a blind squirrel discovers a nut every now and then." I don't think he was talking about us because for us, we felt like this was like discovering gold.

Now, getting into state grants, the EPA budget first included about \$20 million for state public water supply programs, and this offered the states that chose to participate with new resources to enhance their existing programs. Primacy, or promoting primacy, was further enhanced in 1977 when Congress extended the fiscal year from the end of June to the end of September, which allowed us to create three rounds of grant negotiations with the states during the first year of the program, when the statutory requirements for grant eligibility were pretty general. Now, this interesting opportunity, which we thought was very unique, was suggested by one of our regional branch chiefs. It was John Wise from our Region 9, and this greatly contributed to our ability in qualifying the states for primacy. So, John, we still thank you after all these years.

The other thing, a very important aspect of the regions' participation was in conducting meaningful inventories and helping the states conduct meaningful inventories of the public water systems, which was a critical requirement because without that we really didn't know what our universe was. So, lots of kudos to the regions for doing that. So, all in all, over the first few years, and hopefully because of some of these efforts, we were able to promote state primacy to 52 of the 57 states and territories covered by the Act. And Arden, back to you.

ARDEN CALVERT: Thank you, Alan. Was there anything that you did that you thought was special to promote cooperation with the states?

ALAN LEVIN: Yes, I think there was. I think it's kind of unique. As implementation began, we conducted program evaluations of regional and state performance. And a common practice at that time was to get into a "gotcha" mood, and leave a list of discrepancies for the regions to follow, and then get out of town as quickly as possible. But rather than using that common practice, what we did was try to make such activities more of a learning experience. And the way we did this was to include in our regional evaluation teams a representative of the last region reviewed and the next one to be evaluated. And we also encouraged states to do that kind of practice, also. And it was generally successful, because it shared common problems and improved the program performance, rather than just leaving that long list of specific deficiencies that I spoke about.

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ARDEN CALVERT: So, Alan, what kind of payoff did early implementation have?

ALAN LEVIN: Well, in a number of cases the regions produced some unanticipated outcomes. And let me just cite one of them. It was one when one of our national contaminant monitoring surveys detected carbon tetrachloride at very low levels in the Ohio River. And since carbon tet is a manmade chemical of serious toxicological significance, that discovery triggered an inspection of major upstream chemical plant discharges by our regional staff, and that led to discovery of a plant greatly exceeding its water pollution permit limits. And it also led to the identification of a massive and unreported spill from the same facility, which more importantly impacted a number of downstream water supply intakes.

So, in cooperation with EPA's Office of Enforcement, the discharger was temporarily shut down until appropriate remedial treatment was installed, and with a great deal of media attention. And, Arden, before we leave this one, I just also wanted to point out that this example not only helped solve a potentially hazardous environmental problem, but it also demonstrated how various units of EPA worked together to solve a problem for the public good. So, we're kind of pretty proud of that one. Thanks, Arden, now back to you.

ARDEN CALVERT: Thank you, Alan. So, let me sum up. Basically, the intense outcry from the water works officials about the new regulations and the upcoming GAC treatment of large facilities actually caused their management to come to life and overcome previous complacency, and ultimately introduced novel and improved technologies and control systems for treating drinking water to higher quality than they previously delivered.

Two industry institutions seem to have significantly changed their focus during the mid-1980s to have a major positive impact on the quality of the nation's drinking water. Both of them were associated with AWWA, but one was an outgrowth of the association, proper, and that was the Research Foundation. I'm going to ask you, Alan, again, to discuss that.

ALAN LEVIN: Let me start off by giving you a little bit of background. The Executive Director of the organization that I'm going to discuss was Jim Manwaring, and this was the same Jim Manwaring that worked for us in the Water Supply Program. I did not mention that earlier, but Jim came to us Region 3 in Philadelphia. And so, we were able to show all of the other regions that we at least had some regional experience in addition to my own state experience. Anyway, Jim left and went to work as Executive Director of an organization called the AWWA Research Foundation, which is now called the Water Research Foundation. And he was really the father of what I'm about to discuss. Jim could not be with us for this interview due to a previous commitment, but he did submit an email. And what I'd like to do is kind of summarize what Jim said based on my own knowledge and experience plus Jim's more developed knowledge and experience.

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So, anyway, what happened was the Safe Drinking Water Act and its regulations really provided the impetus for the water industry's development and expansion of its own research program, which is now called, as I said, the Water Research Foundation. The Foundation provided scientific basis for all aspects of water supply operations and management and the general enhancement of such aspects. They included improved treatment technology, regulatory compliance, analytical improvements, and just general enhancement. The development of the Foundation was supported by EPA through joint funding of research projects and through the participation of former EPA employees. Now, I think it's significant to point out that during the Foundation's early years, four of the five senior managers of the Foundation were former EPA employees. In addition to Jim and myself, there was Jack Mannion and Marty Allen. Jack came from headquarters, Marty Allen was a researcher in EPA's Region 6 in Dallas.

So, it wasn't by accident that we in the Foundation utilized many of the approaches that were successfully demonstrated by the Public Water Supply Program at EPA, mainly communication, collaboration, and outreach. But in this case the outreach was to the water utility community. They were our stakeholders, as we called them.

Now, funding for the Foundation was provided by a voluntary subscription program whereby the water utilities, both public and private, provided annual fees to the Foundation. And then we designed an agenda that was aimed at common water supply issues identified by the membership, including EPA, who contributed. And we had joint projects with EPA, and at one point more than a thousand water utilities serving more than 90 percent of the US population formed the membership of the Foundation. From its inception 1983, the Water Research Foundation has funded more than 500 million dollars in research, and published more than a thousand projects and programs. It supports many national/international seminars, and developed into the largest research program on water supply issues in the world. And Jim points out that a secondary spin off of the Safe Drinking Water Act was the creation of the Global Water Research Coalition.

Now, I had left the Foundation before the creation of that organization, but Jim has asked me to tell you what it does. Basically, it provides worldwide collaboration on water supply research throughout the world, and among the 15 largest water supply research programs throughout the world. EPA is a major contributor to the coalition, and it also includes institutions from the United Kingdom, Europe, Asia, Africa, and Australia, as well as the US.

So, in summary, one of the benefits of EPA's Water Supply Program was the establishment of a much more progressive water industry, as evidenced by the growth and development of its own research program. Now, the creation of the Foundation and the coalition was not an element of the Safe Drinking Water Act, but I think it's to the Agency's credit, meaning EPA, that they were quick to understand the importance of working with other organizations to achieve the ultimate goal of improving the quality of drinking water served to the public, which was what this was all about. Thank you, Arden.

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ARDEN CALVERT: Now that we've heard about the creation of AWWA Research Foundation, how did the Association itself respond to the implementation of the Safe Drinking Water Act? I'll turn to Jack Hoffbuhr to answer the question who, after retirement became the Executive Director for AWWA.

JACK HOFFBUHR: Well, Arden, first some background on AWWA. It is the historic professional organization focusing on water works operations in the US and abroad. It is a very large organization of water professionals within about 110 countries, primarily in the US. And it has a very broad educational focus, as well as an extensive regional structure through which it provides a great deal of training and support.

But in the late '70s and early '80s, AWWA was struggling with its own issues. Often viewed as too negative, not forward-thinking enough, and too slow to react, members began doubting whether AWWA could be of any assistance at all with implementation of the Act. All this when utilities faced numerous challenges, such as upgrading their inadequate treatment and distribution systems and the need for new monitoring systems and new types of treatment, plus dealing with a sagging public confidence and a very skeptical public, which was undermining their efforts to get the money needed through bond issues and rate increases in order to make the needed improvements. The last straw actually occurred when AWWA had no meaningful role whatsoever in the reauthorization of the Safe Drinking Water Act in 1986, which resulted in some amendments that really troubled utilities and the states.

So, as a result of that unhappiness, some new leadership emerged within the Association that eventually transformed AWWA into a far more effective organization that provided valuable services that really focused on public health protection and the importance of the provision of safe drinking water.

It is interesting to note that during this period, the PHS employees and the EPA employees were quite active in AWWA, particularly at the regional and local levels, and that really helped explain the Act and the importance of implementation. In addition, some former PHS and EPA personnel were actually senior managers during the critical part of this transformation, so all in all, Arden, the AWWA went from being a very slow-to-react organization to being an organization that was fully committed to assisting their members provide safe drinking water.

ARDEN CALVERT: Thanks, Jack.

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Chapter 4: Factors that Led to Successes and some Lessons Learned

ARDEN CALVERT: We will close this oral history with a discussion of what the participants think of their efforts and achievements now. With the benefit of hindsight, what were the major lessons learned over the first ten years of the Safe Drinking Water Act? Vic?

VIC KIMM: Thank you, Arden. I think it's important to recognize that by their very nature, regulatory programs focus on problem areas, and they impose duties on the regulated community to deal with those problems. By their nature, they are inclined to generate conflict between the regulated community and government. And as such, that conflict really needs to be managed if you're going to have an effective regulatory development process. And by that, what we were trying to create was an informed discussion of the underlying issues that we were trying to address and the particular solutions that we had selected, and try to avoid the kind of negative comments that often come from a reluctant regulated community that doesn't really want to make change, that thinks that whatever you're asking them to do is not feasible, or whatever schedules you're proposing for change are inappropriate.

At any rate, it was toward the end of trying to promote, again, and to the maximum degree we could, informed discussion, that all of the things I talked about earlier were part of our processes. One, we worried about improving the technical competency of the Agency and the analysis that we put forward to support our initiatives.

Secondly, we were concerned with the communications strategy, which I had described at some length before. But, again, the communications strategy was to try to get people into the process early rather than just responding to a proposed regulation at the tail end of the process. We were also very concerned with the need to create a number of other activities that took place that were very, very successful or helpful to the program. And, again, I think our efforts were part of the process. They weren't totally responsible, but let me articulate a few changes that I think were very positive.

First of all, we were able to get the water works professionals to focus on new issues. And so, as the water works professionals met as the program began, they would have discussions about how to effectively maintain disinfection and limit the amount of harmful levels of disinfection byproducts, technological challenges.

Secondly, we were able to get the industry for the first time to seriously look at alternative technologies. And that was a big hurdle to get over because this was an industry that was essentially using the same treatment technologies that had been in place for 50 years, so this was an area of change that was significant.

Third, by the nature of the program, that is, a tremendous amount of monitoring of drinking water quality was undertaken. This provided the data with which we had a much better understanding of the

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quality of the drinking water as it was actually being delivered. For the most part, this data was already positive and helpful. It did uncover a few specific areas of problems that were identified, but in those cases you had current and good data that made it pretty obvious what needed to be done.

Another element that came in mind during those first ten years of the program was the impact of the significantly new roles of the state health departments. They had enhanced their programs largely due to the grants. They had lots and lots more resources to oversee and help utilities come into compliance, and they were able to develop other related activities like the capacity for doing risk assessments on new contaminants of concern where they might appear. And that capacity turned out to be very, very helpful in the '80s time frame, when we were confronted by the detection of a large number of groundwater contamination with manmade chemicals, much of them related to waste disposal practices. And here, again, the states were much better and able, technically, to decide how big the risks of these detections were, how rigorous their remedial actions had to be, and it was a significant benefit to managing the public health protection. And, again, it was a result of the institution building that we had done at the state level thanks to the enhanced grants.

During the same time period there was a significant difference with change in the way the utilities communicated with the public. That is, they began over that time frame a process of engaging the customers with information about drinking water problems that they were encountering and how they proposed to deal with them. I believe this was largely associated with their recognition that they needed public support for their rate increases and for the bonds with which to make the needed changes. And nationally, I think this had a very positive effect in getting the American public to realize its safe drinking water was not free, that it had associated costs, and they would have to be generated one way or another from the customers.

And finally, this period saw a huge increase in the amount of university-based research on the science and technology associated with drinking water. Again this work, over the decade, really was the basis for future regulatory activities, and I think was very helpful.

All-in-all, I think the program contributed to these improvements, although we certainly weren't the only factors that played over this decade. But I think over the decade we did make significant progress.

In thinking about the factors that impacted our successes, we identified five of them that I'll run through that I think were truly significant. First, the clear legislative mandate for EPA to set standards, to oversee compliance, and to take direct enforcement action where we found public health threatened by contaminated drinking water, were very powerful tools for us to use.

Secondly, all of the efforts that went into communications and transparent processes, again, I think, opened up the dialogue, got all of the institutions involved early in the process, and I think that contributed to the ultimate successes that we had. Third, I think there's a category of activities I would characterize as the program's integrity. That is, from the early days we were, in fact, demonstrated

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that we were willing to propose actions that went beyond business as usual, that took the water supply industry, if you will, out of its comfort zone, such as the GAC regs that we discussed at some length here. And we also showed the common sense to back off when, after a robust public comment period, we concluded we really didn't have all of the technical justification that we would need to sustain the regulations, had we promulgated them in view of the absolutely certain litigation that would follow any kind of major promulgation of a new regulation.

Finally, I think that we were blessed with an extraordinarily powerful management tool and performance measurement metric. Because we had detailed data on compliance and therefore non-compliance for various sizes of categories and systems, we had a very powerful tool to collect that data and to look at comparisons between systems in local areas and regions and states to make comparisons across states about non-compliance rates. And the focus on non-compliance rates became a truly powerful management tool because it enabled a state manager, for example, to say, "Gee, I'm looking at non-compliance in these types of systems in our state and they are worse than or more troublesome than they might be in some nearby states or other portions of the state," and thereby focus the oversight capacities of the states on the real problems. And I think, over time, that capacity for an effective management tool was employed and was very successful. Back to you, Arden.

ARDEN CALVERT: Thank you, Vic. I think it's important to emphasize that at the inception of this program, as we talked about it at the beginning of this oral history, the fact that the drinking water was not a particularly important issue for most Americans. Most Americans didn't really know, or were aware of the drinking water quality. But by the end of the decade, some time in the middle of that ten-year period, public attitudes radically changed with the onset of concerns about toxic substances, and all of a sudden drinking water became a major vector for exposure. And by the end of this period, the Drinking Water Program, which had been sort of, at the onset, a junior partner in the array of environmental programs became almost the tail that was wagging the Agency dog.

ARDEN CALVERT: We will go to the lessons learned from a regional perspective. Jack, can I ask you to comment?

JACK HOFFBUHR: Sure, Arden. Looking back, I would like to focus on four key points that I think differentiated the Drinking Water Program from others and led to its success in terms of states accepting primary enforcement responsibility. First, with that spirit of trust that had developed between the states, certain utilities, and the regional personnel working together for years on the Interstate Carrier Program, and that really proved critical, as we got our foot in the door, to start talking about primary enforcement responsibility. Secondly was a collegial relationship between headquarters and the regional staff, particularly during the early implementation of the Act. This was crucial since states and utilities were looking for cracks in the relationship, and they were really seeing whether or not the regions and headquarters were on the same page as we progressed through implementation, and we proved to them that we were. Third was the role that, actually, AWWA played as kind of a non-threatening meeting ground, particularly at the local level. We could all kind of sit

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down over a couple of beers and talk about how best to implement the Safe Drinking Water Act. And finally, the support, both monetary and staff support that headquarters provided to the states and AWWA and to the regions to sponsor utility management workshops, operator training, and to produce other tools needed to emphasize the public health importance of proper implementation of the Safe Drinking Water Act. And that was the key, Arden. When push came to shove, we all had one mission, and that was public health protection through the provision of safe drinking water.

ARDEN CALVERT: Thank you very much, Jack. John, John Wise?

JOHN WISE: Well, through the course of this project, recording our oral history and our experiences, my colleagues have shared some of the lesson learned. I would also like to share some summary thoughts and reflect on lessons learned from my perspective. We're all very proud of what we did at the time and what has become of our various policies and initiatives as they were birthed and took life within the agency. The implementation of the Safe Drinking Water Act was an extraordinary experience. We pioneered several new and innovative approaches that set the state for EPA to carry out its future statutory agenda. Let me give five examples. Number one: we performed a comprehensive national drinking water inventory, and then we did a nationwide assessment of drinking water quality. That sounds very elementary, but the first step towards the operational integrity of the program was to define the scope of the endeavor, and that, in turn, enabled the formulation of a strategic plan to set priorities and to address the most serious problems first. Example number two: we engaged stakeholders in every public collaboration, communication, and outreach effort. This engagement was unprecedented at the time, and it served as a model for all future outreach efforts. The third example, we leveraged resources in a severely constrained budget through the productive use of outside grants and contracts, and we integrated our internal resources in ways that had never been done before. Of some special significance were the utilization of technical and scientific expertise in EPA's research laboratories, the integration of legal counsel into every aspect of implementation and rule-making, and finally, the role assigned to the regional offices to develop state programs. The fourth example I want to share is our approach to treatment techniques such as the GAC rule, which we talked about before. The GAC rule and such treatment techniques paved the way for treating classes of compounds rather than individual chemicals. And it formed the basis for new policies on source protection, surface water disinfection, sole source aquifer designations, and the watershed approach. And out of our work on the initial implementation of the Safe Drinking Water Act, EPA embraced pollution prevention as an overarching guiding philosophy of environmental management. And the fifth and final example is that we used the public disclosure obligation that requires water utilities to publicly notify their customers on the quality of the water they served as a self-enforcement mechanism. This became standard procedure in the later community right-to-know provisions of later environmental laws. So, with these five examples it helps confirm the lessons learned from our Safe Drinking Water Act experience and may help inform and guide the Agency in future endeavors. It was a wonderful experience, we were all very proud of it, and we hope the legacy that we have offered will be of great help to the Agency. Thank you, Arden.

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ARDEN CALVERT: Thank you, John.

VIC KIMM: In conclusion, I want to thank everyone for their contributions to this discussion about the early implementation of the drinking water bill. I also would like to mention Dr. Arnold Kuzmack, who was a prime participant in our activities, who contributed heavily both in formulating policies and in the analysis that supported our activities. Unfortunately, Arnie's declining health situation precludes him from being part of this recording, but he certainly was a major contributor to the program in its early days.