

Drinking water public right-to-know requirements in the United States

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ABSTRACT

The United States Environmental Protection Agency implements a national drinking-water program under the authority of the Federal Safe Drinking Water Act. Amendments to the Act in 1996 added new provisions to enhance consumer understanding of drinking-water issues. Notification requirements associated with annual consumer confidence reports, source water assessments and state compliance reports are intended to enhance the public's knowledge of the quality of their drinking water. Water utilities are also subject to public notification requirements to provide more timely information to consumers in response to violations of health standards. These right-to-know requirements are intended to build the public's confidence, but communicating with consumers can be challenging for both utility managers and government leaders. This paper discusses the need for timely communication, the challenge of providing information when there is uncertainty in the science and the importance of preparing to respond to critical incidents. Because surveys have shown that other members of the community may have better access to consumers or are more trusted, it is important for water utilities to establish relationships with the media and the local public health community.

Key words | drinking water, right-to-know requirements, risk communication, safe drinking water act

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INTRODUCTION

In the United States, approximately 53,000 community water systems¹ provide drinking water to more than 280 million people on a daily basis (US EPA 2006). Close to half (46%) of the population receives water from 386, or 1%, of the nation's community water systems. While most of the population (81%) receives water from systems that serve more than 10,000 people, the majority of systems (83%) serve fewer than 3,300 people.

Under the regulatory structure for ensuring safety of drinking water, the Federal Environmental Protection

Agency (EPA) is authorized by the US Congress, under the Safe Drinking Water Act (SDWA), to set national standards and establish programs to ensure the safety of drinking water. EPA has established regulations that address more than 90 contaminants in drinking water, including microbial pathogens, chemicals, and chemicals that are byproducts of disinfection. State public health or environmental protection departments adopt standards that are at least as stringent as the EPA's and have primary enforcement responsibility for ensuring that standards are met by water utilities (with the exception of Wyoming and the District of Columbia, which are overseen by EPA).

In establishing public notification requirements for water utilities, EPA is guided by the basic premise that consumers have a right to know what is in their drinking water and where

¹The US also has approximately 19,000 non-transient noncommunity water systems (e.g. schools, churches, businesses) that serve approximately 6 million people and 86,000 transient noncommunity water systems (e.g. campgrounds, gas stations) that serve approximately 14 million people. Because they serve water to people on a daily basis, community water systems are subject to the most stringent regulatory requirements for acute and chronic contaminants, and public education.

it comes from before they turn on the tap. Education is critical to ensure that consumers both have confidence in the safety of their drinking water and have the information they need to make personal decisions about consumption related to their own special health needs. Educated consumers are also more likely to take an interest in protecting their sources of drinking water (e.g. groundwater, rivers and lakes) and understand the true costs of providing water services. Finally, communication during emergencies or contamination events may be more effective if the water utility has been engaged in on-going communication with the public.

This paper provides a summary of the major right-to-know requirements that water utilities in the United States must meet. It also addresses some of the challenges that water utilities and local officials face in communicating with the public. Finally, the paper discusses the results of a survey conducted by the EPA on consumer awareness and the potential implications of the findings.

NOTIFICATION PROGRAMS UNDER THE 1996 SDWA AMENDMENTS

In the 1996 reauthorization of the SDWA, several provisions were added to the Act that expanded the public's right to know (US EPA 1996). The goals of the new provisions were to inform and educate the public, allow for public participation in drinking-water programs and promote dialogue between consumers and water utilities. While most of the new programs introduced through the reauthorization included a public participation component, the significant changes were related to four provisions – Consumer Confidence Reports, Source Water Assessments, Public Notification and Annual Drinking Water Compliance Reports. Each of these provisions and their associated requirements is described further below.

Consumer confidence reports

The Consumer Confidence Report (CCR) provision², which in many respects represents the cornerstone of the new right-to-know emphasis in the Amendments, requires

community water systems to prepare and provide an annual water quality report to their customers. These reports, which can be tailored to meet the needs of a locality, provide customers with an annual snapshot of local drinking-water quality and information about actions the water utility is taking to protect their health. The goals of the reports are to provide information that customers can use to help them make informed decisions about their health and raise awareness of the work that is done to provide them with drinking water.

With these goals in mind, EPA established requirements for water utilities to follow for conveying information on (1) how to contact the water utility, (2) the drinking-water source, (3) the contaminants detected in the utility's drinking water and (4) additional information to educate the customer (Table 1). The water utility must disclose whether it has detected any regulated contaminant in drinking water and whether the concentration exceeded Federal or state

Table 1 | Contents of a consumer confidence report

| Subject | Content |
|--------------------------|--|
| Water system information | Contact information Public participation opportunities Information for non-English speakers (if needed) |
| Source of water | Type of source, name and location Availability of reports on assessment of source water Information on potential sources of contamination |
| Detected contaminants | Table summarizing the data Health effects language Likely source of contamination Explanation of what the utility is doing to correct any violations of standards |
| Educational information | Explanation of why contaminants are present in drinking water Warnings for vulnerable populations (e.g. immunosuppressed) Additional information for up to three contaminants (lead, nitrate, arsenic), if needed Required definitions (Maximum Contaminant Level, Maximum Contaminant Level Goals, etc.) |

²Additional information about the CCR provision is available on the EPA website at <http://www.epa.gov/safewater/ccl>

standards for safety. All water utilities must include a special message for immunocompromised persons (who may be at greater risk of illness from microbial contaminants) that directs them to seek advice about drinking-water consumption from their health care provider.

Large water utilities must mail or otherwise directly deliver reports to their customers by 1 July every year and take steps to ensure that the information also gets to customers who do not receive bills. The largest water utilities (those serving more than 100,000) must also post their reports on the Internet to make them easily accessible. In lieu of direct mailing, some smaller water utilities (serving fewer than 10,000) may be able to distribute information through newspapers or other means.

In 2002, shortly after consumers would have received their fourth report, the EPA commissioned a survey of 1,000 households which included questions about the CCRs (US EPA 2003a). Twenty-nine percent of those surveyed indicated that they had read their CCRs (an additional 8% remembered seeing their CCR). Eighty percent of those who had read their CCR said the information was adequate, educational and useful. However, many found the reports less appealing, possibly due to the level of detail or technicality of the report. Although the EPA has not conducted a subsequent survey, the Agency believes that many utilities have worked to improve the readability and utility of their reports because they view them as a good opportunity to connect with their customers. For example, the Des Moines Water Works (DMWW 2006) has made changes to the format and style of their reports over the last several years. The Las Vegas Valley Water District (LVVWD 2006) has viewed the CCR as an opportunity to educate consumers about the range of water issues that are faced in their watershed and the actions they can take to protect their drinking water.

Source water assessments

Educating the public about actions they can take to protect their drinking water is also behind the requirements for public notice incorporated into requirements associated with source water assessments³. The 1996 SDWA required states

to conduct assessments of the sources of drinking water for all water utilities under their jurisdiction. In conducting an assessment, the state or water utility identified the land area that contributes water and pollutants to the water supply, inventoried the potential sources of contamination within that area and determined the susceptibility of the supply to those contamination sources. The final requirement was that states and water utilities make the information in the assessments available to the general public. The intent was that the knowledge gained through the assessments would spur action to support protection efforts at the local level. However, access to information contained in the assessments has been hampered somewhat due to concerns about security and it remains to be seen whether they will fulfill the intent of the provision.

Public notification rule

While Consumer Confidence Reports provide an annual review of the status of the utility, there may be situations that warrant more timely information-sharing with consumers. The Public Notification Rule describes requirements a utility must follow to notify the public any time it violates a national primary drinking water regulation or if there is a situation that poses a risk to public health. All public water systems in the country are subject to the regulation. The regulation describes a number of standard elements that must be included within each public notice. The utility must describe the violation or situation, when it occurred and what actions customers should take. It must notify the public of any potential adverse health effects, the population at risk and whether alternative sources of water should be used. The utility must also indicate how and when it will correct the problem. Finally, the notice must include contact information and a statement encouraging recipients to share the notice with other people. The EPA worked with state drinking water program administrators to develop a handbook that includes templates that utilities can use to address specific situations (US EPA 2000).

The rule establishes three tiers of notices, corresponding to the urgency of the situation and type of violation (Table 2). Tier 1 notices address contaminants or situations that have significant potential to have serious

³Additional information about the source water assessment provision is available on the EPA website at <http://www.epa.gov/safewater/sourcewater>

Table 2 | Public notification requirements

| Tier | Timing | Examples of the types of violations covered by the rule |
|------|---|--|
| 1 | Within 24 h | Total coliform rule – fecal coliform violation, failure to test for fecal coliform after initial total coliform sample test positive Nitrate and/or nitrite MCL violations, failure to take confirmation samples Chlorine dioxide disinfectant residual violation in distribution system, failure to take samples in distribution system when required Waterborne disease outbreak or other waterborne emergencies Other violations or situations determined by the state enforcement agency |
| 2 | Within 30 d, repeat every 3 months until resolved | All national primary drinking water regulation violations (except where Tier 1 notice required) Monitoring violations, if elevated to Tier 2 by enforcement agency Failure to comply with variance or exemption conditions |
| 3 | Within 12 months, repeat annually until resolved | Monitoring or testing procedure violations (unless elevated to Tier 2) Operation under a variance or exemption Special public notices (e.g. exceedance of secondary standard for fluoride) |

adverse public health consequences as a result of short-term exposure. These notices must be distributed within 24 h of the utility learning of the violation via media outlets, hand delivery or other mechanisms that will ensure rapid notification of consumers. Tier 2 notices, which must be distributed within 30 d of the event, address violations or situations with the potential to have serious, but not immediate, adverse public health effects. Tier 3 notices, which must be distributed within one year of the event, focus on monitoring or operational issues that are not already covered under Tiers 1 and 2. Although the EPA sets minimum standards, states have the ability to adopt more stringent requirements for public notification. Many states have identified situations under which they will require Tier 1 boil water notices. For example, the State of Texas requires a boil water notice when a utility has an acute coliform MCL (maximum contaminant level) violation, if the turbidity is greater than 5 NTU (nephelometric units), if system pressure drops below 20 psi, or if there is a waterborne disease outbreak (TCEQ 2005). States may also identify situations that call for a widespread Tier 1 notice. Following Hurricanes Katrina and Rita in 2005, the States of Mississippi, Louisiana and Texas issued widespread boil water notices for water utilities in the affected areas as a precautionary measure until the water in each utility could be deemed safe to drink.

State compliance reports

Finally, the 1996 SDWA required that states annually prepare reports for the EPA and the public to provide information on violations incurred by water utilities in their state during the previous year. The EPA uses the information provided in the reports to develop a national report on compliance. While the goal of the provision is to increase accountability, some states are also using the reports as an opportunity to educate the public about what they do in order to ensure a safe supply of drinking water. For example, the State of Wisconsin highlights their annual compliance report on their news page for consumers (WDNR 2006). Their report provides an analysis of the compliance data and also provides information on technical and financial assistance activities carried out by the state's Department of Natural Resources. In an era of declining and competing resources, states and utilities understand that it is critical to make the public aware of the work that needs to be done to ensure that they have access to a safe supply of drinking water.

CHALLENGES IN COMMUNICATING WITH CONSUMERS

The goals of the public right-to-know provisions in the SDWA are to build the consumers' confidence that

the drinking water they receive meets state and Federal standards for public health protection. However, there are significant challenges in communicating with the public, particularly during a crisis, because the public will often have a different perception of risk than utilities or government officials. Dr. Vincent Covello from the Center for Risk Communication defines risk communication as “a science-based approach for communicating effectively in (1) high concern and low trust situations, and (2) sensitive or controversial situations” (US EPA 2003b). Many of the issues that EPA, state agencies and water utilities must address meet these criteria. The examples below demonstrate the importance of communicating in a timely manner and highlight the difficulties of communicating when there is uncertainty. Finally, because, one of the keys to effective communication is preparation, the paper discusses the importance of being ready to respond to critical incidents.

Communicating effectively at the right time

In the US, the EPA regulates lead in drinking water by requiring that water utilities follow a treatment technique which requires additional action if more than 10% of the household taps tested by the system exceed an action level of 15 micrograms per liter (or parts per billion, ppb). Beginning in 2002, the water utility serving the District of Columbia identified a problem with high levels of lead in many of the homes it tested. The utility worked to identify the extent and cause of the problem and included information in its July 2003 water quality report indicating that almost 50% of the samples they had collected exceeded the action level. However, the messages did not adequately convey the extent of the problem, which was first reported widely in 2004 in a series of articles in *The Washington Post*, a local newspaper with wide national distribution. Because utility managers failed to effectively communicate the problem widely up front and anticipate the public's reaction, they were left with an angry public and US Congress (many of whom were served water by the utility). Many customers lost confidence in the ability of the utility to ensure the safety of their drinking water.

During 2004, the City of Seattle, Washington also experienced problems relating to lead and other contaminants

in drinking water⁴. While the local water utility was in compliance with the EPA's regulations for lead in drinking water, the Seattle school district found that they had elevated levels of lead in the water provided at many schools within the system⁵. The school district, like the DC utility, was largely unprepared for communicating with the public on this sensitive issue. Due to the heightened interest resulting from the incidents in DC and Seattle, other school districts throughout the country began testing for lead. To assist school administrators and child care providers, the EPA released a toolkit in 2006, the *3Ts for Reducing Lead in Drinking Water in Schools* (US EPA 2005), which describes how “training, testing and telling” are key components of any school testing program. The “telling” component places a particular emphasis on developing and executing a communication strategy for working with staff, students and parents to provide clear and timely information on the results of testing. In 2006, the Seattle School District once again faced a water quality and communication problem when it detected elevated levels of arsenic in drinking water served in some schools (Heffter 2006). Acting on the lessons it learned during the earlier crisis, the school district acted quickly to shut down fountains in schools, supply bottled water and inform the public about the efforts it was undertaking to carry out additional testing. A May 2006 editorial in *The Seattle Times* noted that “Seattle school officials are on the right track in resolving their latest crisis” (The Seattle Times 2006).

Communicating uncertainty

One of the significant challenges associated with communicating about lead in drinking water in both Washington, DC and Seattle is the fact that the EPA's regulation does not identify a concentration of lead in drinking water at which adverse health effects are certain. Although EPA believes that no level of lead is “safe”, the inability of the utility and the EPA to provide clear information about the health

⁴Articles about the DC lead in drinking water crisis are available at <http://www.washingtonpost.com/wp-dyn/metro/specials/water/>. A listing of the news stories about drinking water in Seattle from December 2003 to the present is available at <http://seattlepi.nwsource.com/specials/lead/>

⁵Water quality in large buildings, such as schools, can be degraded due to issues with the building's internal plumbing. The water utility would generally not be responsible for problems caused by a facility's internal plumbing.

effects associated with certain levels of lead in drinking water poses a problem for local officials. This was particularly the case in Washington, DC, since 10% of the samples tested exceeded more than 60 ppb and many homes had levels higher than 300 ppb. The reaction was also heightened in both Washington, DC and Seattle due to the fact that children are the population at greatest risk from exposure to lead and because the cognitive or developmental effects of lead are not easy to discern over the short term (Karr 2004). Interestingly, some people working on lead issues have expressed concern that the focus on lead in drinking water reduces attention on other and, potentially more important, sources of lead in the household environment (e.g. paint, dust).

Uncertainty also affects drinking-water communication with respect to unregulated contaminants in drinking water. Over the past several years, advances in analytical techniques have made it possible to detect a wide range of contaminants at lower concentrations. Greater attention has been paid to monitoring drinking water and potential sources of drinking water (e.g. lakes, rivers, groundwater) for naturally occurring and anthropogenic contaminants. The public perceives that there has been a concomitant increase in risk because of greater media reporting on the results of scientific studies. However, it remains a question as to whether levels of contaminants are increasing or whether we are simply detecting what was previously non-detectable. Additionally, there is considerable uncertainty about the human health effects of these contaminants at the concentrations observed in drinking water after treatment. Although the EPA has a program to identify contaminants for potential regulation and a related program to monitor for unregulated contaminants in drinking water provided by community water systems, understanding the health effects and occurrence of thousands of emerging contaminants is a challenge.

One specific group of chemicals that has caught the public's attention is disinfection byproducts. Disinfection of drinking water was one of the greatest public health advances of the last century, saving thousands of lives from waterborne pathogens that cause disease. However, disinfectants used in the treatment process can combine with naturally occurring organic material to form chemical disinfection byproducts (DBPs). Some DBPs have been

shown to cause cancer and reproductive effects in lab animals and suggested bladder cancer and reproductive health effects in humans. Water utilities must balance their treatment process to ensure that they adequately address pathogens while minimizing the possible formation of DBPs. As with emerging contaminants, analytical techniques are able to identify a wider range of DBPs at very low levels. Additionally, new drinking-water regulations issued in the last several years are requiring water utilities to monitor for DBPs for the first time and, in doing so, some have identified high concentrations. In communicating about DBPs, it is important to discuss risk balancing – that is, choosing to cease disinfection of drinking water to reduce formation of DBPs is not an option because the potential health effects of improperly disinfected drinking water poses a much greater risk to a wider population. Therefore, water utilities must optimize their treatment such that disinfection is effective and DBP formation is minimized.

Communicating during critical incidents

Since 9/11, government officials and utilities have placed an emphasis on preparing for terrorist or intentional acts on critical water infrastructure. In 2002, Congress further amended the SDWA to add new requirements for the EPA and utilities to ensure the security of the nation's water infrastructure. While the emphasis of the EPA's water security efforts has been on preventing and responding to intentional acts, the 2005 hurricane season reminded utilities and government officials that they need to be prepared for all hazards – whether natural or man-made.

One of the provisions in the 2002 amendments required utilities to develop or update emergency response plans. In developing plans, it is important that utilities reach out to other first responders, the public health community and the media. Utilities need to develop a series of appropriate messages that correspond with the types of incidents or events that might be anticipated. They also need to have procedures in place to facilitate communication when traditional channels may not be available. To help the water sector to prepare to effectively respond to intentional water contamination threats and incidents, the EPA has developed a Response Protocol Toolbox (US EPA 2003c),

one module of which focuses on public health response. The module demonstrates how an effective public health response must consider a range of issues, as shown in Table 3, and discusses pre-response planning, messages and mechanisms for distribution. EPA is facilitating workshops across the country to help utilities and other first responders (e.g. state regulators, law enforcement, fire departments, public health officials) to understand the Toolbox and other Federal incident management systems and to participate in an extensive table-top exercise that simulates an incident. Preparation is critical because it is only by practicing plans via desktop or other exercises that utilities will be able to identify areas for improvement.

BUILDING TRUST AND BRIDGES

In 2002, the EPA commissioned the Gallup Organization to conduct a nationwide poll of 1,000 households (US EPA 2003a). The participants were asked a number of questions to gauge their knowledge about drinking water, their water use behavior, their public confidence with sources of information and the value of the EPA's public right-to-know requirements.

The survey showed that the majority of the respondents (71%) are either confident or very confident about the quality and safety of tap water. More than 90% of the respondents indicated that they were interested in receiving information on the possible contaminants in drinking water, the health effects of those contaminants and how they could help protect drinking water.

One of the questions asked respondents about their sources of drinking-water information. Sixty-six percent of the respondents indicated that their information came from the media, 38% received information from their water utility and 35% from environmental groups (Table 4). Another question asked respondents about their confidence in the quality of information provided by different sources. While the media was the most common source of information, it was not the most trusted. Out of seven sources, it ranked fifth. Doctors and health care professionals were the most trusted source. The Federal government ranked sixth, below the media and above the Internet. This is a concern because health professionals, while the most trusted, may not have adequate information to help patients make informed decisions about drinking water from their local providers. This highlights the importance of water utilities building relationships with local public health agencies and health

Table 3 | Components of a public health response to an intentional incident

Emergency response planning (pre-threat)

| | |
|---|---|
| Conduct planning | Identify partners in response Develop a communication strategy Develop operational response plans Establish public notification procedures Exercise plans |
| Threat management process | |
| Determine public health consequences due to water contamination | Evaluate contaminant properties Assess spread of contaminant |
| Implement operational responses | Isolate and contain potentially contaminated water if possible Consider novel operational response |
| Implement public notification strategy | Provide public notification |
| Implement alternate water supply | Provide appropriate alternate water supply |
| Return to normal operations and use | Notify the public Demobilize alternate water supply |

Adapted from Figure 5-1. *Response Protocol Toolbox (RPTB) – Public Health Response Guide, Module 5 (US EPA 2003c)*

Table 4 | Responses to questions about sources of drinking water information

| Category | Where do you get information? (% identifying as a source) | Who do you trust? (% confident/very confident in information) |
|-----------------------------------|--|--|
| Doctors/health care professionals | 9% | 79% |
| State environmental agency | 31%* | 73% |
| Environmental groups | 35% | 66% |
| Water utilities | 38% | 64% |
| Media | 66% | 57% |
| Federal government | 31%* | 56% |
| Internet | 6% | 41% |

*The survey did not discriminate between local, state and Federal government for this question.

care providers. To help build awareness on the part of health care providers, the EPA supported the development of a VHS/DVD educational tool, *Tap into Prevention: Drinking Water Information for Health Care Providers* (US EPA 2004) and an on-line tool, *Recognizing Waterborne Disease and the Health Effects of Water Pollution: A Physician's On-line Reference Guide* (Meinhardt 2002), both of which provide continuing medical education credits.

Drinking-water professionals need to make a concerted effort to reach out to the medical and public health communities to ensure that they have the information they need to communicate with their patients. At the same time, they should work with the media from whom most people get information, to ensure that they likewise understand how the utility is working to provide drinking water to the community – every day and during emergencies.

CONCLUSION

The 1996 Amendments to the Safe Drinking Water Act added several new provisions that were intended to increase the public's knowledge about their drinking water. The cornerstone of these new requirements is the Consumer Confidence Report. As J.C. Davis, senior public information coordinator for the Las Vegas Valley Water District, noted

in a presentation at the 2006 conference of the American Water Works Association, "The CCR can be a tool for improving customers' confidence regarding the safety of their drinking water, the credibility of the utility, and support for drinking water initiatives" (Parmalee 2006). A 2002 EPA-sponsored survey demonstrated that consumers who read the report found it a valuable resource. However, many customers did not remember receiving or reading their report. While the EPA has not conducted a follow-up survey, many water utilities are making an effort to improve the quality of their reports to better reach customers.

The implications associated with poor communication can be serious. As some utilities and communities have discovered the hard way, once a consumer loses confidence in the safety of drinking water, it can take some time to rebuild it. For example, during a Congressional oversight hearing on the problems in the District of Columbia related to lead in drinking water, one representative noted that she had not consumed water from the tap in the District of Columbia since a previous problem from the mid-1990s that had resulted in a city-wide boil water order. In fact, many residents had not yet recovered their confidence after that earlier incident. Because the District has a high proportion of low-income residents, this lack of confidence poses an economic impact on homeowners who may seek more costly sources of drinking water in search of true or perceived safety.

Water utilities and government officials certainly face challenges in communicating about sensitive issues with sometimes uncertain information. This challenge can be addressed by developing strategies to ensure that issues are communicated clearly in a timely manner, that uncertainties are acknowledged and explained, and by forming partnerships with other communicators within the community to help develop and carry the message to consumers.

DISCLAIMER

The views expressed in this paper are those of the individual author and do not necessarily reflect the views and policies of the US Environmental Protection Agency.

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First received 2 April 2007; accepted in revised form 18 August 2007