Chlorine and the Disinfection Byproducts Rule

Angela Logomasini

For many years, the U.S. Environmental Protection Agency (EPA) has attempted to develop standards to regulate disinfection byproducts, a group of microbial contaminants that result when public water is purified with chlorine. The EPA is working on congressionally mandated deadlines to issue a series of rules to regulate these contaminants. According to the General Accounting Office (GAO), now the Government Accountability Office, the first of two stages of these rules will cost $700 million a year.[1] Because the science used to justify these rules is very weak, it is likely that the public will pay billions in exchange for little or no benefit. Because the rules cause reduced use of chlorination to keep water supplies clean, the public may suffer adverse health impacts.

Regulatory Status

The EPA proposed a rule in 1994,[2] but Congress extended the deadline until November 1998. The EPA issued stage 1 of the rule on schedule. The law required the EPA to finalize stage 2 of the rule by May 2002, but it did not actually finalize the rule until January 2006. For each regulated contaminant under the Safe Drinking Water Act (SDWA), the EPA usually specifies a maximum contaminant level goal (MCLG), which represents the level of a contaminant that the EPA

1. GAO, *Safe Drinking Water Act: Progress and Future Challenges in Implementing the 1996 Amendments*, GAO. RCED-99-31, 6 (Washington, DC: GAO, January 1999).

2. *Federal Register* 59, no. 145 (July 29, 1994): 38668–829.

ideally wants to allow in drinking water.[3] The EPA uses the MCLG as a guide in setting the enforceable standard, the maximum contaminant level (MCL). The MCL represents the amount of a contaminant that systems may legally allow in tap water. In 1998, controversy emerged when the EPA issued its first set of standards for disinfection byproducts. The EPA set a zero MCLG and a 0.08 MCL for a group of four disinfection byproducts called "total trihalomethanes," of which chloroform is one.[4] A federal court reversed the MCLG for chloroform.

The Science

After the passage of the 1996 SDWA amendments, the EPA set up an advisory committee on the rule and cosponsored a study with the International Life Sciences Institute Expert Panel. Consisting of 10 experts from government and industry, this panel concluded that cancer related to chloroform "is expected to involve a dose response relationship, which is nonlinear and probably exhibits an exposure threshold."[5] Hence, the best science indicates that under a given level, chloroform poses zero risk, which would enable the agency to set a less stringent standard than if the substance posed a risk at any level (as is assumed under the linear risk model).[6]

On the basis of those findings, the EPA released a notice in the *Federal Register* (called a Notice of Data Availability, or NODA) stating that it was considering revisions to the 1994 rule because it "concluded that a nonlinear approach is more appropriate for extrapolating low-dose cancer risk rather than the low-dose linear approach."[7] EPA then requested comments. Setting a goal above zero would have been the first time the agency had set a MCLG above zero for a substance it considered carcinogenic and would have enabled the agency to ease the stringency of the standard.

Nine months later, the EPA caved in to political pressures and reversed its position. It set a zero MCLG for chloroform in the final rule.[8] The EPA had failed to use the "best available science," which the 1996 law demands that it observe, and a federal court subsequently vacated the MCLG (but not the final MCL), calling the MCLG "arbitrary and capricious."[9] The EPA subsequently removed the zero goal.[10] Although the EPA has not promulgated a new MCLG, the enforceable MCL that it set remains in effect.

The EPA's flip-flop is difficult to explain on scientific grounds. The final regulations and the NODA are full of disclaimers, noting that there

3. An MCLG is an unenforceable standard that is used as a guide for setting the enforceable standard, the MCL. For more information, see the policy brief titled "Safe Drinking Water Act Overview."

4. Under this standard, water providers must ensure that tap water contains no more than 0.08 mg/L of the combined concentration of these substances.

5. *Federal Register* 63, no. 61 (March 31, 1998): 15685.

6. For more information on threshold models versus linear models, see the policy brief titled "The True Source of Cancer in the Environmental Source.

7. *Federal Register* 63, no. 61 (March 31, 1998): 15685. The regulations for chloroform would not be affected by a zero MCLG because the enforceable MCL would not have changed. Also, the standard does not simply regulate chloroform. It regulates the level of total trihalomethanes; chloroform is one of four such contaminants.

8. *Federal Register* 63, no. 241 (December 16, 1998): 69390–476.

9. *Chlorine Chemistry Council v. Environmental Protection Agency*, 98-1627, 99-1023, and 99-1056 (DC Cir., March 31, 2000).

10. *Federal Register* 65, no. 104 (May 30, 2000): 34404–05.

is little hard evidence that disinfectant byproducts are even carcinogenic.

- In the final rule, the EPA notes, "a causal relationship between exposure to chlorinated surface water and cancer has not yet been demonstrated. However, several studies have suggested a weak association in various subgroups … these studies found a weak association for bladder cancer, although findings were not consistent within and among studies."[11]
- In the NODA, the EPA noted that studies it used for the 1994 rule[12] generally showed results that had weak statistical significance and were not always consistent. For example, some reviewers believe that two studies showed statistically significant effects only for male smokers, while two other studies showed higher effects for nonsmokers. One study showed a significant association with exposure to chlorinated surface water but with exposure to chlorinated groundwater, while others showed the opposite result.[13]

Setting such standards without scientific consensus or any verified alternative to chlorination is very risky. Disinfection byproduct regulations could curtail the use of disinfectants that are vital to the protection of consumers against microbial contamination, a cause of approximately 50,000 deaths daily worldwide.[14] Underscoring that concern, the EPA's own Science Advisory Board (SAB) reported in 1993 that the EPA lacked the hard data necessary to justify passing a disinfection byproduct regulation. The SAB warned, "A key concern is the possibility that chlorination … may be replaced by processes with poorly understood health impacts, both chemically and microbiologically."[15]

Failure to properly disinfect water has already resulted in serious public health impacts. In 1991, the government in Peru reduced chlorine levels in their water supply because of fears about cancer risks resulting from EPA actions to regulate disinfection byproducts.[16] Inadequate chlorination in Peru has been cited in scientific literature[17] as a key factor in a cholera epidemic that started in Peru and spread then throughout the hemisphere, leading to 533,000 cases of cholera and 4,700 deaths.

Key Experts

Angela Logomasini, Director of Risk and Environmental Policy, Competitive Enterprise Institute, alogomasini@cei.org.

Bonner Cohen, National Center for Public Policy Research, bonnercohen@comcast.net.

11. *Federal Register* 63, no. 241 (December 16, 1998): 69407.

12. *Federal Register* 63, no. 61 (March 31, 1998): 15679–80.

13. *Federal Register* 63, no. 241 (December 16, 1998): 69408.

14. "As Control Efforts Reach Turning Point, Water Suppliers Press Congress to Boost Disinfection By-product Research," *Water Policy Report*, May 12, 1993, 30.

15. SAB, *Drinking Water Committee Commentary on Negotiated Regulation for Disinfection Byproducts*, EPA-SAV-DWC-COM-94-002 (Washington, DC: EPA, November 8, 1993), 3.

16. Michael Fumento, "Will the U.S. Repeat Peru's Deadly Chlorine Folly?," www.fumento.com, 1996, http://www.fumento.com/bomis34.html.

17. For example, see David L. Swerdlow et al., "Waterborne Transmission of Epidemic Cholera in Trujillo, Peru: Lessons for a Continent at Risk, *The Lancet*, July 4, 1992; and "Of Cabbages and Chlorine: Causes of Cholera Epidemic in Peru, *The Lancet*, July 4, 1992.

Recommended Readings

Michelle Malkin and Michael Fumento, *Rachell's Folly: The End of Chlorine* (Washington, DC: Competitive Enterprise Insitute: March 1996), http://fumento.com/rachel.pdf.

Enrique Ghersi and Hector Naupari, "Dirty Water: Chlera in Peru," in *Environmental Health: Third World Problems—First World Preoccupations*, Roger Bate and Lorraine Mooney eds. (New York: Butterworth-Heinemann, 1999), 17-46.

Updated 2008.