CEI ON POINT

The Competitive Enterprise Institute

1001 Connecticut Avenue NW • Suite 1250 • Washington, D.C. 20036 • (202) 331-1010 • http://www.cei.org

Advancing the Principles of Free Enterprise and Limited Government

May 16, 2001 No. 80

Arsenic and Old Politics

By Angela Logomasini[1]

President George W. Bush has been taking a lot of heat for his decision to review the science underlying a change to the current drinking water standard for arsenic. This change was pushed through by the Clinton administration in its final days. Bush's political opponents say that merely taking time to review the science imperils public health. In reality, the science is very unclear; politicians, environmentalists, and some members of the press have grossly misrepresented the issue. The adverse public health impacts of an overly stringent rule, by contrast, are clear. The Clinton rule would disproportionately hit lower-income rural Americans, and its high costs could force many families to sacrifice health care and other critical needs. Given these realities, it makes good sense to take time to review both the science and the impacts of the standard itself.

Background. Since 1975 the Environmental Protection Agency (EPA) has allowed no more than 50 parts per billion (ppb) of arsenic per liter of tap water. This standard was set as an "interim standard" after the passage of the Safe Drinking Water Act (SDWA). The 1986 revisions to the law mandated that the agency set a final standard by 1989. After the agency missed the legislative deadline and a court-ordered deadline, amendments to the SDWA in 1996 extended the deadlines for the rule. It required the agency to propose a standard by January 2000 and to finalize the rule by January 2001.

In addition, the 1996 law authorized research funds and mandated that the EPA produce an arsenic research plan by 1997. The EPA was a year late in producing its research plan and subsequently did not have time to produce much new research on which to base its rule. Nonetheless, in June 2000 – five months later than legislatively mandated – the agency proposed a new standard of 5 ppb.[2] Because the proposed rule came late and because the EPA failed to provide much new data, lawmakers, water providers, and local officials expressed concern that there was not enough time to consider fully the proposed rule and its implications. Congress responded by including language in a FY 2000 appropriations bill, which extended the deadline for six additional months.

---

[1] Angela Logomasini is Director of Risk and Environmental Policy at the Competitive Enterprise Institute.

[2] *Federal Register* 65, no. 121, (June 22, 2000): 38888-38983.

But in the waning days of the Clinton administration, the EPA published a final standard of 10 ppb in the *Federal Register*.[3] The standard would have been effective starting this past March 23, though water systems would have had until 2006 to comply. Senator Pete Domenici (R-NM) responded by introducing S. 223, which would void the new rule. In March, the Bush administration announced that it would delay the effective date of the standard for 60 days to review the rule and the underlying science. In April, the administration issued a notice announcing that it would delay the final rule until 2002, after the National Academy of Sciences (NAS) and the EPA's Science Advisory Board (SAB) had additional time for review.[4]

At the same time, the issue has also begun to percolate in Congress. Representative Bernie Sanders (I-VT) and Senator Christopher Dodd (D-CT) have introduced bills (H.R. 1252 and S. 635) to reinstate the 10 ppb standard. Sanders' bill would mandate that water suppliers meet the 10 ppb standard by 2003 and a 3 ppb standard by 2006.

Welfare Losses. To date, the debate has focused on the public health consequences of arsenic in drinking water. To ensure a safe standard, however, officials need to compare overall risks: What are the estimated risks of trace-levels of arsenic versus risks associated with the standard itself. According to a Congressional Budget Office (CBO) study, federal drinking water regulations can impose "welfare losses" – a term which highlights the fact that shortsighted federal standards can reduce the overall public welfare.[5]

With the arsenic rule, the welfare losses likely would be high because the rule would fall disproportionately on rural Americans. Arsenic appears naturally in the water in many rural parts of the United States, and a 10 ppb standard could affect 2,455 of these communities.[6] Many of those who will be affected are either low-income or live on tightly fixed incomes. For many of these families, higher costs for water may mean fewer resources for health care or other essential needs. Towns in rural areas may decide to help cover part of the cost of compliance by sacrificing essential social needs, such as the purchase of fire trucks, or addressing other, more serious drinking water concerns.

In fact, the SAB highlights these very points, noting that an overly expensive arsenic rule "might force tradeoffs that do not maximize the gains to public health." For example, "allocation of income to arsenic might preclude addressing nutritional factors" because the standard could make it difficult for low-income families to put food on the table. In addition, the SAB noted that high treatment costs could lead communities to disconnect systems and access water from potentially more dangerous sources, such as from poorly designed wells or untreated surface waters.[7] The statistics on how much the law will cost further reveal that welfare losses are likely to be high:

---

[3] *Federal Register* 66, no. 14, (January 22, 2001): 6976-7066.
[4] *Federal Register* 66, no. 78, (April 23, 2001): 20580-20584.
[5] U.S. Congressional Budget Office, *Federalism and Environmental Protection: Case Studies for Drinking Water and Ground-Level Ozone* (Washington, D.C.: U.S. Congressional Budget Office, November 1997).
[6] EPA Science Advisory Board, *Arsenic Proposed Drinking Water Regulation* (Washington, D.C.: USEPA, December 2000), 18; EPA-SAB-DWC-01-001; http://www.epa.gov/sab/dwc0101.pdf.
[7] Ibid, 38.

- According to the EPA, per-household costs of this rule alone could add $326 annually to water bills in systems with fewer than a 100 connections, and up to $162 in systems serving between 100 and 100,000 residents. Even residents within larger systems serving up to a million residents might see water bills increase by $20 per year.[8]

- Some communities will suffer even more severe impacts. For example, Maryland's Calvert County may see its per-household water bills increase by $70 per month just to meet the arsenic standard – a steep price for many living on modest incomes.[9]

- According to conservative EPA estimates, total annual costs of the rule could range from $180 million to $205 million.[10] Water suppliers estimate the costs would be far higher – $604 million annually with an initial investment of $5 billion.[11]

Doctoring the Data. Because tightening the standard would force people to make serious sacrifices, one might assume that, before issuing its rule, the EPA had clear science indicating that the current standard is not safe. Yet the science is not only far from clear, it has not revealed any risks at the current level. According to the National Research Council (NRC) – a subcommittee affiliated with the NAS – "No human studies of sufficient statistical power or scope have examined whether consumption of arsenic in drinking water at the current MCL [the standard before the Clinton administration acted] results in the incidence of cancer or noncancer effects."[12]

Most of what scientists do know relates to a handful of studies that reveal one thing: Relatively high-level exposure to arsenic for long periods of time can cause cancer and other ailments. The EPA based its risk assessment of arsenic on studies of Taiwanese populations in 42 villages that were exposed to relatively high levels of arsenic. From these studies, the EPA has extrapolated risks of low-level arsenic exposures in drinking water to the U.S. population. But the SAB and the NRC have pointed out serious flaws. Among them:

- While the Taiwanese studies found an association between high exposures and cancer, these data do not necessarily support any link between low-level exposures and cancer in the United States.[13]

- The EPA failed to consider poor nutrition among the Taiwanese, which very likely exaggerates agency risk estimates. Deficiencies may increase toxicity of arsenic.[14]

---

[8] *Federal Register* 65, no. 14, (January 22, 2001): 7011.
[9] See http://www.ruralwater.org/arsenicreality.
[10] *Federal Register* 65, no. 14, (January 22, 2001): 7010.
[11] "Environmental Group Asks Court to Force OMB to Issue Arsenic Proposal," *Daily Environment Report*, no. 92, (May 11, 2000): A1.
[12] National Research Council, *Arsenic in Drinking Water* (Washington, D.C.: National Academy of Sciences, 1999), 7, 299. Read online at: http://www.nap.edu/catalog/6444.html.
[13] EPA Science Advisory Board, *Review of the Draft Criteria Document on Inorganic Arsenic* (Washington, D.C.: USEPA, November 8, 1993), EPA-SAB-DWC-94-004.
[14] SAB, *Arsenic Proposed Drinking Water Regulation*, 26, 30-31; SAB notes substantial deficiencies in selenium, methyl donors, zinc, and other substances as key confounding factors.

- Both the EPA and the NRC failed to consider the possibility of endemic infectious hepatitis in the region studied and its likely contribution to the liver cancers attributed to arsenic intake.[15]

- The Taiwanese population in the studies consumed a much higher level of arsenic in food – particularly since the Taiwanese consume more fish (which contain arsenic levels higher than in most foods). Accordingly, Taiwanese exposure levels were likely higher than estimated.[16]

- The method for determining exposure levels among Taiwanese likely led to exaggerated risk assessments. The researchers averaged arsenic levels from an incomplete sampling of drinking water wells within each village. As a result, those who may have contracted cancer at the highest levels in the village would be counted as having become ill at the lower, averaged level assigned to that village. As one member of the NRC noted, "The problem[s] with the data are substantial. The lack of data linking individuals with specific wells is a very big deal. For a rule like this, you need a good dose-response. We just don't have one."[17]

- The studies compared populations within Taiwan that had substantially different diet and lifestyles: Villages of poor, malnourished populations were compared to the nation as a whole. According to the SAB, such comparisons may lead to "unrealistically high" risk estimates. More recent studies compared the populations in the study to more similar Taiwanese populations within the same region who were not exposed to as much arsenic. These studies, which the SAB says are more accurate, cut risk estimates in half.[18]

- Similarly, the SAB noted that the agency did not adequately consider studies of U.S. populations in Utah exposed over decades to levels of up to 200 ppb – 20 times the Clinton standard – that failed to find bladder cancers. The SAB called for more study of the Utah data because there are problems with the population comparisons as well. However, the board noted: "Despite its limitations, the results of the Utah Study also suggest there are potential differences between the affected population in Taiwan and the U.S."[19]

- The SAB concluded that the EPA approach likely biases "U.S. risk estimates towards overestimates. … The magnitude of this bias is likely to be large."[20]

Statistical Shenanigans. When estimating public health risks the EPA develops statistical models that estimate risks of chemicals at various levels of exposure. For arsenic, the EPA uses the "linear model." This model assumes that risks increase incrementally as dose increases. However, both the SAB and the NRC have noted that it is more likely that the arsenic

---

[15] Ibid, 30.
[16] SAB, *Review of the Draft Criteria Document on Inorganic Arsenic.*
[17] Transcripts from phone conversations between the EPA Office of Intergovernmental Relations and NRC drinking water panel members, 1999.
[18] SAB, *Arsenic Proposed Drinking Water Regulation,* 26-28.
[19] SAB, *Arsenic Proposed Drinking Water Regulation,* 30.
[20] SAB, *Arsenic Proposed Drinking Water Regulation,* 30.

risk is "sublinear."[21] That means there is relatively little risk increase as the dose increases until exposure reaches a certain critical point at which risk increases more substantially. The other possibility is that the substance follows a threshold model, which means there is zero risk until the exposure level reaches a "threshold level." Either a sublinear risk or a threshold risk model would justify a much less stringent arsenic standard.

- One piece of evidence that a threshold or sublinear risk model is more appropriate is that our bodies can process a certain about of arsenic and remove it via urination without ill effect.[22]

- One reason to consider that arsenic is potentially a threshold carcinogen is because, as the NRC notes, animal studies indicate that arsenic might even be an essential nutrient to humans at low levels.[23]

While there is evidence for both a sublinear risk and a threshold risk, the EPA chose the linear model because researchers have not determined the mechanism by which arsenic may cause cancer. Both the SAB and the NRC concur with the "cautious" policy, yet each acknowledges that the sublinear model is the more likely choice and that choosing a linear model will probably exaggerate risk estimates. "All were agreed that the curve was non-linear," noted one NRC panel member to the EPA Office of Congressional and Intergovernmental Relations.[24]

Political "Science." The EPA used the 1999 NRC report as a key justification for its standard. However, the NRC report does not shed new light on the issue. It simply reviews existing research and calls for more. Despite the many limits to existing science that NRC notes in this report, the executive summary stated that members on the panel believed that the 50 ppb standard was not protective of public health and that the EPA should make the standard more stringent. The report did not say what level was acceptable.

The recommendation appears to have been more political than scientific. Transcribed phone conversations between NRC panel members and the EPA's Office of Congressional Intergovernmental Affairs reveal that members felt pressured into issuing a strong recommendation. One panelist noted: "Conclusions cited in the Executive Summary are much stronger than the data support." Another said: "There was pressure to not come forward with findings that were less than conclusive." "There was pressure (during the process of determining how to elucidate the group's findings) to avoid the appearance of offering weak conclusions," said another.[25]

---

[21] SAB, *Arsenic Proposed Drinking Water Regulation,* 3; NRC, *Arsenic in Drinking Water*, 3.
[22] For a discussion of this research see Mark R. Powell, *The 1991 Lead and Copper Rule and the 1995 Decision Not to Revise the Arsenic Drinking Water Rule: Two Case Studies in EPA's Use of Science* (Washington, D.C.: Resources for the Future, March 1997), 41-45.
[23] NRC, *Arsenic in Drinking Water* 20-21.
[24] Transcripts from phone conversations between the EPA Office of Intergovernmental Relations and NRC drinking water panel members, 1999.
[25] Ibid.

Moreover, former EPA officials,[26] politicians,[27] and environmental activists[28] have seriously misrepresented the data found in the NRC report. Citing the NRC report, some have made the claim that the "National Academy of Sciences"[29] found that the current arsenic standard of 50 ppb in drinking water poses a 1 in 100 risk of cancer. The report made no such finding. The 1 in 100 figure is found in a chapter analyzing various statistical methods for assessing risk. It does not assume the data input into these models are even close to correct or than any of the "findings" have a basis in reality. Instead, the entire chapter is provided for illustrative purposes, and the NAS warned against using the figures because the report did not constitute a risk assessment. Within this chapter, the 1 in a 100 figure was tossed out as speculation. The report did not even run a model to find this number. Rather, it says that assuming all speculated cancer risks were true (a very big assumption) and applying those speculations to a certain statistical model "could easily result in a combined cancer risk on the order of 1 in 100." [30] If this figure tells us anything, it's that the model and/or assumptions are incredibly flawed.

Not surprisingly, the NRC report called on the EPA to address numerous flaws in its data before running any of these models for a real risk assessment. The SAB notes that the agency not only failed to address data problems, but that "the agency might have taken the modeling activity in the NRC report as prescriptive despite the NRC comments about possible limitations in the existing knowledge base and their intention that their efforts be seen as illustrative and not as actual risk assessments. ... [The EPA] did not conduct the formal risk assessment integrating additional factors called for by the NRC."[31]

Benefits or Net Public Health Loss? Ironically, even if the EPA's risk assessment were at all accurate, the benefits of its rule are so small that its costs likely would lead to a net reduction in public health and qualify of life.

- According to agency estimates, a 10 ppb standard would eliminate 23-33 cancers deaths each year (lung and bladder cancers combined).[32] The agency speculates other benefits, but it cannot quantify them because it lacks solid evidence for such claims.

---

[26] Chuck Fox, "Arsenic and Old Laws," *New York Times*, March 22, 2001, A25; Fox was EPA Assistant Administrator for Water during the Clinton Administration.

[27] See: Senator Tom Daschle, "Daschle Expresses Disappointment Over Bush Arsenic Decision; Current Water Standards are 60 Years Old, Creates Cancer Risk of 1 in 100," Press Release, March 23, 2001; http://www.senate.gov/~daschle/pressroom/releases/01/03/2001323C13.html.

[28] Eric Olson, Testimony Before the House Energy and Commerce Committee; Subcommittee on Environment and Hazardous Materials Hearing, Drinking Water Needs Infrastructure, March 28, 2001; http://www.house.gov/commerce/hearings/03282001-127/Olson193.htm.

[29] Equating the NRC with the NAS also raises questions because the subcommittee does not apply the same scientific standards employed by the NAS; see Steve Milloy, "National Research Council Poisons Arsenic Debate," Fox News Channel (online), April 27, 2001; http://www.foxnews.com/story/0,2933,17555,00.html.

[30] NRC, *Arsenic in Drinking Water*, 264-298, see page 293 and 8.

[31] SAB, *Arsenic Proposed Drinking Water Regulation*, 26.

[32] *Federal Register* 65, no. 14, (January 22, 2001): 7011; The EPA estimates benefits will come to $140 to $198 per year and it estimates $6.1 million per life saved.

- However, the agency fails to consider loss of life due to the burdens placed on the public from the standard. Considering such factors, an American Enterprise Institute-Brookings Institution study estimates that the rule could lead to *a net loss* of 10 lives per year. [33]

- The SAB notes that any substantial benefits of tightening the arsenic standard would occur in communities that have arsenic levels approaching the current 50 ppb standard – mostly rural southwestern areas of the country. However, the SAB report highlights the fact that any benefits may be overridden by the costs to these communities in meeting the standard. In fact, such costs may lead to a net reduction in public health.[34]

Conclusion. At any point in time, localities can monitor and control any contaminant that they chose. They know best where to devote their scarce resources to maximize public health. Most communities choose not the regulate arsenic at the 10 ppb level because the science doesn't warrant that standard and because it would demand that communities make considerable sacrifices. It makes good sense for policymakers to consider those concerns, particularly given the fact that the regulation was rushed out during the final days of the Clinton presidency.

[33] Jason Burnett and Robert W. Hahn, *EPA's Arsenic Rule: The Benefits of the Standard Do Not Justify the Costs*, (Washington, D.C.: AEI-Bookings Joint Center for Regulatory Studies, 2001), Regulatory Analysis 01-02.
[34] SAB, *Arsenic Proposed Drinking Water Regulation*, 37-39.