

Rachel's Environment & Health News

#722 - Arsenic From Your Tap

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by Rachel Massey*

President Bush has canceled a health regulation that would have reduced allowable levels of arsenic in U.S. drinking water from 50 parts per billion (ppb) to 10 ppb. According to the U.S. Environmental Protection Agency (EPA), arsenic in drinking water causes cancer of the skin, lungs, bladder and prostate in humans.[1] Arsenic in drinking water is also linked to diabetes, cardiovascular disease, anemia, and disorders of the immune, nervous and reproductive systems, EPA says.[1] Furthermore, recent evidence suggests that arsenic even at very low levels equivalent to 10 ppb in water interferes with hormones, making it a potent endocrine disrupter. Hormones are chemical messengers that the body produces to regulate critical life processes.[2]

The current U.S. arsenic standard of 50 ppb was adopted in 1942. After a decade of study and public review of scientific evidence, EPA proposed the stricter standard while Bill Clinton was president. Mr. Bush reversed EPA's decision shortly after taking office.

Arsenic appears in two forms, organic and inorganic; in general, the inorganic form is more dangerous. Inorganic arsenic occurs naturally in some locales. In addition, at least six million pounds of arsenic are released into the environment of the U.S. each year by mining, coal burning, copper and lead smelting, wood-preserving treatments, municipal incinerators and the use of certain pesticides.[3,pg. 249] The International Agency for Research on Cancer, a division of the World Health Organization (WHO), and the U.S. EPA both agree that arsenic is known to cause cancer in humans.[4] According to EPA, at least 11 million people in the U.S. currently drink water contaminated with arsenic at levels above 10 ppb.[5]

The 10 ppb arsenic standard would have put the U.S. squarely in the mainstream. In 1993, the World Health Organization (WHO) set 10 ppb as the recommended limit for arsenic in drinking water. The 15-nation European Union adopted 10 ppb as a mandatory standard for arsenic in drinking water in 1998.[6] WHO says even this level is not safe; for example, WHO estimates that lifetime exposure to water containing 10 ppb of arsenic will lead to six cases of skin cancer per 10,000 people.[7]

A 1999 study by the U.S. National Academy of Sciences (NAS) recommended that the allowable levels of arsenic in U.S. drinking water should be lowered "as promptly as possible." Taking into consideration all forms of cancer, NAS said the current standard of 50 ppb "could easily result in a combined cancer risk on the order of 1 in 100." [8,pg.301] A one-in-100 risk is 10,000 times as great as the one-in-a-million risk that EPA usually deems "acceptable."

EPA estimated that cutting allowable arsenic from 50 to 10 ppb would prevent 1000 bladder cancers and 2000 to 5000 lung cancers during a human lifetime. EPA did not estimate the reductions in skin or prostate cancers, diabetes, nervous system damage, immune system damage, or cardiovascular disease.[1]

Now a new study suggests that arsenic is a potent hormone disrupter.[9] Working with rat tumor cells, researchers have found that low-level arsenic exposure interferes with the activity of hormones known as glucocorticoids. Glucocorticoids are involved in most of the human body's basic systems. They help to regulate the immune system, the central nervous system, and changes in blood, bones and kidneys, as well as the body's use of sugars, starches, fats, and proteins. Glucocorticoids affect weight, growth, and development.[10]

Arsenic's hormone-disrupting activity may explain how arsenic promotes cancer. Studies of laboratory animals show that glucocorticoids suppress some tumors. Arsenic may promote cancers by interfering with this tumor-suppressing mechanism.

For President Bush, arsenic poisoning provides an opportunity for

humor. At a dinner speech in March the President said, "As you know, we're studying safe levels for arsenic in drinking water. (laughter) To base our decision on sound science, the scientists told us we needed to test the water glasses of about 3,000 people. (laughter) Thank you for participating. (laughter)"[11]

It is not entirely clear why Mr. Bush takes arsenic poisoning so lightly, but it may have something to do with his ties to the coal industry. Burning coal is a major source of arsenic contamination. Many landfills contain arsenic-laden ash produced by coal-burning power plants. Arsenic is likely to leak out of these landfills, contaminating groundwater.[3,pg.250]

Coal companies were major contributors to Mr. Bush's election campaign. Mr. Bush recently announced he was abandoning his campaign promise to regulate carbon dioxide emissions from power plants,[13] and he has turned his back on the Kyoto Protocol, the international treaty to combat global warming. Representative Henry Waxman (D., Calif.) says Mr. Bush's arsenic policy is "another example of a special interest payback to industries that gave millions of dollars in campaign contributions." [5]

The wood products industry, which uses arsenic to pressure-treat lumber, also stands to benefit from unsafe arsenic standards. A representative of the American Wood Preservers Institute said members of his organization were "relieved and delighted" by Mr. Bush's decision.[5]

EPA spent ten years studying the dangers of arsenic in a public process before proposing the 10 ppb standard. The Bush administration now says the science behind the 10 ppb standard is "unclear." Furthermore, the Bush EPA questions whether the Clinton administration "fully understood" the costs of reducing arsenic contamination, even though the Clinton EPA published detailed cost estimates for public review and comment.[14]

In developing the 10 ppb standard, EPA estimated that the total cost of reducing arsenic contamination to 10 ppb nationwide would be around \$181 million a year. If this cost were paid entirely by households that use affected water supplies, it would average about 12 dollars per person per year. EPA says the total annual benefits from avoiding unnecessary bladder and lung cancers would range from \$140 million to \$198 million. In other words, the monetary benefits from reducing these two illnesses alone would match the costs of removing arsenic from drinking water. EPA did not estimate monetary benefits from avoiding other illnesses associated with arsenic exposure, such as skin, prostate, and lung cancer, diabetes, cardiovascular disease, and damage to the immune and nervous systems.[15]

NEW YORK TIMES writer Gina Kolata has gone to bat for Mr. Bush on arsenic. By carefully selecting information, Kolata has managed to make the proposed 10 ppb arsenic regulation seem scientifically muddled and ultimately not worth the cost.[16] To begin with, she points out correctly that arsenic is natural: "God put it there," she quotes one scientist as saying, but she does not mention the millions of pounds of arsenic that corporations dump into air and water each year.

Kolata quotes an industry consultant who says he would bet a dollar that the "minuscule" number of lives to be saved by reducing arsenic levels is not statistically different from zero. Given that we know arsenic causes many different human diseases and given that we even know the mechanism by which this seems to occur (hormone disruption), it seems scientifically untenable and ethically bankrupt to assume "zero" effect when exposing tens of millions of people to arsenic in their drinking water.

Kolata cites EPA's estimate of how many bladder and lung cancers could be prevented by adopting the 10 ppb standard, but she does not mention the many other diseases that could be prevented by a safer standard. Kolata points out, correctly, that NAS did not

recommend a specific level to which contamination should be reduced. However, she forgets to mention that the NAS urged the U.S. to reduce its arsenic "as promptly as possible," and that the NAS indicates that no level of arsenic exposure is known to be safe.[8,pg.300]

Kolata mentions correctly that the World Health Organization has set 10 ppb as its standard for arsenic in drinking water, but she says, "Most European countries have set their maximum arsenic levels at 20 parts per billion in water..." thus making it seem as if the WHO and the EPA are outside the mainstream. This is incorrect. The 15-nation European Union in 1998 adopted 10 ppb arsenic as a standard for drinking water; EU member nations are specifically prohibited from adopting a standard less stringent than 10 ppb.[6] Thirteen other European nations have applied for membership in the EU; when they achieve it, they too will be bound by the EU's 10 ppb arsenic standard.

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[1] EPA Office of Water, "Technical Fact Sheet: Proposed Rule for Arsenic in Drinking Water and Clarifications to Compliance and New Source Contaminants Monitoring [EPA 815-F-00-011] ," (May 2000). Available at http://www.epa.gov/safewater/ars/prop_techfs.html.

[2] See <http://www.ourstolenfuture.org/New/newstuff.htm#arsenicandc>.

[3] Syracuse Research Corporation, TOXICOLOGICAL PROFILE FOR ARSENIC (Atlanta, Ga.: Agency for Toxic Substances and Disease Registry, September 2000).

[4] See International Agency for Research on Cancer, "List of IARC Evaluations," Group 1 (list updated April 5, 2000). Go to <http://193.51.164.11/monoeval/grlist.html> and click on "Group 1." Also see Environmental Health Information Service, "Ninth Report on Carcinogens," Group A (revised January, 2001). Go to <http://ehis.niehs.nih.gov/roc/toc9.html> and click on "Known Human Carcinogens."

[5] Douglas Jehl, "E.P.A. to Abandon New Arsenic Limits for Water Supply," NEW YORK TIMES (March 21, 2001), pg. A1.

[6] Council of the European Union, "Council Directive 98/83/EC of November 1998 on the quality of water intended for human consumption," OFFICIAL JOURNAL OF THE EUROPEAN COMMUNITIES May 12, 1998, pgs. L330/32-L330/52. Available for purchase at <http://eudor.eur-op.eu.int>.

[7] World Health Organization, "Water, Sanitation and Health: Guidelines for Drinking Water Quality," information extracted from World Health Organization, GUIDELINES FOR DRINKING-WATER QUALITY , 2nd edition, Vol. 1 (Geneva: World Health Organization, 1993), pgs. 41-42. Available at http://www.who.int/water_sanitation_health/GDWQ/Chemicals/arsenicsum.htm .

[8] National Research Council, ARSENIC IN DRINKING WATER [ISBN 0309063337] (Washington, D.C.: National Academy Press, 1999). Available at <http://books.nap.edu/books/0309063337/html/index.html>

[9] Ronald C. Kaltreider and others, "Arsenic Alters the Function of the Glucocorticoid Receptor as a Transcription Factor," ENVIRONMENTAL HEALTH PERSPECTIVES Vol. 109, No. 3 (March 2001), pgs. 245-251.

[10] See <http://www.ourstolenfuture.org/NewScience/newsources/glucocorticoids.htm> .

[11] Frank Bruni, "Word for Word/Bushspeak; The President's Sense of Humor Has Also Been Misunderestimated," NEW YORK TIMES (April 1, 2001), Week in Review, pg. 7.

[12] John Harte and others, TOXICS A TO Z: A GUIDE TO EVERYDAY POLLUTION HAZARDS [ISBN 0520072243] (Berkeley: University of California Press, 1991), pgs. 217-221.

[13] Douglas Jehl and Andrew C. Revkin, "Bush, in Reversal, Won't Seek Cut in Emissions of Carbon Dioxide," NEW YORK TIMES (March 14, 2001), pg. A1.

[14] U.S. Environmental Protection Agency, "EPA to Propose Withdrawal of Arsenic in Drinking Water Standard; Seeks Independent Reviews," Press Release (March 20, 2001). Available at <http://yosemite.epa.gov/opa/admpress.nsf/b1ab9f485b098972852562e7004dc686/77e59dbb919fdf4785256a150063d6a0?OpenDocument>

[15] EPA Office of Water, "Technical Fact Sheet: Final Rule for Arsenic in Drinking Water [EPA 815-F-00-016] ,"(January 2001). Available at http://www.epa.gov/safewater/ars/ars_rule_techfactsheet.html.

[16] Gina Kolata, "Putting a Price Tag on the Priceless," NEW YORK TIMES (April 8, 2001), Week in Review, pg. 4.