

Radon

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The Environmental Protection Agency (EPA) has been working to promulgate a drinking water rule on radon for more than a decade. As with many other rules, the debate focuses on whether science proves that the rule is necessary to protect public health, given its very high costs, particularly to rural America. Costs to small communities may force them to make huge sacrifices. The only solution for such communities might be to discontinue drinking water service, which could lead residents to turn to dangerous sources such as untreated surface waters.

Regulatory and Legislative History

The drinking water standard for most regulated substances is specified as a “maximum

contaminant level” or MCL. The MCL sets the maximum amount of a substance that the EPA will allow in tap water. Currently, EPA regulations set a MCL of 4,000 picocuries per liter for radon. In 1991, the EPA proposed changing the MCL to 300 picocuries per liter on the basis of 1991 findings of an agency report on radon.¹ Because of controversies regarding EPA science and the potential costs of the rule, Congress placed a hold on the EPA’s promulgation of the rule until it reauthorized the SDWA. But rather than reining in the EPA and preventing it from setting a ridiculously stringent standard, the 1996 SDWA amendments required the agency

1. U.S. Environmental Protection Agency, *Report to Congress on Radon in Drinking Water: Multimedia Risk and Cost Assessment of Radon* (Washington, DC: EPA, 1994).

to issue a final rule within four years after reviewing the findings of a government-funded National Academy of Sciences (NAS) risk assessment of radon. An affiliate of the NAS—the National Research Council (NRC)—produced a report in 1998.² The EPA proposed a rule in 1999, again suggesting an MCL of 300 picocuries per liter. However, under the 1996 SDWA amendments, the EPA rule would allow localities and states to meet a less stringent standard if they used programs to regulate radon in indoor air. Despite a mandate to finalize the rule in 2002, the EPA has not yet produced a final rule.

Aggregate Costs and Benefits

Aggregate costs and benefits of the radon rule are as follows:

- The EPA estimates that the rule would cost \$407.6 million per year.³
- The EPA claims that the rule will yield \$362 million in benefits, or \$5.8 million per theoretical life saved and \$538,000 per theoretical nonfatal cancer prevented.⁴

Science

Early on, the EPA’s own Science Advisory Board (SAB) expressed serious concern regarding the agency’s claims about radon:

- Back in 1993, EPA science adviser William Raub warned the agency that it was relying on “inconclusive epidemiological findings as to whether radon (either ingested or inhaled) actually presents an appreciable risk within the typical American household if none of the occupants smokes tobacco products.”⁵
- The agency, however, essentially ignored Raub’s admonition and issued a draft report on radon (which it ultimately adopted as the final report with few changes), sticking by its radon alarmism.
- The SAB criticized the EPA’s draft report findings noting: “There is no direct epidemiological or laboratory evidence of cancer being caused by ingestion of radon in drinking water ... it is not possible to exclude the possibility of zero risks for ingested radon.”⁶
- After reviewing the scientific literature, the chairman of the SAB review committee overseeing the EPA radon report, Roger McClellan, concluded that an MCL of 3,000 picocuries per liter—10 times less stringent than the proposed EPA standard—would prove sufficient to protect public health.⁷
- In 1998, the NRC issued the congressionally mandated risk assessment, which EPA and others hailed as a new definitive finding on radon. But the NRC assessment is not based on new information. The report uses the same data that raised questions in the past among the SAB members and others.⁸

2. National Research Council, *Risk Assessment of Radon in Drinking Water* (Washington, DC: National Academies Press, 1998), <http://www.nap.edu/openbook.php?isbn=0309062926>.

3. *Federal Register* 64, no. 211 (November 2, 1999): 59269. Figures represent 1997 dollars.

4. *Ibid.*

5. Richard Stone, “EPA Analysis of Radon in Water Is Hard to Swallow,” *Science* 261, no. 5128 (1993): 1514–16.

6. *Ibid.*

7. *Ibid.*

8. J. H. Lubin, J. J. Boice, C. Edling, R. W. Hornung, G. Howe, E. Kunz, R. A. Kusiak, H. I. Morrison, E. P. Radford, J. M. Samet, M. Tirmarche, A. Woodward, Y. S. Xiang, and

- The data show elevated cancer levels among miners who smoked heavily and were exposed to very high levels of radon as well as of nitrogen oxides and mineral dusts in mines. The relevance of these studies to low-level residential exposures is unknown.
- Neither the NRC nor the EPA has been able to establish that low-level radiation in homes causes cancer in nonsmokers or even in smokers. Accordingly, the NRC risk assessment indicates that the risks from ingestion could be zero, “depending on the validity of the linear non-threshold dose response hypothesis.”⁹
- Despite these very serious weaknesses in the data, the NRC claimed that radon in drinking water might cause as many as 180 deaths a year.¹⁰
- On the basis of the NRC estimates, the EPA claims that its 1999 proposal would save 62 lives.¹¹

The EPA and the 1998 NRC report ignore not only that radon may be safe under a given exposure level but also that low-level exposures might even be beneficial. Some studies indicate

that our bodies may create defense mechanisms against chemicals when we are exposed at low doses. So, rather than causing cancer, low-dose exposures may help us fight off cancer and other illnesses. According to a number of researchers:

- Studies have found instances in which people exposed to low levels of radiation actually experienced less incidence of leukemia than the general population, while highly exposed individuals experienced elevated rates of leukemia.¹²
- Some studies have found that increasing levels of low-level radon exposure are linked to decreasing cancer rates.¹³
- Nonetheless, even using its dubious science to exaggerate risks, the EPA’s proposed rule still promises more costs than benefits. (As already mentioned, the EPA estimates annual costs at \$407.6 million and benefits at \$362 million.)¹⁴

Having failed the cost-benefit test, the EPA justified its proposed rule on the basis of a provision of the SDWA that attempted to make the new law flexible and multimedia oriented.

D. A. Pierce, *Radon and Lung Cancer Risk: A Joint Analysis of 11 Underground Miners Studies*, NIH publication 94-3644 (Bethesda, MD: National Institutes of Health, 1994). See also NRC, *Health Risks of Radon and Other Deposited Alpha-Emitters (BEIR IV)* (Washington, DC: National Academies Press, 1988); NRC, *Health Effects of Exposures to Radon (BEIR VI)*, (Washington, DC: National Academies Press, 1999).

9. National Research Council, *Risk Assessment of Radon in Drinking Water*.

10. Ibid, the estimate includes 160 theoretical deaths from inhaling radon gas emitted from tap water, plus 20 theoretical bladder cancers resulting from ingestion of radon in water, 6.

11. *Federal Register* 64, no. 211 (November 2, 1999): 59269.

12. Jay Lehr, “Good News about Radon: The Linear Nonthreshold Model Is Wrong,” May 1996, <http://www.junkscience.com/news/lehr.html>. Dr. Lehr cites the following studies: T. D. Luckey, *Radiation Hormesis* (Boca Raton, FL: CRC Press, 1991); T. Sugahara, L. A. Sagan, and T. Aoyama, *Low Dose Irradiation and Biological Defense Mechanisms* (Amsterdam: *Excerpta Medica*, 1992); and E. J. Calabrese, *Biological Effects of Low-Level Exposures to Chemicals and Radiation* (Boca Raton, FL: CRC Lewis Publishers, 1994).

13. B. L. Cohen, “Test of the Linear–No Threshold Theory of Radiation Carcinogenesis for Inhaled Radon Decay Products,” *Health Physics* 68, no. 2 (1995): 157–74.

14. *Federal Register* 64, no. 211 (November 2, 1999): 59269.

This provision allows public water systems to meet a less stringent standard—the “alternative maximum contaminant level” (AMCL)—if the state, locality, or public water system sets up a multimedia mitigation program (MMM). States must gain EPA approval of an MMM by outlining measures that they will take to control radon in indoor air. If a state does not submit a plan, then localities and public water systems may propose plans to the EPA. Accordingly, in 1999, the EPA proposed a radon rule that includes an MCL of 300 picocuries per liter, an AMCL of 4,000 picocuries per liter, and a set of requirements for MMMs. The EPA estimated that if states chose the MMM route, the regulation would cost only \$80 million.¹⁵

However, rather than being more flexible, this provision gives the EPA an excuse to enter an entirely new area of government regulation: control over levels of radon in indoor air. In fact, the language in the EPA’s rule indicates that the agency set the MCL high to promote MMMs, not because the MCL was necessary to protect public health. The agency explained that it needed the higher MCL because “the equal or greater reduction required to be achieved through the AMCL/MMM option would be diminished as the MCL approaches the AMCL of 4,000 [picocuries per liter] and that fewer states and [community water systems] would select this option. Further, the AMCL/MMM would be eliminated entirely if the MCL were set at the AMCL.”¹⁶ In other words, the EPA

was setting a needlessly high standard so that it could regulate indoor air quality.

Moreover, this approach may not be any less expensive. In fact, attempts to control indoor radon in the past have been expensive and have produced mixed results. Poorly designed or installed mitigation technology can increase radon levels, and successful technology has cost thousands of dollars per home. In addition, state-led programs implemented during the 1980s have proved costly. A New Jersey program during the 1980s proved disastrous, permanently displacing residents from their homes after the government removed soil from under the houses. The New Jersey government then spent years and millions of dollars trying to dispose of the soil as political debates raged over disposal sites.¹⁷

Key Expert

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Recommended Readings

- Cole, Leonard A. 1993. *Element of Risk: The Politics of Radon*. New York: Oxford University Press.
- Stone, Richard. 1993. “EPA Analysis of Radon in Water Is Hard to Swallow.” *Science* 261, no. 5128: 1514–16.

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15. Ibid.

16. Ibid., 59270.

17. For more information on disastrous radon policies, see Leonard A. Cole, *Element of Risk: The Politics of Radon* (New York: Oxford University Press, 1993).