



## RADIATION STANDARDS

# GAO report explores low-dose science and policy

**T**HE GENERAL ACCOUNTING Office released a report on July 14—“Radiation Standards: Scientific Basis Inconclusive, and EPA and NRC Disagreement Continues” (GAO/RCED-00-152)—an update to a 1994 report on the same subject.

The report, dated June 2000, provided one of many perspectives on an increasingly divisive issue, but offered no dramatic new conclusions. It did, however, explain the roles of the Environmental Protection Agency and the Nuclear Regulatory Commission in the low-dose health effects debate, and should increase congressional awareness of the issue. It focused mainly on differences in radiation standards for the proposed Yucca Mountain, Nev., spent fuel/high-level waste repository and for nuclear cleanup and decommissioning sites, because they are prominent current examples of the debate about the standards.

The Environmental Protection Agency’s and the Nuclear Regulatory Commission’s “[r]egulating at these [exposure] levels, well below the range where radiation effects have been conclusively verified, is essentially a policy judgment,” the GAO report declared. The EPA and the NRC have a history of disagreement over radiation protection standards, with the EPA’s generally being more restrictive than the NRC’s. Even so, all of the numbers being discussed are well below levels at which deleterious effects have been determined.

Senator Pete Domenici (R., N.M.) requested the report in July of last year, because of concerns that the costs of upholding the unproven linear no-threshold (LNT) hypothesis were too burdensome (NN, Sept. 1999, p. 47). Domenici asked that the GAO report address these questions in particular:

■ How have radiation standards changed since 1994? Is a consensus being approached, and what has resulted from the recommendations in that report?

■ What were the bases for setting the radiation protection limits, and how is the linear no-threshold hypothesis used in setting these limits?

■ If differences exist between agencies’ standards, what is the impact of these differences?

■ Provide, from available data, information on the variance in background radiation between locations in the United States and around the world. Are differences in cancer

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MAJOR U.S. RADIATION STANDARDS

Standard/agency	Numerical limit
<b>General standards</b>	
General public/NRC (10 C.F.R. 20)	100 millirem/year
<b>Source-specific standards</b>	
Uranium mill tailings/EPA, NRC (40 C.F.R. 192; 10 C.F.R. 40, App. A)	Radium 226, 228: 5 picocuries/gram surface, 15 picocuries/gram subsurface Radon 222: 20 picocuries/square-meter second <sup>a</sup>
High-level waste operations/NRC (10 C.F.R. 60)	100 millirem/year
Spent fuel, high-level waste, transuranic waste disposal/EPA (10 C.F.R. 191)	All pathway: 15 millirem/year Groundwater 4 millirem/year <sup>b</sup>
Yucca Mountain high-level waste (proposed)/EPA (64 Fed. Reg. 46976)	All pathway: 15 millirem/year Groundwater 4 millirem/year <sup>b</sup>
Yucca Mountain high-level waste (proposed)/NRC (64 Fed. Reg. 8640)	25 millirem/year all pathway
Low-level waste/NRC (10 C.F.R. 61)	25 millirem/year
Drinking water/EPA (40 C.F.R. 141)	Radium: 5 picocuries/liter Gross alpha: 5 picocuries/liter Beta/photon: 4 millirem/year <sup>b</sup>
Uranium fuel cycle/EPA (40 C.F.R. 190)	25 millirem/year
Superfund cleanup/EPA (40 C.F.R. 300)	Risk range goals: 1 in 10 000 to 1 in 1 million <sup>c</sup>
Decommissioning/NRC (10 C.F.R. 20)	25 millirem/year
<b>Occupational standards</b>	
Occupational Safety and Health Administration, NRC, DOE (29 C.F.R. 1910; 10 C.F.R. 20; 10 C.F.R. 835)	5000 millirem/year

<sup>a</sup> A picocurie is a trillionth of a curie, which is a commonly used unit of measurement of the activity of radiation.

<sup>b</sup> Radioactivity from human-made radionuclides in community drinking water systems.

<sup>c</sup> Lifetime risk of an individual’s getting cancer.

rates between these locations related to differences in background radiation levels?

■ What are the costs of complying with current radiation protection regulations, and how, if at all, would these costs be affected if radiation standards were substantially relaxed?

According to a letter from Jim Wells, GAO director of Energy, Resources, and Sciences Issues, that summarizes the report, the GAO

believes that “Although conclusive scientific evidence of the effects of low-level radiation is lacking and may not soon be found, U.S. regulators still have the challenge of developing radiation standards that represent their best estimates of acceptable radiation risks to the public.”

The GAO noted that it had recommended “as far back as 1994” that the EPA and the

NRC “take the lead in pursuing an interagency consensus on acceptable radiation risks to the public,” and cites the Yucca Mountain facility and the cleanup and decommissioning of nuclear facilities as the two major regulatory applications where the two agencies disagree.

On one important issue in particular, that of groundwater radiation standards for Yucca Mountain, the GAO stated, “it does not appear that EPA and NRC will readily agree. . . . Given the agencies’ historical differences and lack of recent progress, without congressional intervention, they may not resolve their differences.”

As the law now stands, the EPA has the authority to establish the standards for Yucca Mountain, and although the National Academy of Sciences has criticized the EPA’s separate groundwater standard as technically unsupported, the EPA believes it is technically justified. In situations where both the EPA and the NRC may have jurisdiction, such as site cleanup and decommissioning, “the two agencies’ different regulatory approaches have sometimes raised questions of inefficient, conflicting, dual regulation,” noted the GAO report.

The GAO researchers who put together the report acknowledge the fundamental difficulty of assessing and regulating low-dose radiation. While the GAO does not want to enter the argument, its report did observe that the NRC’s approach to groundwater protection in standards submitted for the proposed waste repository at Yucca Mountain “conforms to internationally recommended radiation protection guidance.” The NRC’s standards propose a 25-mrem per year standard for all pathways.

On the other hand, “EPA’s groundwater approach has been criticized as technically unsupported by the National Academy of Sciences, which the Congress mandated to recommend standards for the repository.” The EPA has set a 15-mrem per year standard for exposure from all pathways, with a separate 4-mrem per year standard for drinking water.

All of these numbers are well below “regulated public exposure levels—levels of 100 mrem a year and below from human-generated sources,” according to the report.

The costs of implementing more restrictive standards were acknowledged and addressed

briefly in the report. A 1995 DOE analysis, for example, set the cost of cleaning up part of the Nevada Test Site to a 100-mrem per year level at \$35 million. That cost would triple to reach a 25-mrem per year level, it would be six times higher to reach a 15-mrem per year level, and it would be more than 28 times the base cost of \$35 million to achieve a 5-mrem per year level.

The GAO report urged Congress to consider legislation to reconcile the EPA and NRC differences on Yucca Mountain groundwater standards, and also to clarify the two agencies’ regulatory responsibilities in general. The GAO recommended in its 1994 report that the EPA and NRC create a memorandum of understanding on their separate duties, but has seen little progress up to this point.

The report was provided to the NRC, the Department of Energy, and the EPA in draft form. The GAO reports that while the “NRC found the report to be fundamentally sound, and DOE found it to be factual and balanced,” the “EPA disagreed with the report’s conclusions. . . .” The report is available on the GAO Web site at <[www.gao.gov](http://www.gao.gov)>. ■