



Congress Watch • Critical Mass • Global Trade Watch • Health Research Group • Litigation Group  
Joan Claybrook, President

November 21, 2005

EPA Docket Center  
Air and Radiation Docket  
Environmental Protection Agency  
1200 Pennsylvania Ave, NW  
Washington, DC 20460

**Attn: Docket ID No. OAR-2005-0083**

To Whom It May Concern:

Enclosed you will find Public Citizen's comments on EPA's Proposed Rule for Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada, as published in the August 22, 2005 issue of the Federal Register (Docket ID No. OAR-2005-0083).

Public Citizen is a consumer advocacy organization with more than 150,000 members nationwide. We were a member of the coalition of nongovernmental organizations that successfully challenged EPA's first standards for the proposed Yucca Mountain repository. As per our attached comments, we request that EPA withdraw this draft rule and reissue a draft rule that is scientifically, legally, and morally sound.

Please enter these comments into the official record on this proceeding.

Sincerely,

Michele Boyd  
Legislative Director, Energy Program

## Overview

On July 9, 2004, the DC Circuit Court of Appeals ruled that the Environmental Protection Agency (EPA) illegally set a 10,000-year compliance period for radiation protection standards at the proposed high-level radioactive waste dump at Yucca Mountain, Nevada. The EPA's 10,000-year compliance period, and the Nuclear Regulatory Commission licensing rule that implemented it, were voided.

Congress mandated in the 1992 Energy Policy Act that EPA set public health and safety standards for allowable radiation exposure from Yucca Mountain "based upon and consistent with" the findings and recommendations of a National Academy of Sciences (NAS) study directed to identify the scientific bases for such standards at Yucca Mountain. The NAS study, which was issued in 1995, recommended "that compliance with the standard be measured at the time of peak risk, whenever it occurs," and found "no scientific basis for limiting the time period of the individual-risk standard to 10,000 years, or any other value." Yet, EPA "unabashedly rejected NAS's findings, and then went on to promulgate a dramatically different standard, one that the Academy had expressly rejected," according to the Court ruling.

Unfortunately, EPA's second attempt at drafting radiation standards is yet another example of setting regulations to guarantee that the site will get licensed, rather than setting health-based regulations that the site must meet. EPA's proposed standards do not protect public health, do not comply with federal law, and ignore the scientific consensus of the health effects of radiation.

## EPA's Proposed Rule Is Completely Inadequate

### ❖ EPA is proposing the least protective radiation standard in the world.

No other U.S. or international radiation protection standard permits a dose of 350 millirems per year to individuals. Most other countries that are investigating sites for a geologic repository have proposed or established an unvarying radiation standard of 10 millirems per year. Swiss regulations explicitly set no "expiration date" on protecting future generations.

EPA itself has for decades declared any radiation dose above 15 to 25 millirems per year to be inadequate to protect public health. It has repeatedly gone on record that doses of 100 millirems per year produce unacceptable levels of risk. In its final rule for the first Yucca radiation standard, EPA wrote in its response to a comment proposing a 70 millirems-per-year standard:

The risk level associated with 70 millirems (about  $4 \times 10^{-5}$ ) is about five times as high as the risk level associated with the individual-protection limit. This is well above the NAS-recommended level *and unprecedented* in the current regulations of this and other nations for this activity.<sup>1</sup> [Emphasis added]

---

<sup>1</sup> "Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada (40 CFR Part 197) - Final Rule, Response to Comments Document," pages 79 and 80 (Section 4, page 4 and 5)

EPA regulates radioactivity in water at 4 millirems per year, air emissions at 10 millirems per year, and toxic waste site cleanup (under Superfund) at the equivalent of about 0.03 to 3 millirems per year. The EPA's proposed rule also exceeds:

- the maximum acceptable radiation exposure from man-made sources in all industrialized countries by a factor of 3.5 to 10.5;
- the National Academy of Sciences' recommended acceptable range of radiation exposure, which is 2 to 20 millirems per year;
- the U.S. Nuclear Regulatory Commission's radiation health standard for low-level radioactive waste disposal sites, which is 25 millirem per year;
- the U.S. Nuclear Regulatory Commission's radiation health standard for the Private Fuel Storage interim storage site, which is 25 millirem per year; and
- the maximum proposed cleanup standard for DOE sites by a factor of 3.5 to 10.5.

❖ **EPA inappropriately claims that the level of radiation is satisfactory as long as it does not exceed the highest levels of background radiation in the highest radiation-prone states. Moreover, EPA inflates those levels by improperly including radon exposure as part of natural background radiation.**

No U.S. or international regulations use background radiation to set public health standards for radiation exposure. According to the National Academy of Science, any amount of radiation will increase an individual's risk for getting cancer.<sup>2</sup> In fact, about 3 percent of American public will get a cancer from background radiation, which is equivalent to almost 9 million people of the current U.S. population. Of the fatal cancers in the U.S., approximately 7% are attributable to exposure to background radiation.<sup>3</sup>

EPA incorrectly argues that a radiation standard of 350 millirems per year, in addition to the presumed background radiation level in Amargosa Valley near Yucca Mountain (350 millirems per year), is protective of the public, because the total (700 millirems per year) is equal to an inflated estimate of the current average background radiation in Denver, Colorado.

This is not a sound basis for EPA's standard, because not only is background radiation not a safe level of exposure, but background levels of radiation across the U.S. are highly variable, with Colorado being significantly above the average. EPA also improperly includes indoor radon exposure as part of its estimates of natural background radiation. Radon is normally never included as part of background dose, because indoor radon exposure is a man-made public health risk. EPA itself has classified radon as a known human carcinogen. Also according to the EPA, radon exposure is the second leading cause of lung cancer in the U.S.<sup>4</sup> When high levels of radon are detected in buildings, renovations are usually made to reduce radon that goes into the

---

<sup>2</sup> *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2*, Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, Board on Radiation Effects Research, National Academy of Sciences, 2005, <http://www.nap.edu/openbook/030909156X/html/>.

<sup>3</sup> Calculation is based on NAS risk figures in the table on page 28 of the BEIR VII report using EPA's background radiation figure of 350 millirems per year.

<sup>4</sup> EPA, *Health Risks: Exposure to Radon Causes Lung Cancer In Non-smokers and Smokers Alike*, <http://www.epa.gov/iaq/radon/healthrisks.html>.

building. The EPA has found that radon comprises about 87% of the background radiation in Denver.<sup>5</sup>

❖ **EPA’s proposed rule is unethical, because it would expose future generations to much higher levels of radiation than current generations.**

Intergenerational equity—the principle that the health of future generations should be as protected as current generations—has been the foundation of U.S. and international public health and safety laws. Yet, in its draft rule, EPA throws this fundamental principle out by applying a standard that is more than 23 times weaker for hundreds of future generations.

The Court declared that the original 15 millirems per year standard was artificially cut off at 10,000 years, and required EPA to come out with a rule that would extend though the time when the radiation dose to the public would be highest (called “peak dose”) as recommended by the NAS. EPA claims that “rising uncertainties justify adopting a different (higher) dose level” after 10,000 years. But in its study, NAS concluded that the uncertainty for one million years is manageable because of the known geologic processes affecting the site, clearly contradicting EPA’s statements. Thus, EPA’s reasoning for increasing the dose after 10,000 years is not substantiated. EPA is proposing to allow an action that will kill people for hundreds of thousands of years—people who had no say in the decision nor received any benefit from it.

It has long been resolved—both in the United States and internationally—that it is unethical to expose future generations to much higher levels of radiation than current generations. EPA stated as much in its Final Rule for its first radiation standard for Yucca Mountain:

A guiding philosophy in radioactive waste management, as well as waste disposal in general, has been to avoid imposing burdens on future generations for cleanup efforts as a result of disposal approaches that would knowingly result in pollution in the future. With respect to radioactive waste disposal, we believe the fundamental principle of intergenerational equity is important. We should not knowingly impose burdens on future generations that we ourselves are not willing to assume.<sup>6</sup>

Yet, EPA’s proposed rule blatantly tramples on the principle of intergenerational equity. According to science ethicist Dr. Kristin Shrader-Frechette in her recent article in *Science and Engineering Ethics*, “E.P.A.’s double radiation standards for different generations...suggest that we merit more protection than our descendants. Yet we, not they, profit from nuclear power plants that produce the radioactive waste.”<sup>7</sup>

❖ **EPA incorrectly uses the median dose to set its standard, which ignores cases of very high dose, rather than the mean (or average) dose. The result is that EPA’s proposed radiation standard would allow 1 cancer in every 10 people exposed.**

---

<sup>5</sup> “Assessment of Variations in Radiation Exposure in the United States,” Contract Number EP-D-05-002 Work Assignment No. 1-03, Prepared for: U.S. Environmental Protection Agency, July 15, 2005, Table 1, page 4.

<sup>6</sup> *Ibid.*, page 35 of pdf.

<sup>7</sup> Kristin Shrader-Frechette, “Mortgaging the Future: Dumping Ethics with Nuclear Waste,” *Science and Engineering Ethics*, November 2005.

In its draft rule, EPA determines exposures based on the projected median exposure instead of the projected mean exposure. Scientists around the world have rejected this approach for decades, as the projected median exposure does not take into account the higher of the possible doses, and thus artificially lowers the average. EPA itself has always used the projected mean exposure for its work in the past. According to DOE's Total System Performance Assessment for Site Recommendation, at the time of peak dose (after the waste packages corrode and fail), the mean dose of the many computer simulations is about 600 millirems per year, while the median dose is about 200 millirems per year. The repository could not meet a standard that required the mean to be less than 350 millirems per year, but would meet the standard if the median were used instead of the mean.

EPA's general position for decades has been to regulate exposures to keep the risk to the public at one cancer in one million people. In some circumstances, EPA has allowed workers to be exposed to a higher risk of cancer – one in one thousand. According to a recent National Academy of Sciences report on radiation health risks, 350 millirems per year over one's lifetime will cause cancer in approximately one out of every 36 people exposed—a risk 3 to 5 orders of magnitude greater than the range that EPA has always used before.

DOE calculations show that the mean exposure at the site would be more than 3 times the median exposure. Therefore, under EPA's 350 millirem per year standard, *some people will actually receive about 1,000 millirems per year, producing a cancer in 1 in every 10 people.* Because this is not a maximum, but rather an average dose, more people would get doses far higher, resulting in proportionately higher risks. Under the EPA's rule, there is no upper limit of dose for the half of the exposures that would be above the median. In other words, under the EPA standards, significant numbers of people could legally be exposed to doses that would produce a statistical 100% chance of inducing a cancer in the exposed individuals.

❖ **EPA inappropriately abandons its groundwater protection standard after 10,000 years. Despite its claims to the contrary, EPA must consider public comments on this issue.**

The EPA has concluded that groundwater is the most likely pathway to lead to human exposure to radiation from the Yucca Mountain. The groundwater under Yucca Mountain provides drinking and irrigation water to Amargosa Valley, an organic farming community, and Southern California.

When the Nuclear Energy Institute challenged EPA's authority to set separate groundwater standards as supplement to the individual-protection standard, the court upheld EPA's right, agreeing that "EPA has offered an entirely rational reason for protecting water resources while they remain underground: *Preventing* ground water contamination is more cost-effective and environmentally protective, and applying [drinking water] standards will encourage a robust containment and isolation design."<sup>8</sup> EPA itself wrote in its Final Rule for its first radiation standard:

---

<sup>8</sup> Nuclear Energy Institute, Inc. v. Environmental Protection Agency, United States Court of Appeals for the District of Columbia Circuit, Decided July 9, 2004, page 50.

We believe that there is no question that separate ground water protection standards are appropriate for deep geologic disposal facilities. We believe that the use of contaminated ground water for purposes that could result in exposures to individuals should be of concern, and that avoiding contaminating useable ground water resources is in the general interest of the public at large.<sup>9</sup>

Yet, in this draft rule, the EPA proposes to discard the groundwater standard after the first 10,000 years—when the groundwater will become increasingly contaminated, according to DOE’s models. The EPA claims that the public will be protected after 10,000 years by extending the concept of individual dose standard, but this standard is more than 23 times higher than the first 10,000 years.

Moreover, the EPA has declared that it will not consider public comment on this vital aspect of the proposed regulation, despite the fact that this decision is integral to the overall radiation standard. Simply because the court decision allows EPA to set groundwater standards does not mean that the agency is exempt from considering public comment on its decision to not extend the groundwater standard to 1 million years. The groundwater standard is integral to the protectiveness of the overall radiation standard. EPA should extend the groundwater standard to 1 million years and must take into consideration all public comments on this issue.

**❖ In its climate and water models for evaluating radionuclide movement through the site, EPA wrongly assumes that in the long-term conditions will be, on average, nearly the same during the next 1 million years as they are currently.**

EPA proposes that “The nature and degree of climate change [from 10,000 years to 1 million years] may be represented by constant climate conditions.” [40 CFR Part 197.36(c)(2)]. It also directs NRC to specify values to be used to represent climate change, such as temperature, precipitation, or infiltration rate of water.

Studies of past climate provide no support for this simplistic assumption, but do suggest, as does the NAS, that future climate parameters and climate changes can be bounded within limits and analyzed in a performance assessment. For reasons described below, a range of possible climate states, rather than constant climate conditions assumed for the next 1 million years should be required to be incorporated in the performance assessment.

Climate and water models are important for determining how much water will be seeping through the site in the future. More water means faster corrosion of the metal containers, faster movement of radionuclides through the soil to the groundwater below the mountain, a higher concentration of radionuclides in the groundwater, and thus higher doses to individuals that drink the water. In addition to underestimating the possible increase in precipitation, EPA claims that exposures to contaminated groundwater would be less likely if the area were to become wetter in the future, because surface water would become more available and reduce use of the groundwater (even if the groundwater is more contaminated as a result of increased precipitation and water infiltration into the repository). Yet, EPA concedes that a wetter climate means that

---

<sup>9</sup> 40 CFR Part 197, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV Final Rule - Federal Register / Vol. 66, No. 114 / Wednesday, June 13, 2001, page 36 of pdf.

more people are likely to live closer to the site and, thereby, use groundwater closer to the site. This alone increases the risk posed, and must be taken into account.

❖ **EPA cannot refuse to consider public comments on key aspects of its draft rule.**

In its draft rule, EPA discusses, then dismisses, many aspects directly related to the rule as “outside the scope of the proposal” and states that it will only “consider or respond to comments” on a very limited number of issues. Given that the EPA is now claiming to have extended protection to people for one million years, the EPA cannot refuse to accept and consider comments on key aspects of the regulation, including:

- EPA’s decision not to extend the groundwater standard beyond 10,000 years, despite the fact that this is integral to the overall radiation standard.
- EPA’s decision not to re-evaluate the boundary of the controlled area, despite the fact that the groundwater would be allowed to become 23 times more contaminated after 10,000 years and the possibility that people will move closer to the site under wetter climate conditions in the future.
- EPA’s decision to not reconsider its definition of the Reasonably Maximally Exposed Individual as a “rural-residential” individual, rather than the more conservative analysis that this person would be a “subsistence farmer” who raises his/her own food and drinks water near the site.

❖ **The EPA’s proposed standards are not simply about people living in Nevada now and in the future: lowering the bar on public health standards sets a precedent for other sites and regulations around the country.**

The draft rule, if made final, would set a precedent that could be applied to other sites around the country, such as a second high-level waste repository, decommissioned nuclear sites, and Superfund sites.

## **Conclusion**

The Energy Policy Act of 1992 requires EPA to set “public health and safety standards for protection of the public from releases from radioactive materials...at the Yucca Mountain site.” This draft rule utterly and completely fails in that scientific, legal, and moral duty. Therefore, EPA should withdraw these proposed standards and reissue a draft rule that will meet this requirement.