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## Mortgaging the Future: Dumping Ethics with Nuclear Waste

**Kristin Shrader-Frechette**

University of Notre Dame, Indiana, USA

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**ABSTRACT:** *On August 22, 2005 the U.S. Environmental Protection Agency issued proposed new regulations for radiation releases from the planned permanent U.S. nuclear-waste repository in Yucca Mountain, Nevada. The goal of the new standards is to provide public-health protection for the next million years – even though everyone admits that the radioactive wastes will leak. Regulations now guarantee individual and equal protection against all radiation exposures above the legal limit. Instead E.P.A. recommended different radiation exposure-limits for different time periods. It also recommended using only the arithmetic mean of the dose distribution, to assess regulatory compliance during one time period, but using only the median dose to assess compliance during another period. This piece argues that these two changes – in exposure-limits and in methods of assessing regulatory compliance – have at least four disturbing consequences. The changes would threaten equal protection, ignore the needs of the most vulnerable, allow many fatal exposures, and sanction scientifically flawed dose calculations.*

On August 22, 2005 the U.S. Environmental Protection Agency (E.P.A.) issued its long awaited regulations for radiation releases from the proposed U.S. nuclear-waste repository in Yucca Mountain, Nevada.<sup>1</sup> E.P.A. recommended a dramatic reversal of international and U.S. health standards. Current regulations guarantee individual and equal protection against all radiation exposures above the legal limit. The proposed regulations remove these guarantees for Yucca Mountain. Instead E.P.A. recommends changes both in the exposure-limits and in how they are measured and enforced.

Because radioactive leaks will increase over time, E.P.A. proposes one radiation exposure-limit for the near future (the next 10,000 years) and another limit – 2300

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**Address for correspondence:** Kristin Shrader-Frechette, O'Neill Family Professor, Department of Philosophy and Department of Biological Sciences, 100 Malloy Hall, University of Notre Dame, Notre Dame, IN 46556, USA; email: Kristin.Shrader-Frechette@nd.edu.

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percent higher – for the distant future (the period beyond 10,000 years). For the near future, this annual standard is 15 millirems. For the distant future, it is 350 millirems. To assess compliance with these limits, E.P.A. proposes using the arithmetic mean of the dose distribution during the near future, and using the median dose during the distant future.

By setting different exposure limits for different time periods, E.P.A.'s first proposal fails to give all citizens equal protection. The agency defends this double radiation standard by saying that even the more lenient exposure-limit allows a dose only slightly higher than what is already received from natural-background radiation.<sup>2</sup>

How dangerous a dose is that? According to the United Nations Scientific Committee on Effects of Ionizing Radiation (U.N.S.C.E.A.R.), the International Atomic Energy Agency (I.A.E.A.), and other scientific groups, natural-background radiation causes about 3 percent of fatal cancers – roughly 18,000 annual U.S. deaths.<sup>3</sup> As the U.S. National Academy of Sciences reaffirmed in June, no dose of ionizing radiation is completely safe, no matter how small or how natural.<sup>4</sup>

What would happen if all polluters followed E.P.A.'s reasoning about natural-background radiation? They could save money by avoiding pollution control. They could increase profits at the expense of the public but claim that victims' health risks were acceptable merely because they were no worse than what some natural event had caused. Neither fairness, polluter responsibility, compensating victims, nor obtaining their consent would be relevant.

E.P.A.'s double radiation standards for different generations also suggest that we merit more protection than our descendants. Yet we, not they, profit from nuclear power plants that produce the radioactive waste.

What about E.P.A.'s second proposal, to use mean dose to assess near-future compliance with regulations, and to use median dose to assess distant-future compliance? Neither mean nor median exposure-limits protect against fatal doses at the tail of the distribution. Neither protects the medically vulnerable 25 percent of the population – including children, pregnant women, and those with allergies.

To see what could happen when one uses mean-exposure standards for assessing regulatory compliance, suppose that in the near future 715 residents of a small town received radiation doses from Yucca Mountain. If a baby received a fatal dose of 10,000 millirems but all other residents each received 1 millirem, the mean dose would be under 15 millirems. Although such dose distributions might be unlikely, nevertheless this situation would be allowed by the mean-exposure standard. That is one reason all nations require keeping individual radiation exposures “as low as reasonably achievable” (ALARA). All nations rely on individual dose limits and keeping individual doses ALARA, not just keeping mean exposures ALARA.<sup>5</sup>

Imagine the consequences if all regulatory compliance were based only on mean or average protection. Even serious harms caused by negligence or unfairness could be sanctioned if the rate of harm were below the mean. For instance, if a city's murder rate were below the U.S. mean – 7 deaths per 100,000 – police might say protection was adequate and stop pursuing suspects.<sup>6</sup>

Even mean radiation exposure from Yucca Mountain would be high in the distant future. Because E.P.A. recognizes this, it recommends assessing distant-future regulatory compliance by using median, not mean, exposure-limits. By definition, median limits would allow nearly half of exposures to exceed any standard. Consider what could happen if E.P.A.'s 350-millirems median standard were applied to the earlier town of 715 people. If doses were ranked lowest to highest, the middle or median dose would be received by person 358. Provided her dose were below 350 millirems, this median standard could legally allow 357 people to receive fatal doses. Whether or not such an exposure distribution actually would occur, the case illustrates that any median standard provides only minimal protection because nearly half of the exposures could exceed it.

Apart from these two policy reversals, E.P.A.'s proposals rely on poor science, as the 2001 peer review by the International Atomic Energy Agency warned. The I.A.E.A. said the government's own Yucca Mountain studies show its projected radiation doses have uncertainties between 8 and 12 orders of magnitude.<sup>7</sup> This means projected Yucca radiation exposures to the public could be a trillion times too low or too high. Yet if doses were only 29 times higher than the distant-future limit, they could immediately kill human embryos. Doses only 750 times higher could immediately kill half the adults exposed.<sup>8</sup>

Whether or not people agree with E.P.A.'s changing radiation-exposure limits and regulatory-compliance standards, people likely agree that pollution regulations should protect everyone individually and equally. These new regulations do not appear to do so. They mortgage the lives of people in the distant future.

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