Equity and Nuclear Waste Disposal

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Abstract  Following the recommendations of the US National Academy of Sciences and the mandates of the 1987 Nuclear Waste Policy Amendments Act, the US Department of Energy has proposed Yucca Mountain, Nevada as the site of the world's first permanent repository for high-level nuclear waste. The main justification for permanent disposal (as opposed to above-ground storage) is that it guarantees safety by means of waste isolation. This essay argues, however, that considerations of equity (safer for whom?) undercut the safety rationale. The article surveys some prima facie arguments for equity in the distribution of radwaste risks and then evaluates four objections that are based, respectively, on practicality, compensation for risks, scepticism about duties to future generations, and the uranium criterion. The conclusion is that, at least under existing regulations and policies, permanent waste disposal is highly questionable, in part, because it fails to distribute risk equitably or to compensate, in full, for this inequity.

Keywords: compensation, equity, future generations, nuclear waste, policy, risk, Yucca Mountain.

Introduction

Nuclear proponent Alvin Weinberg (1972) described the problem of radioactive wastes as a “Faustian bargain.” In return for the present benefits of atomic energy, we must export the risks of nuclear waste to future generations —risks that the waste will leach out, contaminate water and soil, and threaten not only our agriculture and economy but also present and future health and security (1972: 27–34). Because we have already made the Faustian bargain, we cannot turn back; we cannot avoid dealing with radioactive waste already generated. The US National Research Council of the US National Academy of Sciences
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(NAS) affirmed in 1990 that:

There is a strong worldwide consensus that the best, safest long-term option for dealing with HLW [high-level radwaste] is geological isolation. (Parker, 1990: 2)

In order to evaluate this NAS strategy, it is important, at least, (1) to assess the ethical desirability of permanent geological disposal and (2) to assess the comparative ethical desirability of monitored, retrievable storage – the most important alternative to permanent disposal. In this essay, we shall accomplish (1). Task (2) will be accomplished elsewhere (Shrader-Frechette, 1993). We shall argue here that because permanent disposal is not safe, it is also questionable on grounds of equity.

Prima Facie Arguments for Equity

Permanent disposal of high-level radioactive wastes at Yucca Mountain is questionable on grounds of equity, in part, because the quantitative risk assessments (QRAs) used in site evaluation rely on a number of controversial policy assumptions. One such assumption is that virtually all worst-case accidents on-site are “not credible.” Assessor postulate that no radioactive-waste accidents, for example, could result in violation of the radiation-dose limits set by the NRC, and that fracture flow of groundwater and volcanic activity are not credible at Yucca Mountain. They argue that they need not take such events into account, even though both could rapidly increase the transport time of radioactive leachate (Jackson et al., 1985: 477-487; Wilson and Dudley, 1986; Sinnock and Lin, 1984: 16; Loux, 1988: vol. 1, I-10, II-2, II-3). For example, Nuclear Regulatory Commission (NRC) officials note that a violation of regulations could occur at Yucca Mountain if fracture flow caused groundwater travel time, from the repository to the water table, of less than 1000 years (US Congress, 1987). Yet, although weapons tests have caused fracturing and earthquakes at the proposed Yucca Mountain site, the DOE has assumed that no worst-case radionuclide releases could occur because of these effects. Likewise, the DOE has assumed that the worst-case earthquake is one that might occur only once every 10,000 years, even though the site will be hazardous in perpetuity (Loux, 1988: vol. 1, I-7, II-1).

One apparent rationale for not considering such worst cases is that, in general, the DOE claims that events whose probability is less than $10^{-5}$ per year are not credible (Goble et al., 1988: 40). However, an event having an annual probability of $10^{-5}$ obviously has a quite high probability of occurring, $10^{-2}$ or 1 in 100, during the 1000 years that the Yucca Mountain radwaste would be most lethal. Given such high probabilities, it appears that the DOE assumes not only that present persons (the 1 in 100) have no right to be protected against worst-case accidents, but also that future generations may not have a right to be protected against even more likely catastrophes. Otherwise, DOE analyses